

Dear Parents,



Session 2018-2019 is progressing quite well. We just had our 'Orientation Session' with Primary, Middle and Secondary schoolers parents and it was heartening to see your approach, co-operation and support. APS family extends gratitude for it.

A warm welcome to students who have joined our school this session. We stand committed to providing quality education to our children. The teachers follow a detailed plan of instruction that is guided by CBSE and AWES. SAMC is our pillar of strength as our teachers focus on holistic development of our students. We shall certainly continue to implement our 'Systems Approach' to support all students by using interventions to help each child make academic progress. Progress is best assured when student, parents and school are working towards same goal. It's like when every player is an active member, the team is sure to be the best and everyone is a winner. So let's strive to be all winners!

For Summer Break Assignments, practice sheets are devised to ensure revisions for coming assessment. Kindly go to the website: www.apsbinnaguri.org and follow these steps for the same

Steps to download:

- i. Browse the website→ Home page (first page of the website)
- ii. Then check the Bulletin Board→ link will be available.

OR

Home Page→ Click on 'APS News' option→ Choose Holiday Homework option from the dropdown menu.

We would also seek your co-operation to help lift up academics. We would welcome parents to offer their names for substitute facilitators/ teachers, judges for events round the year. Kindly e-mail at apsbinnaguri1@gmail.com or give your details at Front Desk.

We truly believe that an entire community is needed to empower our students to become successful citizens. I look forward to a great year and working with such an amazing community.

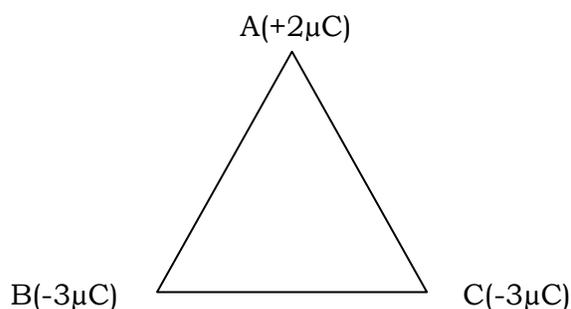
Awaiting your constructive suggestions.

ARMY PUBLIC SCHOOL BINNAGURI
CLASS XII SCI
WORKSHEET 2018-19
PHYSICS

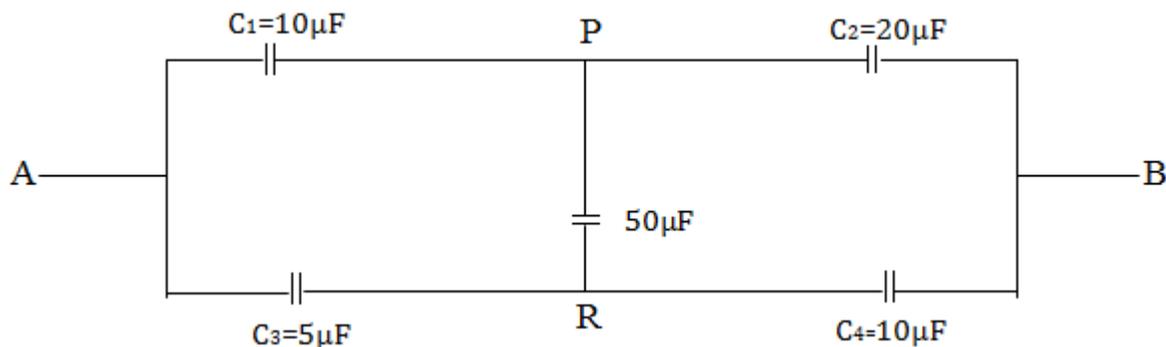
UNIT I :ELECTROSTATICS

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1. What is the nature of electrostatic force between two point electric charges Q_1 and Q_2 if
 - a. $Q_1+Q_2>0$?
 - b. $Q_1+Q_2<0$?
2. Three point charges of $+2\mu\text{C}$, $-3\mu\text{C}$ and $-3\mu\text{C}$ are kept at the vertices of A, B and C respectively of an equilateral triangle of side 20 cm as shown in figure . What should be the sign and the magnitude of the charge to be placed at the midpoint of side BC so that the charge A remains in equilibrium?



3. A charge having magnitude Q is divided into two parts q and $(Q-q)$. If the two parts exert maximum force of repulsion on each other then find the ratio of Q/q ?
4. Two small identical electrical dipoles AB and CD each of dipole moment 'p' are kept at an angle of 120° . What is the resultant dipole moment of this combination? If this system is subjected to electric field (E) directed along +X direction, what will be the magnitude and direction of the torque acting on this?
5. A parallel plate capacitor is charged by a battery, which is then disconnected. A dielectric slab is then inserted in the space between the plates. Explain what changes, if any, occur in the values of :
 - a. capacitance
 - b. potential difference between the plates
 - c. electric field between the plates
 - d. the energy stored in the capacitor
6. A capacitor of unknown capacitance is connected across a battery of V volts. The charge stored in it is $360\mu\text{C}$. When potential across the capacitor is reduced by 120 V, the charge stored in it becomes $120\mu\text{C}$. Calculate:
 - (a) the potential V and the unknown capacitance C .
 - (b) What will be the charge stored in the capacitor, if the voltage applied had increased by 120V?
7. Calculate the equivalent capacitance between points A and B in the circuit below. If a battery of 1 V is connected across A and B, calculate the charge drawn from the battery by the circuit.



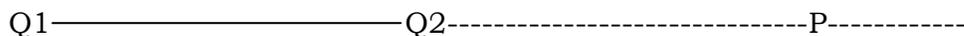
8. Using Gauss's law obtain the expression for the electric field due to a uniformly charged thin spherical shell of radius R at a point outside the shell. Draw a graph showing the variation of electric field with r , for $r > R$ and $r < R$.

9.(a) Why do the electrostatic field lines not formed closed loops?

(b) Why do the electric field lines never cross each other?

(c) The electrostatic field at the surface of a charged conductor must be perpendicular to every point on it?

(d) Two point charges q and q are placed at a distance 'd' apart as shown in the diagram. Write two properties related to the charges q and q due to which the electric field at point 'p' on the line joining the two charges.



10. (a) Define electric flux. Write its SI unit.

(b) Using Gauss's law, prove that the electric field at a point due to a uniformly charged infinite plane sheet is independent of the distance from it.

(c) How is the field directed if (i) the sheet is positively charged, (ii) negatively charged?

11. Two charges of magnitude $-2Q$ and $+Q$ are located at points $(a,0)$ and $(4a,0)$ respectively. What is the electric flux due to these charges through a sphere of radius $3a$ with its centre at the origin.

12. An electric dipole of length 4 cm when placed with its axis making an angle of 60° with a uniform electric field experience a torque of $4\sqrt{3}\text{ Nm}$. Calculate the potential energy of dipole if it has charge $\pm 8\text{ nC}$.

13. In a hydrogen atom, the electron and proton are bound at a distance of about 0.53 \AA .

(a) Estimate the potential energy of the system in eV, taking the zero potential energy at infinite separation of electron from proton.

(b) What is the minimum work required to free the electron, given that its kinetic energy in the orbit is half the magnitude of potential energy obtained in (a)?

(c) What are the answer to (a) and (b) above if the zero of potential energy is taken at 1.06 \AA separation?

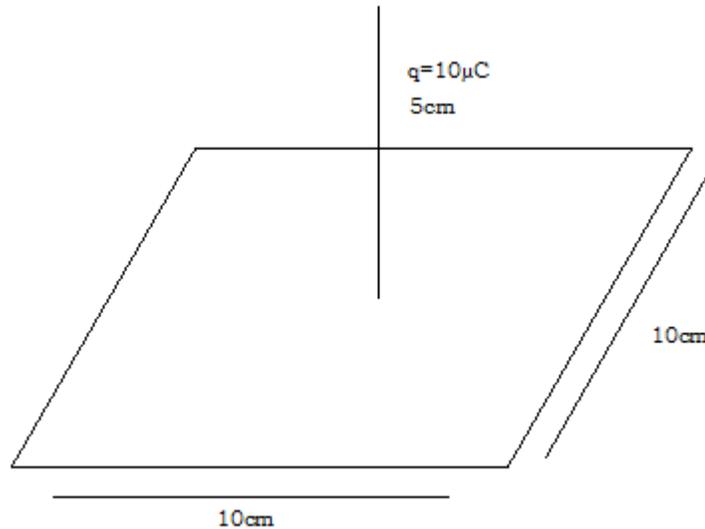
14. State Gauss law in electrostatics. Apply this theorem to obtain the expression for the electric field at a point due to an infinitely long, thin, uniformly charged straight wire of linear charge density $\lambda\text{ C/m}$.

15. Two capacitors with capacitance C_1 and C_2 are charged to potential V_1 and V_2 respectively and then connected in parallel. Calculate the common potential across the combination, the charge on each capacitor. The electrostatic energy store in the system and the change in electrostatic energy from its initial value.

16. Two charges $+Q$ and $-Q$ are kept at points $(-X_2,0)$ and $(X_1,0)$ respectively, in the XY plane. Find the magnitude and direction of the net electric field at the origin $(0,0)$.

17. The electrostatic force of repulsion between two positively charged ions carrying equal charge is 3.7×10^{-9} N when they are separated by a distance of 5Å. How many electrons are missing from each ion?

18. A point charge $+10\mu\text{C}$ is at a distance 5 cm directly above the centre of a square of side 10 cm as shown in figure . What is the magnitude of the electric flux through the square ?[Hint: Think of the square as one face of a cube with edge 10 cm]



19. Five charges q each are placed at the corners of a regular pentagon of side ' a '. Then:

- (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 ' q ' is removed from A .
- (iii) What will be the electric field at O , if the charge ' q ' at A is replaced by ' $-q$ '.

20. (a) Two insulated charged copper spheres A and B have their centres separated by a distance of 50cm. What is the mutual force of electrostatic repulsion if the charge on each is $6.5 \times 10^{-7}\text{C}$? The radii of A and B are negligible compared to the distance of separation.

(b) What is the force of repulsion if each sphere is charged double the above amount, and the distance between them is halved?
