

# O P JINDAL SCHOOL, SAVITRINAGAR

## PRACTICE PAPER

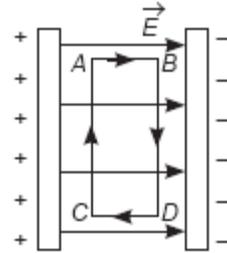
CLASS XII PHYSICS

TOPIS : Electric potential and Capacitance

Date : 09/04/20

MM :40

- 1 A uniform electric field  $E$  exists between two charged plates as shown in figure. What would be the work done in moving a charge  $q$  along

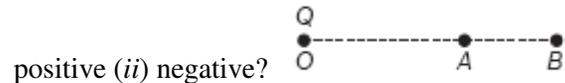


the closed rectangular path  $ABCD$ ?

- 2 In the expression  $W = pE (\cos \theta_0 - \cos \theta_1)$ , why is  $\theta_0$  is taken as  $\pi/2$  for obtaining expression for the potential energy of electric dipole?

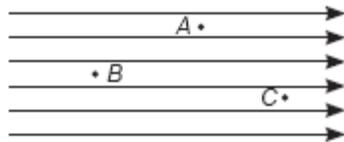
- 3 For what position of an electric dipole in a uniform electric field its potential energy is (i) minimum and (ii) maximum?

- 4 A point charge  $Q$  is placed at point  $O$  as shown in the figure. Is the potential difference  $V_A - V_B$  positive, negative or zero, if  $Q$  is (i)



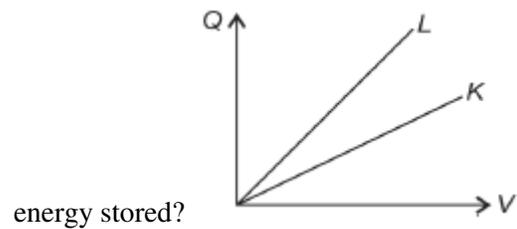
positive (ii) negative?

- 5 Figure given below shows three points  $A$ ,  $B$  and  $C$  in a uniform electrostatic field. At which of the points will the electric potential be



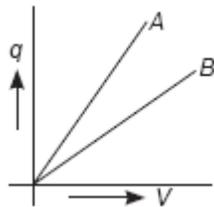
maximum ?

- 6 The following graph shows the variation of charge  $Q$ , with voltage  $V$ , for two capacitors  $K$  and  $L$ . In which capacitor is more electrostatic

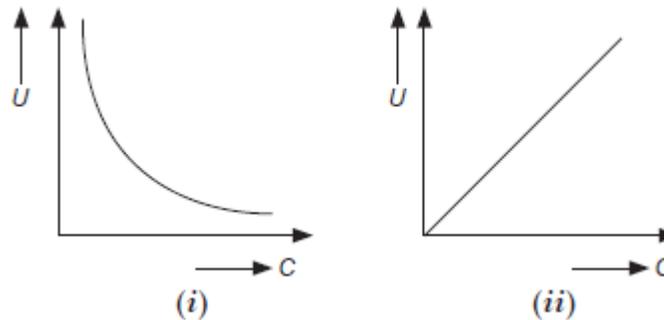


energy stored?

- 7 A charge  $Q$  is given to three capacitors  $C_1$ ,  $C_2$  and  $C_3$  connected in parallel. Determine the charge on each. 2
- 8 Draw a plot showing the variation of (i) electric field ( $E$ ) and (ii) electric potential ( $V$ ) with distance  $r$  due to a point charge  $Q$ . 2
- 9 What is an electrostatic shielding? What is its practical importance? 2
- 10 (a) Draw equipotential surfaces due to a point  $Q > 0$ . (b) Are these surfaces equidistant from each other? If not, explain why. 2
- 11 Draw equipotential surfaces and corresponding electric field lines for the: (i) single point charge  $q < 0$  and (ii) uniform electric field. 2
- 12 The given graph shows that 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 lines in the graph correspond to  $C_1$  and  $C_2$  and why? 2



- 13 The energy of a capacitor varying with its capacitance is shown by two graphs (i) and (ii). Find in which of the graphs: (a) charge is 2



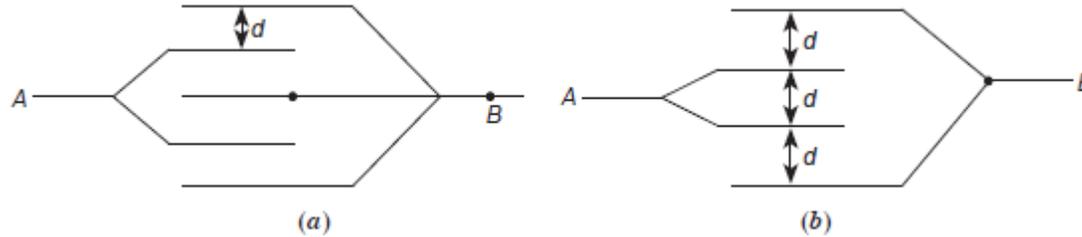
constant, and (b) potential difference is constant.

- 14 Deduce an expression for the electric potential due to an electric dipole at any point on its axis. Mention one contrasting feature of electric 3

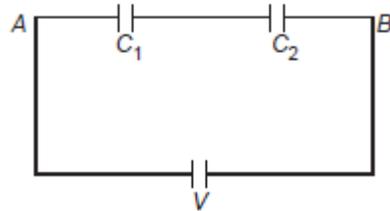
potential of a dipole at a point as compared to that due to a single charge.

- 15 Four charges  $+q, -q, +q$  and  $-q$  are to be arranged respectively at the four corners of a square  $ABCD$  of side  $a$ . (a) Find the work required to put together this arrangement. (b) A charge  $q_0$  is brought to the centre of the square, the four charges being held fixed. How much extra work is needed to do this? 3

- 16 Five identical horizontal square metal plates each of area  $A$  are placed at a distance  $d$  apart in air and connected to the terminals  $A$  and  $B$  as shown in the figures (a) and (b). Find the effective capacitance between the two terminals  $A$  and  $B$ .

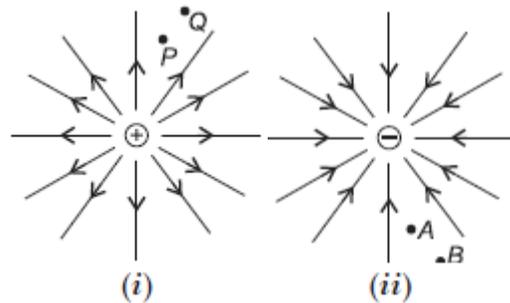


- 17 Two air-filled capacitors  $C_1$  and  $C_2$  of capacitances  $2C$  and  $C$  are connected in series to a battery as shown below. (a) Find across which capacitor, the potential difference is high. (b) Draw the graph for variation of potential with distance from  $A$  to  $B$ . (c) If a dielectric of constant 2 is filled completely in the air gap of second capacitor, then what will be the final ratio of charge, potential difference and energy stored by each capacitor. 3



stored by each capacitor.

- 18 Figures (i) and (ii) show the field lines of the positive and negative point charges respectively. (a) Give the signs of the potential difference  $V_p - V_Q, V_B - V_A$ . (b) Give the sign of the potential energy difference of a small negative charge between the points  $Q$  and  $P, A$  and  $B$ . (c) Give the sign of the work done by the field in moving a small positive charge from  $Q$  to  $P$ . (d) Give the sign of the work done by the external agency in moving a small negative charge from  $B$  to  $A$ . (e) Does the kinetic energy of a small negative charge increase or decrease in going from  $B$  to  $A$ ? 3



in going from  $B$  to  $A$ ?

- 19 Show by graph how  $q$  given to a capacitor varies with its potential difference.  
Using the graph or otherwise, prove that the energy of a capacitor is  $1/2 CV^2$ . Calculate the energy density of the electrostatic field in a parallel plate capacitor.

5

***N.B.-This sheet is prepared from home.***