

Model Question Paper
Electrostatics - Part II

12th Standard

Physics

Reg.No. :

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I. Answer all the Questions.
II. Use blue pen only.

Time : 01:15:00 Hrs

Total Marks : 65

Section-A

5 x 1 = 5

- 1) If a point lies at a distance x from the midpoint of the dipole, the electric potential at this point is proportional to
(a) $\frac{1}{x^2}$ (b) $\frac{1}{x^3}$ (c) $\frac{1}{x^4}$ (d) $\frac{1}{x^{3/2}}$
- 2) Four charges $+q, +q, -q, -q$ respectively are placed at the corners A, B, C and D of a square of side a . The electric potential at the centre O of the square is
(a) $\frac{1}{4\pi\epsilon_0} \frac{q}{a}$ (b) $\frac{1}{4\pi\epsilon_0} \frac{2q}{a}$ (c) $\frac{1}{4\pi\epsilon_0} \frac{4q}{a}$ (d) Zero
- 3) Electric potential energy (U) of two point charges is
(a) $\frac{q_1 q_2}{4\pi\epsilon_0 r^2}$ (b) $\frac{q_1 q_2}{4\pi\epsilon_0 r}$ (c) $pE \cos \theta$ (d) $pE \sin \theta$
- 4) The work done in moving $500\mu C$ charge between two points on equipotential surface is
(a) Zero (b) finite positive (c) finite negative (d) infinite
- 5) Which of the following quantities is scalar?
(a) dipole moment (b) electric force (c) electric field (d) electric potential

Section-B

5 x 3 = 15

- 6) Distinguish between electric potential and potential difference.
- 7) What is an equipotential surface?
- 8) Define electric flux. Give its unit.
- 9) What is a capacitor? Define its capacitance.
- 10) A parallel plate capacitor is connected to a battery. If the dielectric slab of thickness equal to half the plate separation is inserted between the plates what happens to (i) capacitance of the capacitor (ii) electric field between the plates (iii) potential difference between the plates.

Section-C

5 x 5 = 25

- 11) Two insulated charged spheres of charges $6.5 \times 10^{-7} C$ each are separated by a distance of 0.5 m. Calculate the electrostatics force between them. Also calculate the force i) the charges are doubled and the distance of separation is halved. ii) When the charges are placed in a dielectric medium water $\epsilon_r = 80$.
- 12) Two small equal and unlike charges $2 \times 10^{-8} C$ are placed A and B at a distance of 6 cm. Calculate the force on the charge $1 \times 10^{-8} C$ placed at P is 4 cm on the perpendicular bisector of AB.
- 13) Compare the magnitude of the electrostatic and gravitational force between an electron and proton at a distance r apart in hydrogen atom.
- 14) Two point charges $+9e$ and $+1e$ are kept at a distance of 16 cm from each other. At what point between these charges, should a third charge q to be placed so that it remains in equilibrium?
- 15) a) Two small charged spheres repel each other with a force $2 \times 10^{-3} N$. The charge on one sphere is twice that on the other. When one charge is moved 10 cm away from the other, the force is $5 \times 10^{-4} N$. Calculate the charges and the initial distance between them.

(OR)

- b) Two charges $10 \times 10^{-9} C$ and $20 \times 10^{-9} C$ are placed at a distance of 0.3 m apart. Find the potential and intensity at a point mid-way between them.

Section-D

2 x 10 = 20

- 16) State Gauss's law. Applying this, Calculate electric field due to an infinitely long straight charged wire with uniform charge density.
- 17) Explain the principle of capacitor. Obtain the expression for the capacitance of a parallel plate capacitor.
