Problem 3) A tiny spherical oil drop carrying a net charge q is balanced in still air with a vertical uniform electric field of strength 81 5 10 7 Vm–1 . When the field is switched off, the drop is observed to fall with terminal velocity 2 × 10–3 m s–1 . Given g = 9.8 m s–2 , viscosity of the air = 1.8 × 10–5 Ns m–2 and the density of oil = 900 kg m–3 , the magnitude of q is :

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1) 1.6 × 10–19 C
2) 3.2 × 10–19 C
3) 4.8 × 10–19 C
4) 8.0 × 10–19 C

Ans) 4