

## Electric Charge and Electric Field Assignment 1

Given below are few MCQs of chapter Electric Charge and Electric Field along with their answers. We'll also provide you the solution of these MCQs. So first try and solve these questions on your own and match your answers with the answers given below and then look for the solutions provided.

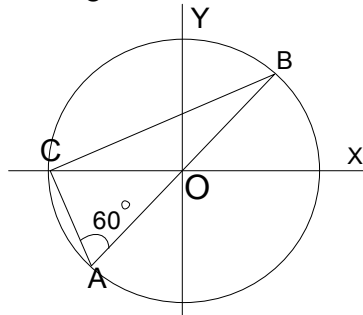
### Question 1

A charge of magnitude  $q$  is divided into two parts such that force between resulting two charges is maximum when separated through some distance  $r$ . The division of charges would be

- (a)  $3q/8, 5q/8$  (b)  $2q/4, 2q/4$   
 (c)  $q/2, q/2$  (d)  $3q/6, 3q/6$

### Question 2

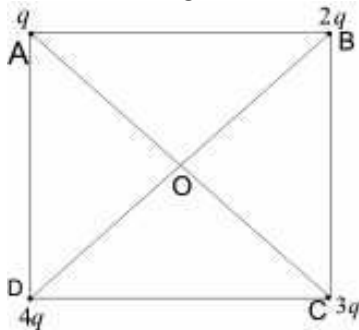
Consider a system of three charges  $q/3, q/3$  and  $-2q/3$  placed at points A, B and C respectively as shown in the figure. Take O to be the centre of the circle of radius  $R$  and angle  $CAB = 60^\circ$



- (a) The electric field at point O is  $q/8\pi\epsilon_0 R^2$  (b) The magnitude of the force between the charges at C and B is  $q^2/54\pi\epsilon_0 R^2$   
 (c) The potential energy of the system is zero (d) The potential at point O is  $q/12\pi\epsilon_0 R$

### Question 3

Four charges  $q, 2q, 3q, 4q$  are placed at corners A, B, C and D of a square as shown below in the figure. The field at centre O of square has the direction along



- (a) AB (b) CB  
 (c) AC (d) DB

**Question 4**

A point charge  $q$  is placed at geometrical centre of one of the face of a cube. The total flux through the cubical surface due to charge is

- (a)  $\frac{q}{\epsilon_0}$  (b)  $\frac{q}{2\epsilon_0}$   
 (c)  $\frac{q}{4\epsilon_0}$  (d) Zero

**Question 5**

Two large metal sheets having surface charge density  $+\sigma$  and  $-\sigma$  are kept parallel to each other at a small separation distance  $d$ . The electric field at any point in the region between the plates is

- (a)  $\sigma/\epsilon_0$  (b)  $\sigma/2\epsilon_0$   
 (c)  $2\sigma/\epsilon_0$  (d)  $\sigma/4\epsilon_0$

**Question 6**

A rod lies along the x-axis with one end at the origin and other at  $x \rightarrow \infty$  it carries a uniform charge  $\lambda$  C/m. Find the electric field at the point  $x=-a$  on the x-axis

- (a)  $-(\lambda/4\pi\epsilon_0 a)\mathbf{i}$  (b)  $-(\lambda/4\pi\epsilon_0 a^2)\mathbf{i}$   
 (c)  $(\lambda/4\pi\epsilon_0 a)\mathbf{i}$  (d)  $(\lambda/4\pi\epsilon_0 a^2)\mathbf{i}$

**Question 7**

Twelve charges of charge  $q$  are situated at the corners of the 12 sided polygon of side  $a$ . What is the net force on the charge  $Q$  at the centre

- (a) Zero (b)  $3qQ/\pi\epsilon_0 a^2$   
 (c)  $qQ/\pi\epsilon_0 a^2$  (d) None of the above

**Question 8**

Two positive point charge are placed at the distance  $a$  apart have sum  $Q$ . What values of the charges, coulomb force between them is maximum

- (a)  $q_1=q_2=Q/2$  (b)  $q_1=3Q/4, q_2=Q/4$   
 (c)  $q_1=5Q/6, q_2=Q/6$  (d) Non of the above

**Question 9**

A metallic shell having inner radius  $R_1$  and outer radii  $R_2$  has a point charge  $Q$  kept inside the cavity. Electric field in the region  $R_1 < r < R_2$  where  $r$  is the distance from the center is given by

- (a) depends on the value of  $r$  (b) zero  
 (c) Constant and nonzero everywhere (d) None of the above

**Question 10**

Consider two statements

A)The force with which two charges interact is not changed by the presence of the other charges

B)Electric force experienced by the charge particle due to number of fixed point charges is vector resultant of the forces experience due to individual charges

- (a) A and B both are correct  
 (b) A is correct only  
 (c) B is correct only  
 (d) A and B both are wrong

**Question 11**

A metallic solid sphere of radius R is given the charge Q. Which of the following statement is true then

- (a) Electric field at points  $0 < r < R$  is zero  
 (b) Charge Q is on the outer surface of the sphere  
 (c) Electric field at  $r > R$  is given by  $Q/4\pi\epsilon_0 r^2$   
 (d) Electric field is perpendicular to the surface of the sphere

**Question 12**

A simple pendulum consists of a small sphere of mass and positive charge q is suspended by the string of length L. The pendulum is placed in the electric field of strength E directed vertically downwards. Which of the following is true

- (a) Time period of oscillation =  $T = 2\pi\sqrt{L/(g + qE/m)}$   
 (b) Time period of oscillation =  $T = 2\pi\sqrt{L/(g - qE/m)}$   
 (c) Tension in the string when the pendulum is at rest =  $mq + qE$   
 (d) Tension in the string when the pendulum is at rest =  $mq - qE$

**Question 13**

A rod lies on the x-axis with end and at  $x = -L$  and other end at  $x = L$  with uniform charge  $\lambda$  C/m. Which of the following is true

- (a) Electric field at any point (0, y) on the y-axis is given by  

$$\mathbf{E} = (2k\lambda L / y\sqrt{y^2 + L^2})\mathbf{j}$$
  
 (b) For point on the Y-axis greater than  $y \gg L$   

$$\mathbf{E} = (2k\lambda L / y^2)\mathbf{j}$$
  
 (c) Electric field if  $L \rightarrow \infty$   

$$\mathbf{E} = 2k\lambda / y$$
  
 (d) None of the above

**Question 14**

A particle of mass m and charge q is thrown horizontally with a velocity v from top of the building of height H. An electric field exists in the plane and it is horizontally away from the building

which of the following is true

- (a) Range of the particle is greater than  $v\sqrt{2H/g}$   
 (b) Time of flight is  $\sqrt{2H/g}$   
 (c) Path is parabolic  
 (d) None of the above

**Question 15**

At a point on the axis of an electric dipole

- (a) Electric field is zero  
 (b) Electric potential is zero  
 (c) Neither electric field nor electric potential is zero  
 (d) Electric field is directed perpendicular to axis

## Answers

1. (c)
2. (b)
3. (b)
4. (b)
5. (a)
6. (a)
7. (a)
8. (a)
9. (b)
10. (a)
11. (a),(b),(c),(d)
12. (a),(c)
13. (a),(b),(c)
14. (a),(b)
15. (c)