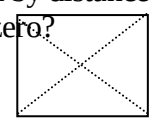
# CLASS XII
# SAMPLE PAPER
# PHYSICS

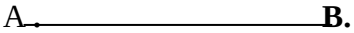
ELECTROSTATICS POTENTIALS, CAPACITANCES ANE DIELECTRICS (NUMERICALS)

1. A charge of 12micro-f is given to a hollow metallic sphere of radius 0.1m. Find the potential at (i) the surface of the sphere and (ii) the centre of the sphere.
2. The electric potential at 0.9m from a point charge is +50V. Find the magnitude and nature of the charge.
3. Two point charges, +4 μf C at a distance of 20 cm in air separates -6 μf C. At what point on the line joining the two charges is the electric potential zero.
4. (i) Calculate the electric potential at a point X due to a point charge of 0.5 μC located at 10cm distance. (ii) Also calculate the work done in bringing a charge of $3x10^{-9}$C from infinity to the point X.
5. Calculate the potential at the centre of a square of side 2 m, which carries at its four corners charges of +2nC, +1nC, -2nC and –3nC respectively.
6. Define electric potential. Deduce an expression for the electric potential at a point at distance r for a point charge. ( q > 0 )
7. A point charge q is placed at O as shown. Is $V_A - V_B$ positive, negative or zero, if q is a (i) positive, (ii) negative charge?
8. Two point charges 4 μC, -2 μC are separated by distance of 1m in air. At what point on the line joining the charges is the electric potential is zero?
9. Two point charges + $3x10^{-8}$C and $-2x10^{-8}$C are separated by distance of 15 cm in air. At what point on the line joining the charges is the electric potential is zero?
10. 2 μC charge is placed at each corner of a square ABCD of side 2√2cm. Calculate electric potential at the center O of the square.



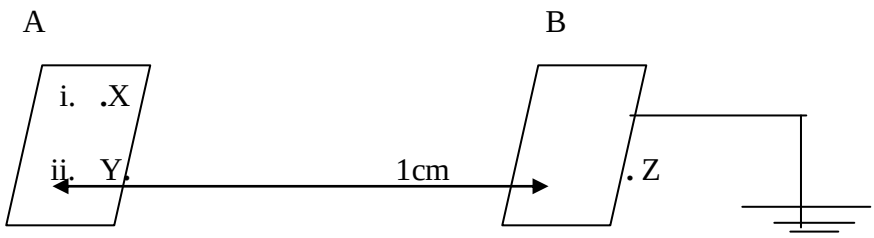

11. Four point charges, $10^{-8}$C, $-2x10^{-8}$C, $-4x10^{-8}$C and $6x10^{-8}$C are placed at the four corners of a square of side 2√2 m. Calculate the electric potential at the center of the square.

12. Two point charges A, $5 \times 10^{-8}$ C and B, $-2 \times 10^{-8}$ C are separated by a distance of 20 cm in air as shown in the figure. Find at what distance from A the electric potential be zero.




13. A proton, placed in uniform electric field of magnitude $2x10^3$ N/C, moves from a point A to B in the direction of electric field. If AB = 0.05m, calculate (i) potential difference between A and B, (ii) work done in moving the proton form A to B.
14. A charge of +10 μC is given to a hollow metallic sphere of radius 0.1m. Find the potential at the (i) outer surface, and (ii) centre of the sphere.
15. Two point charges 4 μ C and -2 μ C are separated by a distance of 1m in air. At what distance on the line joining the charges is the electric potential is zero?

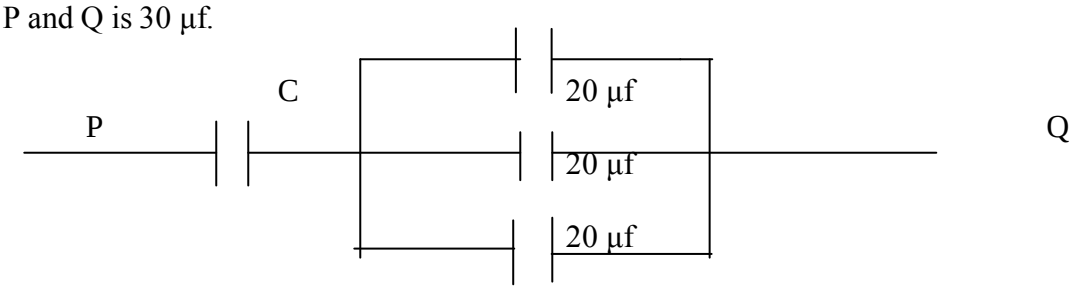
16. A proton is accelerated in a uniform field of 1.7 x $10^{-4}$ N/C between two points A and B separated by a distance of 0.1m. (I) What is the potential difference between the points? (ii) How much work is done in the above process?
17. Two identical plane metallic surfaces A and B are kept parallel to each other in air separated by a distance of 1 cm as shown in the figure. A is given a positive potential of 10 V and the outer surface of B is earthed.




b. What is the magnitude and direction of the uniform electric field between Y and Z?
c. What is the work done in moving a charge of 20 μ C from X to Y

18. Electric field intensity at point 'B' due to a point charge 'Q' kept at point 'A' is 24 N/C and electric potential at point 'B' due to same charge is 12 J/C. Calculate the distance AB and also the magnitude of charge Q.
19. Two positive charges 0.2 micro-C and 0.01 micro-C are placed 10cm apart. Calculate the work done reducing their distance to 5 cm.
20. Two point charges A and B of value +5x$10^{-9}$C and +3x$10^{-9}$C are kept 6cm apart. Calculate the work done when charge B is moved by 1cm towards charge A.
21. What is the area of the plate of a parallel plate capacitor of capacity 2F and with separation between the plates 0.5 cm? Why do the ordinary capacitor have the capacitance of the order of micro-farad?

22. A 80micro-f capacitor is charged by a 50V battery. The capacitor is disconnected from the battery and then connected across another unancharged 320 μf capacitor. Calculate the charge on the second capacitor.
23. Calculate the capacitance of the capacitor C in the fig. The equivalent capacitance of the combination between P and Q is 30 μf.

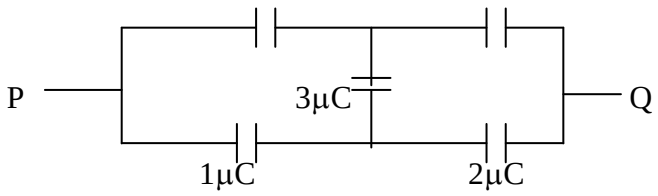



24. Two capacitors of capacitances $C_1$ = 3 μf and $C_2$ = 6 μf arranged in series are connected in parallel with a third capacitor $C_3$ = 4 μf. The arrangement is connected to a 6.0 V battery. Calculate the total energy stored in the capacitors.

25. When two capacitors of capacitances C1 and C2 are connected in series the net capacitance is 3 μf; when connected in parallel its value is 16 μf. Calculate the value of C1 and C2.

1μC 2μC

26. Calculate the equivalent capacitance of the combination between the points P and Q as shown in the figure.




27. A 10 μf capacitor is charged by a 30 V d.c. supply and then is connected across an uncharged 50 μf capacitor. Calculate (I) the final potential difference across the combination and (ii) the initial and final energies. How will you account for the difference in energy?

28. Q24. A 10μF capacitor is charged by a 30 V d.c. supply and then connected across an uncharged 50μF capacitor. Calculate (I) the final potential difference across the combination and (II) the initial and final energy stored. How will you account for the difference in energy?

29. A hallow metal sphere of radius 6cm is charged such that the potential on its surface is 12V. What is the potential the centre of the sphere? (C.B.S.E. 2011).

30. Net capacitance of three identical capacitors in series is 3 μf. What will be their net capacitance if connected in parallel? Find the ratio of energy stored in the two configuration if they are both connected to the same source. (C.B.S.E. 2011).

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