

Birla Institute of Technology and Sciences, Pilani, Goa campus
Instruction Division
First Semester 2009 - 2010

Course Handout

Course Title : Modern Physics

Course No.: PHY C221

Instructor-in-charge: Prasanta Kumar Das

Contact: CC-113(office), 0832-2580-448(phone)

1. Course description: This is an introductory course to Special Theory of Relativity and Quantum Mechanics that form the basis of our understandings of Modern Physics.

2. Text Book:

- **TB.** *Introduction to Quantum Mechanics* by D. J. Griffith, Second Edition, Pearson Education Pvt. Ltd, 2005.

3. Reference Books:

- **RB1.** *Introduction to Special Relativity* by R. Resnick, Wiley Eastern Ltd, 1989.
- **RB2.** *Modern Physics* by G. Aruldas et. al., Prentice-Hall of India Ltd, 2005.
- **RB3.** *Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles* by R. Eisberg and R. Resnick, Second Edition, Wiley, NY, 1985.
- **RB4.** *Quantum Mechanics* by B. H. Bransden and C. J. Joachain, Second Edition, Pearson Education Pvt. Ltd, 2000.

4. Evaluation Scheme(TBA: To Be Announced)

EC No.	Evaluation Component(EC)	Duration	Weightage(%)	Date & Time	Remarks
1.	Terminal Test 1	1 hour	20 %	18.09.09 AN	Closed Book
2.	Terminal Test 2	1 hour	20 %	27.10.09 AN	Open Book
3.	Comprehensive Exam.	3 hours	30 %	9.12.09 FN	Closed Book
4.	Project/Quiz & Attendance		30 %		

5. Home Assignments: They will be given in the class.

6. Make-up: Only genuine cases will be considered.

7. Chamber consultation hours: To be announced in the class.

8. Notices: See the C-wing Student Notice Board and/or the weblink:

http://10.10.10.109/Departments/Faculty/faculty%20pages/prasantadas_files/WBPAGE/pkd_homeM.html

9. Course Plan:

Lect. Nos.	Learning Subjects	Topics to be covered	Text/Ref. books
1-7	Special theory of Relativity	Inertial frames, ether hypothesis, Lorentz transformations, time dilatation, length contraction	Chap. 1 of RB1 and RB2
8-9	Planck's quantum theory, Classical Physics	Blackbody radiation	Chap. 2 of RB2
10-12	Photon: dual nature of light	Photoelectric effect, De Broglie's Matter-Wave duality hypothesis, Uncertainty Principle	Chap. 2 & 4 of RB2
13-16	General Principle of Quantum Mechanics	Hermitian Operators, Eigenfunctions and Eigenvalues, Measurement	Chap. 5 of RB2
17-18	The Schrodinger equation	Time-(in)dependent Schrodinger equation, wave function, current density	Chap. 2 of TB
19-26	Solutions of time-independent Schrodinger eqn.	Infinite, finite Square well potential, harmonic oscillator, etc	Chap. 2 of TB
27-34	One electron atom	Hydrogen atom, Energy quantization, Angular momentum, Zeeman effect, spin, Anomalous Zeeman effect, spin-orbit coupling	Chap. 4 of TB
35-37	Multi-electron atom	The multiparticle Schrodinger equation, Identical particles, Exchange symmetries, Pauli principle	Chap. 5 of TB & RB2
38-43	Quantum Statistical Mechanics	The Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstein distributions, the blackbody spectrum	Chap. 5 of TB

Instructor
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