

**Birla Institute of Technology
Department of Applied Physics**

Physics (PH 1201)

B. E. 1st Sem. Monsoon

35 lectures

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| 1 Special Theory of Relativity: | Introduction, Inertial frame of reference, Galilean transformations (Ch1- Appendix), Postulates (AB 1.1), Lorentz transformations and its conclusions (AB ch1- Appendix), Length contraction, time dilation, velocity addition (AB 1.2, 1.4, Ch1 Appendix), Mass change (AB 1.7), Einstein's mass energy relation. (AB 1.8). [5] |
| 2 Physical Optics: | Polarization, Malus' Law, Brewster's Law, Double Refraction [AG 22.1 – 22.3], Interference in thin films (Parallel films) [AG 15.1 - 15.2], Interference in wedge-shaped layers [AG 15.8], Antireflection coating (qualitative) [AG 15.4], Newton's rings [AG 15.10], Fraunhofer diffraction by single slit [AG 18.2], Double slit and grating (qualitative) [AG 18.6 - 18.7], Resolving Power, Limit of Resolution, Rayleigh Criterion [AG 18.5] [5] |
| 3 Electromagnetic Theory I: | Gauss's law (SAD 4.5), Applications (SAD 4.6), Concept of electric potential (SAD 4.7), Relationship between E and V (SAD 4.8), Polarization of dielectrics (SAD 5.5), dielectric constant (SAD 5.6), Boundary conditions for E & D (SAD 5.9), Gauss's law in magnetostatics, (SAD 7.5), Ampere's circuital law (SAD 7.3), Boundary conditions for B & H (SAD 8.7) [5] |
| 4 Electromagnetic Theory II: | Equation of continuity of charge (SAD 5.8), Displacement current (SAD 9.4), Maxwell's equations, (SAD 9.5), Electromagnetic plane wave equations for free space and dielectrics (SAD 10.3 to 10.6), Poynting vector (SAD 10.7), Fresnel's equation (qualitative) (SAD 10.8, 10.9) [5] |
| 5 Quantum Mechanics: | Planck's theory of black-body radiation (AB: 2.2 & 9.6), Compton effect (AB: 2.7), Wave particle duality, De Broglie waves (AB: 3.1), Davisson and Germer's experiment (AB: 3.5), Uncertainty principle (AB: 3.7, 3.8, 3.9), physical interpretation of wave function (AB: 3.2), Schrodinger equation in one dimension (AB: 5.2), free particle (AB: 3.6, 5.5, 5.6), particle in an infinite square well (AB: 5.8), potential barrier and tunneling (qualitative) (AB: 5.10). [6] |
| 6 LASERS: | Spontaneous and stimulated emission (AB: 4.9, and AG: 23.1), Einstein's A and B coefficients, Population-inversion (AG: 23.4), Light amplification, Basic laser action, Ruby and He-Ne lasers, Properties and applications of laser radiation (AG: 18.1), Elementary ideas of fiber optics (AG: 24.1-24.3). [5] |
| 7 Nuclear Physics: | Nuclear forces, binding energy, liquid drop model, fission, nuclear reactors, fusion. [2] |
| Plasma Physics: | Plasma state, types of plasma, applications of plasma (FFC-Ch-1,2). [2] |
| <p>Text Books: Arthur Beiser (AB), Concept of Modern Physics, 6th edition 2009, Tata McGraw- Hill. A. Ghatak (AG), Optics, 4th Edition, Tata McGraw Hill, 2009 Mathew N.O. Sadiku (SAD), Elements of Electromagnetics, Oxford University Press (2001) F.F.Chen (FFC), Introduction to Plasma Physics, 2nd Edition, Plenum Press, 1994.</p> <p>Reference Book: Halliday, Resnick, Walker, Fundamentals of Physics 6/e, John Wiley & Sons 2004 H. K. Malik, A. K. Singh, Tata McGraw Hill, 2010.</p> | |