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## PRACTICE PAPER UNIT- II -ELECTROSTATIC-POTENTIAL AND CAPACITANCE

Note: Q. No. 1-4 is of 01 mark each, Q. 5-6 is of 02 marks each, Q.No. 7 is of 03 marks, Q. No. 8 is a case study based and is of 04 marks, Q. No. 11 is of 5 marks.

| S <br> N | Question | Ma <br> rks |
| :--- | :--- | :--- |
| 1 | A positively charged particle is released from rest in a uniform electric field. The electric <br> potential energy of the charge <br> (a) remains a constant because the electric field is uniform. <br> (b) increases because the charge moves along the electric field. <br> (c) decreases because the charge moves along the electric field. <br> (d) decreases because the charge moves opposite to the electric field. | 1 |
| 2 | Assertion: When two conductors charged to different potentials are connected to each other, the <br> negative charge always flows from lower potential to higher potential. <br> Reason: In the charging process, there is always a flow of electrons only. <br> a- Both assertion and reason are correct and the reason is the correct explanation of assertion. <br> b- Both assertion and reason are correct and reason is not a correct explanation of assertion. <br> c- Assertion is correct but the reason is incorrect <br> d- Assertion is incorrect but the reason is correct. | 1 |
| 3 | A capacitor is charged by a battery. The battery is removed and another identical uncharged <br> capacitor is connected in parallel. The total electrostatic energy of resulting system <br> (a) increases by a factor of 4. <br> (b) decreases by a factor of 2. <br> (c) remains the same. <br> (d) increases by a factor of 2. | 1 |
| 4 | A parallel plate air capacitor is charged to a potential difference of V volts. After disconnecting <br> the charging battery, the distance between the plates of the capacitor is increased using an <br> insulating handle. As a result, the potential difference between the plates <br> (a) increases <br> (b) decreases <br> (c) does not change <br> (d) becomes zero | 1 |
| 5 | Can electrostatic potential at a point be zero, while electric field at that point is not zero? |  |
| 6 | If a dielectric slab is introduced between the plates of a parallel plate capacitor after the battery is is <br> disconnected. How do the following quantities change? <br> (i) Charge <br> (ii) Potential difference <br> (iii) Capacitance <br> (iv) Energy. | 2 |
| 7 | Define an equipotential surface. Draw equipotential surfaces. <br> (i) in the case of a single point charge and <br> (ii) in a constant electric field in Z-direction. <br> Why the equipotential surfaces about a single charge are not equidistant? <br> (iii) Can electric field exist tangential to an equipotential surface? Give reason. | 2 |

Case study-based questions (questions no 8-11) Capacitor and Capacitance
A capacitor contains two oppositely charged metallic conductors at a finite separation. It is a device by which capacity of storing charge may be varied simply by changing separation and/or medium between the conductors. The capacitance of a capacitor is defined as the ratio of magnitude of charge ( Q ) on either plate and potential difference $\left(\mathrm{V}\right.$ ) across the plate, i.e., $\mathrm{C}=\frac{Q}{V}$ The unit of capacitance is coulomb/volt or farad (F)
8. What is a capacitor?
9. What is main purpose of using a capacitor?
10. Can we increase the capacitance by increasing potential applied across it?

## OR

10. What will be the effect on capacitance by inserting a dielectric in between the plates? 2

11 (a) Derive an expression for the energy stored in a parallel plate capacitor C , charged to a
5 potential difference V. Hence derive an expression for the energy density of a capacitor.
(b) Find the ratio of the potential differences that must be applied across the parallel and series combination of two capacitors $C_{1}$ and $C_{2}$ with their capacitances in the ratio 1:2 so that the energy stored in the two cases becomes the same

