SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.
M.Sc.(Physics) END SEMESTER EXAMINATIONS NOVEMBER - 2023
SEMESTER - II

20PPHCT2006 - Electro Magnetic Theory and Plasma Physics

Total Duration : 2 Hrs. 30 Mins. Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. A sphere of homogeneous linear dielectric material is placed in a uniform electric field. Find the electric field inside the sphere.
2. Obtain the first three non-zero terms in the multi-pole expansion for the electric field.
3. Show that the Ampere's law holds for closed path of any shape.
4. Show that the energy density of the magnetic field is given by $U_m = (1/2)\mu\ H^2$ where H is magnetic field and μ is permeability.
5. Write a short note on Lorentz gauge.
6. State Ampere's circuital law. Discuss why and how it was modified to include displacement current.
7. Attain the solution for maxwells equation using simple plane wave in non-conducting media.
8. Describe (i) Alfen waves (ii) Magnetosonic waves.

Section C

I - Answer any **TWO** questions $(2 \times 10 = 20$ Marks)

9. Find the solution to Laplace equation using spherical coordinate.
10. A magnetised sphere of radius R is placed in uniform external magnetic field H_0. Find out the potential and field inside and outside the sphere.
11. What is waveguide? For TE waves perfectly propagating in a rectangular wave guide with perfectly conducting walls;find the cut off wavelength.
12. Discuss the Debye shielding problem in detail.

II - Compulsory question $(1 \times 10 = 10$ Marks)

13. State and prove Poynting theorem relating the flow of energy at a point in space in an electromagnetic field.

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