Course Name: **Engineering Physics**

Course Code: **PH-101**

Course Type: **Core**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objectives

- To create and an ability to understand laser system, optical fibre in industries, laboratories and in communication
- To understand concepts of communication through electrodymanics
- The broad education necessary to understand behavior of semiconductor devices
- A knowledge of concepts / technologies like superconductivity

Unit Number	Course Content	Lectures
UNIT-01	**Semiconductor Device Physics**: Energy bands in solids, the E-k diagram, Density of states, Occupation probability, Fermi level and quasi Fermi levels, Fermi-Dirac Statistic, Effective mass, Conductivity as a function of temperature p-n junctions, Schottky junction and Ohmic contacts.	**06L**
UNIT-02	**Laser Physics**: Concepts of laser, spontaneous and stimulated emission, elementary idea about Lasers, basic principles involves in laser, three and four level laser system, coherence, characteristics of laser light; ruby, He-Ne, CO2 and semiconductor lasers, application of lasers.	**06L**
UNIT-03	**Fibers Optics and Photonics**: Optical Fiber, physical structure and basic theory, modes in optical fibers, step index and graded index fibers, losses in optical fibers, sources and sensors for optical fibers, applications of optical fibers in communication.	**06L**
UNIT-04	**Electrostatics and Electrodynamics:** Gauss's Law in dielectric medium, Equation of continuity, displacement current, Maxwell's equations, wave equation for electromagnetic radiation, electromagnetic wave propagation in free space and isotropic dielectric medium, Poynting theorem & Poynting vector.	**06L**
UNIT-05	**Quantum Mechanics:** Need of quantum mechanics, Compton effect, Born's concept of wave function, eigen function and eigen values, operators in quantum mechanics, expectation values, time independent,time dependant Schrodinger's wave equations and its applications viz., particle in one dimensional potential well.	**06L**
UNIT-06	**Superconductivity and Ultrasonics:** Introduction and discovery of superconductivity, superconducting materials, Meissner effect, critical magnetic field and critical current, type-1 and type-2 superconductors, isotope effect, theory of superconductivity, ultrasonics, generation, properties and applications.	**06L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: describe the optical devices and their applications

CO2: identify the applications of electrodynamics using Maxwell equations

CO3: apply conept of semiconductor physics to understand electronic systems

CO4: apply concepts of Quantum mechanics in solving physics problems at nanoscale

CO5: learn the working of equipment based on physical phenomenon

Books and References

1. Solid State Electronic Devices by B. G. Streetman, Prentice Hall of India, New Delhi 2006.
2. Introduction to Solid State Physics by Kittle C. John Wiley & Sons, 2005.
3. Lasers Fundamentals and Applications by Ghatak A. K. & Thyagarajan K, Springer, 2010.
4. Modern Engineering Physics; A.S. Vasudeva, S. Chand & Co. Ltd.
5. Introduction to Electrodynamics by Griffiths D. J, Pearson Education Pvt. Ltd., New Delhi, 2002
6. Quantum Mechanics by Ghatak A and Lokanathan S Mc Millan India Ltd.

Course Name: **Applied Mechanics**
Course Code: **CE-101**
Course Type: **Core**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objectives

- To impart knowledge about the force and moments and their vectorial and scalar representation
- To enable the students to understand equilibrium of two dimensional force system
- To enable the students to understand the Center of Gravity and Moment of Inertia
- To understand the concept of stress and strain, Pure Bending and Torsion
- To enable the students to comprehend the laws of motion, kinematics of motion
- To enable the students to understand the Friction on general plane motion
- To understand the concept of shear force and bending moments of beams and analysis of trusses

Unit Number	Course Content	Lectures
UNIT-01	**Introduction to Statics:** Particle and Rigid Body, Types of forces, Transmissibility of a force, vector algebra **Two dimensional force system:** Resolution of forces, Moment of forces, Couple, Resolution of a coplanar force by its equivalent force-couple system, Resultant of forces, free body diagram, equilibrium	**05L**
UNIT-02	**Centre of Gravity and Moments of inertia:** Centroid of plane, curve, area, volume and composite bodies MI with respect to different axis, Parallel axis theorem, Mass moment of inertia **Virtual work and Energy method:** Principle of virtual work; Applications of virtual work principle to machines; Mechanical efficiency; Work of a force/couple, Potential energy and equilibrium **Concept of Friction:** Laws of Coulomb friction, Angle of Repose, Coefficient of friction, large and small contact surfaces, Belt friction, Equilibrium of a belt, Bearing friction	**09L**
UNIT-03	**Kinematics of Rigid Body:** Introduction, Plane Motion of Rigid Body, Velocity and Acceleration under Translation and Rotational Motion, Relative Velocity, **Kinetics of Rigid Body:** Introduction, Force, Mass and Acceleration, Work and Energy, Impulse and Momentum, D'Alembert's Principles and Dynamic Equilibrium	**05L**
UNIT-04	**Impulse Momentum Principle:**. Impulsive force, Conservation of Linear momentum and Angular momentum. Impact between bodies	**03L**
UNIT-05	**Simple stresses and strains:** Normal stress, Shear stress, Bearing stress, Normal strain, Shearing strain; Hooke's law; Poisson's ratio; Factor of safety. **Bending stress of Beams**: Introduction, Simple Bending Theory, Stress in beams of different cross sections, shear stress, combined stresses.	**06L**
UNIT-06	**Torsion:** Introduction, Torsion of shafts of circular section, torque and twist, shear stress due to torque. **Analysis of Truss:** Method of joints, Method of Sections **Analysis of frames:** Shear force and bending moment diagram of determinate beams and frame.	**08L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Determine the resultant force and moment for a given system of forces
CO2: Determine the Centre of Gravity and Moment of Inertia of surfaces and solids
CO3: Determine the shear force, Bending moment of beams and analyze the trusses and problems related to frictions
CO4: Determine the stresses in beam for pure bending and effect of torsion in shafts
CO5: Calculate the motion characteristics of a body subjected to a given force system

Books and References

1. Introduction to Solid Mechanics by H. Shames & J. M. Pitarresi, PHI.
2. Mechanics of Materials by E.P. Popov, PHI.
3. Vector Mechanics for Engineers: Statics and Dynamics by F. P. Beer, R. Johnston , D. F. Mazure P. J. Cornwell , S. Sanghi, McGraw Hill Education.