**Lecture Plan**

**UNIT I**

**Introduction To Thermodynamics**

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| **1** | **The continuum Model, Principal concepts of Thermodynamics, Thermal Equilibrium and Zeroth Law of Thermodynamics**  | **1** | **2** |
| **2** | **Equivalence of Heat and work, Work done by a Thermodynamic System, Work done in different process** | **1** |
| **3** | **First law of Thermodynamics, Limitations of First Law of Thermodynamics** | **1** |
| **4** | **Reversible and Irreversible Processes, Heat Engine and Thermal Efficiency** | **1** |
| **5** | **Carnot’s Cycle, Carnot’s Engine and Carnot’s Refrigerator** | **1** | **2** |
| **6** | **Second Law of Thermodynamics** | **1** |
| **7** | **The Thermodynamic Temperature Scale** | **1** |
| **8** | **Entropy, Third Law of Thermodynamics (Nernst’s Law)**  | **1** |

**UNIT II**

**Waves and Oscillations and Introduction to Electromagnetic Theory**

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| **9** | **Simple Harmonic Motion and Harmonic Oscillator** | **1** | **2** |
| **10** | **Waves, General Equation of Wave Motion, Plane Progressive Harmonic Wave** | **1** |
| **11** | **Superposition of Progressive Waves: Stationary Wave** | **1** |
| **12** | **Vectors as a Tool, Vectors and Vector Algebra, Scalar and Vector Fields** | **1** |
| **13** | **Gradient, Divergence, Curl and their Physical significance, Important conclusions on the basis of Grad, Div and Curl** | **1** | **2** |
| **14** | **Vector Integration, Gauss’s divergence theorem, Stokes Curl Theorem** | **1** |
| **15** | **Maxwell’s equations and electromagnetic wave** | **1** |
| **16** | **Poynting Theorem and its physical significance, Angular Momentum in EM Fields** | **1** |
| **17** | **Plane EM waves in free space, dielectric and conducting medium** | **1** |

**UNIT III**

**Interference, Diffraction and Polarisation**

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| **18** | **Wavefront and Rays, Huygen’s Principle of secondary wavelets, Young’s Double slit Experiment, Fresnel’s Biprism** | **1** | **2** |
| **19** | **Interference from parallel Thin Films or Colour of Thin Films, Wedge shaped films** | **1** |
| **20** | **Newton’s Ring, The Michelson Interferometer** | **1** |
| **21** | **Types of Diffraction of Light Waves, Fresnel’s Diffraction at a circular Aperture** | **1** | **2** |
| **22** | **Fraunhofer’s Diffraction at a single slit, at two slits, at N parallel Slits** | **2** |
| **23** | **Diffraction Grating and Resolving Power of diffraction grating** | **1** |
| **21** | **Fundamental Concepts of Polarisation, Types of Polarisation, Methods to produce Plane Polarised Light** | **1** | **2** |
| **22** | **Nicol Prism, Wave plates** | **2** |
| **23** | **Optical Activity, Polarimeters** | **2** |

**UNIT IV**

**The Theory of Relativity and Introduction To Laser Physics**

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| **24** | **Frames of Reference, Galilean Transformation for space and time, Concept of Ether** | **2** | **2** |
| **25** | **Michelson-Morley Experiment, Postulates of Special Theory of Relativity** | **1** |
| **26** | **Lorentz Transformation, Length Contraction and Time Dilation**  | **1** |
| **27** | **Concept of Simultaneity in Relativity, Addition of velocity, Equivalence of Mass and Energy** | **1** | **2** |
| **28** | **Transformation Equations for Momentum and Energy, Invariance of Maxwell’s Equations under Lorentz Transformation**  | **1** |
| **29** | **Characteristics of a Laser Beam, Interaction of Radiation with matter**  | **2** |
| **30** | **Relation between Einstein’s A and B coefficients, Requirements for Laser Action** | **1** | **2** |
| **31** | **Population Inversion, Pumping, Principle of Laser** | **1** |
| **32** | **Main component of a Laser, Types of Lasers, Ruby Laser, He-Ne Laser, Applications of Lasers** | **2** |