PHY 103N: GENERAL PHYSICS 2, (2007-2008, Semester -II)
Department of Physics, I.I.T. Kanpur

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Schedule and location:

Lectures – Mon, Wed, Fri : 0900 - 0955 (L7, D-Sections); 1400-1455 (L16, C-Sections)

Tutorial – Tue, Thurs: 0900-0955 (TB109-204, D-Sections); 1400-1455 (TB109-204, C-Sections)

Textbooks

1. D.J. Griffiths,*Introduction to Electrodynamics*, 3rd Ed. (Pearson Education, 1999)

2. D. Halliday, R. Resnick and J. Walker, *Fundamentals of Physics*, 6th Ed. (Wiley, 2001)

3. E.M. Purcell, *Electricity and Magnetism: Berkeley physics course*, Vol. 2, (McGraw Hill Education)

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, Boundary Value problems, 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: para-, dia-, ferro- magnets, fields of magnetized objects

10. Electromagnetic induction, emf, inductance

11. Maxwell's correction of Amperés law, Maxwell's equations in vaccum and material media

12. The wave equation, travelling 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:

Tutorial Evaluation   : 10 %

2 Mid-semester Examinations : 20 % each

End-Semester Examination   : 50 %

The tutorial marks will be determined by attendance in the tutorials, the level of participation in the tutorial discussions and performance in any tutorial quizzes. Contact your tutor for more details.