

# PHY 103N: GENERAL PHYSICS 2, (2009-2010, Semester -II)

Department of Physics, I.I.T. Kanpur

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## Schedule and location:

Lectures – Mon, Wed, Fri : 1200 - 1300 (L7, All sections)

Tutorial – Tue (IPSA<sup>‡</sup>) 1200-1300 (TB201-208, All sections)

Thu (DIPA<sup>†</sup>) 1200-1300 (L5: D1-D3, L-11: D4-D5, L13: D6-D7, L15: D8-D9)

## Textbooks

1. E.M. Purcell, *Electricity and Magnetism: Berkeley physics course*, Vol. 2, (McGraw Hill Education)
2. D.J. Griffiths, *Introduction to Electrodynamics*, 3<sup>rd</sup> Ed. (Pearson Education, 1999)
3. D. Halliday, R. Resnick and J. Walker, *Fundamentals of Physics*, 6<sup>th</sup> Ed. (Wiley, 2001)

## Course Contents

1. Introduction to electromagnetism, Vector analysis and Calculus
2. Electric field, charge distributions, Gauss's law, Potentials, Energy of charge distributions, Conductors and capacitance
3. Laplace equation, Uniqueness theorems, method of images
4. Multipole expansions, fields and interaction of dipoles
5. Electrostatics of material media: bound charges, polarization, displacement field, electrostatic energy
6. Lorentz force law on charges
7. Magnetic fields, current distributions, Bio-Savart law, forces between current carrying conductors
8. Amperés Law, magnetic vector potential
9. Magnetostatics of material media
10. Electromagnetic induction, emf, inductance
11. Maxwell's correction of Amperés law, Maxwell's equations in vacuum and material media
12. The wave equation, traveling waves, plane waves, spherical wave solutions
13. Energy and momentum of plane electromagnetic waves; Poynting's Theorem
14. Propagation of radiation in linear dielectric media and conductors
15. The Lorentz model for dispersion, dissipation and notion of a plasma frequency
16. Reflection and Transmission coefficients for dielectric and metal interfaces
17. Interference and diffraction of radiation
18. Introduction to quantum phenomena, de Broglie wavelength and the uncertainty principle
19. Schrödinger equation, The wavefunction, Probability and normalization
20. Stationary states, free particle and particle bound in an infinite well

## Evaluation:

2 Mid-semester Examinations : 25 % each

End-Semester Examination : 50 %

**Note:** The IPSA sessions will be held in the following manner. Specific assignment questions, *i.e.* Q1-6 will be discussed in TB-201-206, respectively (for example, Q-3 in TB-203 and Q-5 in TB-205). In addition, in Room TB207 and TB208 two instructors S.A.Ramakrishna/H.Wanare and A.Singh/H.C.Verma, will be available for clarifying other doubts.

DIPA sessions will be held according to sections mentioned above.

‡ IPSA : Interactive Problem Solving Access

† DIPA : Discussion of Illustrative Problems & Assignments