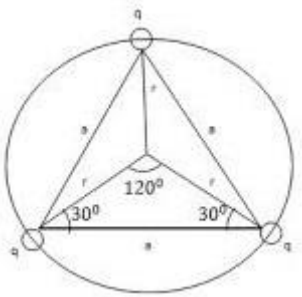
NIOS/Acad./2021/312/16/E

National Institute of Open Schooling
Senior Secondary
Lesson 16– Electric Potential and Capacitors
WORKSHEET – 16

Q1. Three small spheres each carrying a charge q are placed on the circumference of a circle of radius r to form an equilateral triangle.Find the electric field and potential at the centre of the circle.



Q2. Two charges of 5μC and -2μC are placed at points (2cm, 0, 0) and (xcm, 0,0) in a region of space where there is no other external field.If the electrostatic potential energy of the system is -0.5 J what is the value of x?

Q3. Statement I: A small metallic sphere is placed at the centre of a large charged spherical shell and two are the connected by a wire. The charge will not flow from outer sphere to inner sphere.

Statement II: A charged conductor is placed inside the hollow conductor and two are connected by the wire. The whole charge will flow on the outer surface of the outer conductor.

Choose the correct option.

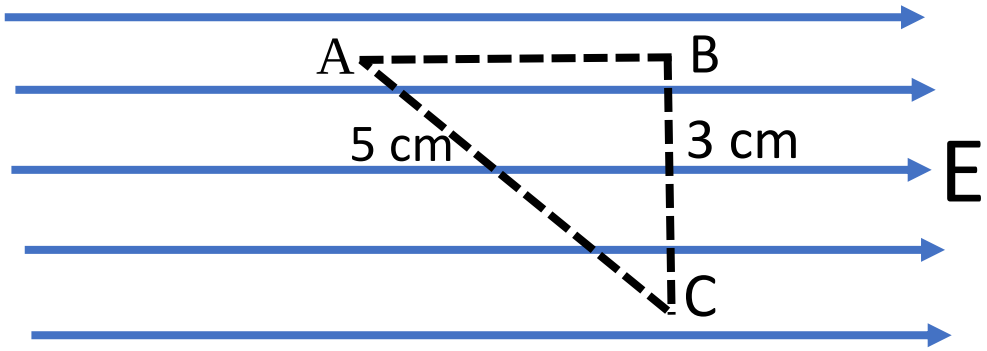
- **a)** Both the statement I and II are correct.
- **b)** Statement I is correct only.
- **c)** Statement II is correct only.
- **d)** Both the statements are untrue

Q4. A parallel plate capacitor of capacitance C is charged to a potential V. It is then connected to another uncharged capacitor having the same capacitance. Find out the ratio of the energy stored in the combined system to that stored initially in the single capacitor.

Q5. a) Plot a graph comparing the variation of potential V and electric field E due to a point charge Q as a function of distance R from the point charge.

b) Find the ratio of the potential differences that must be applied across the parallel and the series combination of 2 identical capacitors so that the energy stored, in the two cases, becomes the same.

Q6. Three points A, B and C lie in the uniform electric field (E) of 5 x 10^3 N/C as shown in figure.

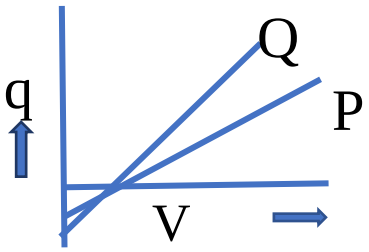


Find the Potential Difference between points

a) A and C

b) B and C

Q7. The graph given below shows the variation of charge Q versus potential difference V for two capacitors C_1 and C_2.The two capacitors have same plate separation but the plate area of C_2 is double than that of C_1.Which of the two graphs P and Q correspond to capacitors C_1 and C_2 and why?



Q.8 Four identical plates each of area a are separated by a distance d. The connection is shown below. What is the capacitance between P and Q?

Q.9 Capacitance of a capacitor becomes 7/6 times of the original value if a dielectric slab of thickness t=2/3d is introduced between the plates. If d is separation between the plates. What is the dielectric constant of the above mentioned slab?

Q.10 A parallel plate capacitor is made by stacking n equally spaced plates connected alternatively. If the capacitance between the 2 adjacent plates is C, then calculate the resultant capacitance.