Sir Padampat Singhania University
Bhatewar, Udaipur
School of Engineering

LESSON PLAN

PH 103 (Physics of Materials) **Credits: 3 - 0 - 1- 4**

Course Instructors: Prof. K. K. Sud (Course Leader)
Dr. Vinod Patidar

Note: The lecture notes will be available at http://www.vinod-patidar.webs.com/PH103.html prior to the discussion in the class. Students are advised to go through the notes before coming to the class room.

S. No.	Topics	Lecture Hours
1.	EM waves, Black body radiation, Planck's radiation law	2
2.	Compton effect	1
3.	Photon, Wave properties of particles, de Broglie waves	1
4.	Wave packet, phase velocity, group velocity	1
5.	Hisenberg's Uncertainty Principle	1
6.	Scrodinger equation	1
7.	Wave function, boundary conditions	1
8.	Applications of Schrodinger Equation-free particle, particle in a box, potential barrier, tunneling	2
9.	Hydrogen Atom, Brief about Bohr model and its shortcomings	1
10.	Application of Schrodinger equation for Hydrogen atom and quantum numbers	1
11.	Zeeman effect and concept of electron spin	1
12.	Introduction to relativity, inertial and non-inertial frames of reference, Galilean transformations	1
13.	Lorentz transformations	1
14.	Length contraction, time dilation, relativistic mass and Energy	2
15.	Lasers: Interaction of light with matter through absorption, spontaneous and stimulated emissions	2
16.	Basic requirements for light amplification: pumping, Metastable state	1
17.	Three level and Four Level Pumping, Lasing action	1
18.	Ruby Laser, He-Ne laser and Semiconductor Laser	2
19.	Applications of Lasers and Holography	1
20.	Conduction in Metals, Mobility, conductivity,	1
21.	Free electron model,	1
22.	Shortcomings of Free electron model: Heat Capacity, Thermal conductivity, electrical conductivity, wiedeman Franz law and	2

	Lorentz number	
23.	Concept of statistical distribution, Classical and quantum distributions	1
24.	Maxwell Boltzman, Bose-Einstein and Fermi distributions	1
25.	Effect of temperature on Fermi distribution	1
26.	Density of states and Fermi energy	1
27.	Removal of shortcomings of classical free electron model using quantum considerations	1
28.	Energy band theory of solids, Classification of solids into metals, semiconductors and insulators	1
29.	One simplified illustration of existence of band theory using Kronig penney model (electron in one dimensional periodic potential)	1
30.	Carrier transport phenomena: drift and diffusion	1
31.	Hall effect	1
32.	Doping in semiconductors, intrinsic and extrinsic semiconductors	1
33.	n and p type semiconductors, p-n junction	1
34.	Concept of deplation layer and its relation with barrier potential	1
35.	Some basic p-n junction diodes: tunnel diode, photodiode, LED	1
36.	Superconductivity, basic properties of semiconductors	1
37.	Meissner's effect	1
38.	Type – I and type II semiconductors, Application of Semiconductors	1
39.	A brief introduction to Engineering materials: magnetic and dielectric materials	1

Total Lecture Hours: 45