



Maheshwari Public School, Ajmer
Pre mid Test; Session: 2018- 19
Class: XII; Subject: Physics

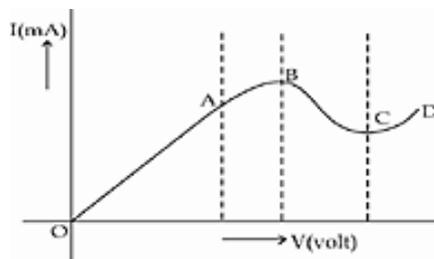
Time allowed: 45 minutes.

Max Marks:20

General Instructions:

- i) All 11 questions in this paper are compulsory to attempt.
- ii) Marks are indicated against each question.

1. What is the advantage of using thick metallic strips to join wires in a potentiometer? (1)
2. An uncharged conductor **A** placed on an insulating stand is brought near to a charged conductor **B**. What happens to the charge and potential of **B**? (1)
3. An arbitrary surface encloses an electric dipole. What is the electric flux through this surface? (1)
4. In what orientation is an electric dipole placed in a uniform electric field in stable equilibrium? (1)
5. The graph shown here represents the V-I characteristics of a device. Identify the region, if any, over which this device has a negative resistance. (1)



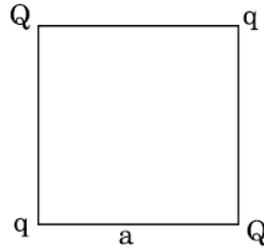
6. Two electric bulbs P and Q have their resistances in the ratio of 1: 2. They are connected in series across a battery. Find the ratio of the power dissipation in these bulbs.

OR

In a potentiometer arrangement for determining the internal resistance of a cell, the balance point of the cell in open circuit is 350 cm. When a resistance of 9Ω is used in the external circuit of the cell, the balance point shifts to 300 cm. determine the internal resistance of the cell. (2)

7. In the set-up of a meter bridge, when two unknown resistances X and Y are inserted, the null point is obtained 35 cm from the positive end of the meter bridge wire. When a resistance of 15Ω is connected in series with X, the null point shifts by 15 cm. determine the values of resistances X and Y. (2)
8. A parallel plate capacitor is charged by a battery. After sometime the battery is disconnected and a dielectric slab of a dielectric constant K is inserted between the plates. How would
 - (i) the capacitance
 - (ii) the electric field between the plates of capacitor be affected? Justify your answer. (2)

9. Four point charges Q , q , Q and q are placed at the corners of a square of side 'a' as shown in the figure.

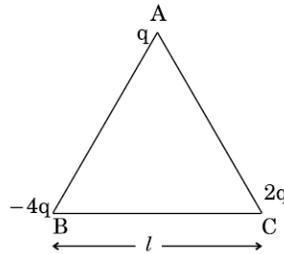


Find the

- (a) resultant electric force on a charge Q , and
 (b) potential energy of this system.

OR

- (a) Three point charges q , $-4q$ and $2q$ are placed at the vertices of an equilateral triangle ABC of side ' l ' as shown in the figure. Obtain the expression for the magnitude of the resultant electric force acting on the charge q .



- (b) Find out the amount of the work done to separate the charges at infinite distance. (3)

10. (a) Define the term 'conductivity' of a metallic wire. Write its SI unit.

- (b) Using the concept of free electrons in a conductor, derive the expression for the conductivity of a wire in terms of number density and relaxation time. Hence obtain the relation between current density and the applied electric field E . (3)

11. Find the ratio of the potential difference that must be applied across the parallel and series combinations of two capacitors having capacitances C_1 and C_2 in the ratio $1 : 3$, so that the energy stored in the two cases becomes the same. If the potential differences are made equal, calculate the ratio of energy stored in the two cases.

OR

- In the circuit shown, $R_1 = 4\Omega$, $R_2 = R_3 = 5\Omega$, $R_4 = 10\Omega$ and $E = 6\text{ V}$. Work out the equivalent resistance of the circuit and the current in each resistor. (3)

