Question Paper

Exam Date & Time: 04-May-2023 (09:30 AM - 12:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES
END SEMESTER THEORY EXAMINATION - MAY 2023
II SEMESTER B.Sc (Applied Sciences) in Engg.

PHYSICS - II [IPH 121 - S2]

Marks: 50 **Duration: 180 mins.**

Answer all the questions.

Missing data, if any, may be suitably assumed

✓ **Useful constants**

Speed of light in vacuum= 3.00×10^8 m/s
Electron mass = 9.11×10^{-31} kg
Permittivity of vacuum = 8.85×10^{-12} F/m
Avogadro constant = 6.02×10^{23} /mol

Electron charge = 1.60×10^{-19} C
Boltzmann constant= 1.38×10^{-23} J/ K
Rydberg constant = 1.10×10^7/m

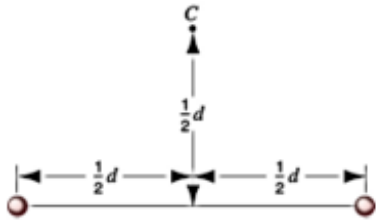
Mass of proton / neutron= 1.67×10^{-27}kg
Planck's constant = 6.63×10^{-34} J-s
Permeability of vacuum = $4\pi \times 10^{-7}$ H/m

1) (5)

A) Obtain an expression for the torque acting on a dipole in an electric field and hence derive an expression for the change in potential energy of the system when dipole is rotated from θ_0 to θ

B) (3)

Two charges q = +2.13 μC are fixed in space a distance d = 1.96 cm apart, as shown in Fig. (i) What is the electric potential at point C? Take V = 0 at infinity. (ii) You bring a third charge Q = +1.91 μC slowly from infinity to C. How much work must you do? (iii) What is the potential energy U of the configuration when the third charge is in place?



C) (2)

Distinguish between electric potential and electric potential energy

2) (4)

A) What does it mean by spherically symmetric charge distribution? Use Gauss' law to obtain expressions for the electric field, both inside and outside of a spherically symmetric charge distribution.