

Sir Padampat Singhania University
Bhatewar, Udaipur
School of Engineering

LESSON PLAN

PH 104 (Engineering Physics)

Credits: 3 - 0 - 1- 4

Course Instructor: Dr. Ghanshyam Purohit

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.	Heisenberg's Uncertainty Principle	1
6.	Schrödinger equation	1
7.	Wave function, boundary conditions	1
8.	Applications of Schrödinger 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 Schrödinger 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	1
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 Lorentz number	2
23.	Concept of statistical distribution, Classical and quantum distributions	1
24.	Maxwell Boltzman, Bose-Einstein and Fermi distributions	1

S. No.	Topics	Lecture Hours
25.	Effect of temperature on Fermi distribution	1
26.	Removal of shortcomings of classical free electron model using quantum considerations	1
27.	Energy band theory of solids, Classification of solids into metals, semiconductors and insulators	1
28.	One simplified illustration of existence of band theory using Kronig penney model (electron in one dimensional periodic potential)	1
29.	Use of vectors in practical mechanics. Conservative vector fields and their potential functions-gravitational and electrostatic examples.	1
30.	Gradient of a scalar field. Flux, divergence of a vector. Gauss theorem	1
31.	Irrotational versus rotational vector fields. Physical significance of circulation, curl of a vector field	1
32.	Stokes' theorem, physical applications	1
33.	Basic Laws of electromagnetics – Coulomb's law and Gauss's Law	1
34.	Biot-Savart's and Ampere's Law	1
35.	Faraday's Law of magnetic induction	1
36.	Maxwell's equations and electromagnetic waves	1

Total Lecture Hours: 41