

LECTURE PLAN

15B11PH111– Physics-1 (2019-20)

- L1 Introduction to the course, Wave nature of light, Superposition principle, Coherent sources
- L2 Division of wave front, Fresnel's bi-prism, Displacement of fringes (**Assignment 1: YDSE**)
- L3 Interference by division of amplitude, Phase change at reflection, Stokes' law
- L4 Thin films, Wedge shaped films, Anti-reflection films (**Assignment 2: Derivation of Wedge-shaped films**)
- L5 Newton's rings and applications
- L6 Michelson interferometer
- L7 Fraunhofer and Fresnel class of diffraction, Resultant amplitude of N vibrations
- L8 Single slit diffraction
- L9 Double slit diffraction, Missing orders
- L10 N-slits diffraction, Diffraction gratings, Dispersive power(**Assignment 3: Intensity variation in N-slit diffraction**)
- L11 Meaning of polarization, Polarization by reflection and refraction, Brewster's law and Malus' law
- L12 Polarization by double refraction, Nicol-Prism, Huygens theory of double refraction (Only case utilized in QWP and HWP)(**Assignment 4: Geometry and construction of Nicol Prism**)
- L13 Half wave plates, Quarter wave plates, Production and Analysis of polarized light
- L14 Optical activity
- L15 Half shade and bi-quartz polarimeter
- L16 Frame of references, Galilean transformation, and Michelson-Morley experiment
- L17 Lorentz transformation
- L18 Length contraction and Time dilation
- L19 Addition of velocities
- L20 Mass variation with velocity and Mass-energy relation
- L21 Wave particle duality, Compton scattering
- L22 De-Broglie concept of matter waves, Wavelength expression for different cases, Davisson-Germer experiment(**Assignment 5: G P Thomson experiment**)
- L23 Phase velocity, Group velocity and their derivations for matter wave
- L24 Heisenberg's uncertainty principle and its applications, (Position of a particle by high power Microscope, Diffraction of electron beam by a single slit).(**Assignment 6: Non-existence of electron in the atomic Nucleus**)
- L25 Wave function and its physical significance, Normalized wave functions, Operators and their representation, Expectation value
- L26 Time independent and Time dependent Schrödinger wave equation
- L27 Particle in one dimensional box (**Assignment 7: Particle in a three dimensional box**)
- L28 Potential barrier (Tunneling effect) and applications
- L29 One dimensional Harmonic Oscillator
- L30 Black body radiation, Wien's law, Rayleigh Jeans law (no derivation)
- L31 Planck's law of radiation
- L32 Stefan's and Wien's displacement law
- L33 Origin of spectral lines, Orbital and spin angular momentum, Space quantization
- L34 Definition of quantum numbers, Spin-orbit coupling
- L35 Designation of states, Fine structure of H_α lines, origin of D -lines of Na
- L36 Atoms in magnetic field, Normal Zeeman effect
- L37 Basic laws of thermodynamics and its applications
- L38 Carnot cycle and Carnot Engine
- L39 Concept of entropy (Entropy calculations for heating, melting and for the expansion of gases)
- L40 Solid-liquid Phase transitions and Clausius–Clapeyron relation