Course Title: **Engineering Physics**			
Course Code	**21PH12/22**	**Credits: 03**	CIE: 50
Number of Lecture Hours/Week	**3L**		SEE: 50
Total Number of Lecture Hours	**42**		SEE Hours: 03

Course Objectives:

1. Depreciate the learning of phenomenon of electrical polarization and dielectrics prescribe the effect of external electrical field on dielectric materials.
2. Develop the implications of Quantum theory on the classical free electron theory and introduces the concept of Fermi energy through the Fermi Dirac statistics.
3. Superconductors and its applications through different effects.
4. Analyze the basic account of the functioning of laser systems with applications.
5. Explain the propagations of light through the optical fibre and the applications of optical fibres.
6. To familiarize students with the concepts of elasticity and recognize the elastic properties of materials for engg. Applications.

Modules	**Teaching Hours**
Module I : **Applied Optics:** Basic principles of lasers, Requisites of laser system. Condition for laser action. Boltzmann factor. Numerical. Construction and working of Nd-YAG and semiconductor lasers. Application of lasers: LIDAR, Industrial, Medical, and Holography: Principle of recording and reconstruction of images. Optical fibers; propagation mechanism. Acceptance angle, numerical aperture. Condition for propagation. Fractional index change, relation between NA and fractional index change, V-number. Types of optical fibers. Attenuation Co-efficient, Application of fiber optics: Endoscopy, Temperature sensor. Numericals **(L1,L2,L3)**	**9 Hours**
Module II : **Crystallography** Space lattice, lattice parameters, unit cell. Crystal systems, sketch of Bravias lattice. Miller indices - procedure for finding miller indices. Planes in cubic unit cell. Expression for interplanar distance. Packing factor for SC, BCC and FCC. Crystal structure of NaCl. Numerical. Bragg‟s law, Braggs X-ray diffractometer and application for determination of wavelength & crystal structure. Crystal imperfection-point, line & planar defects (Qualitative**).** Numericals. **(L1,L2,L3)**	**8 Hours**
Module III : **Elastic Properties Of Materials:** Review of stress, strain, Hooke's law, Elasticity, plasticity, strain hardening, strain softening and failure (fracture/fatigue).Different elastic moduli and derivation of their inter relationships, Poisson's ratio. Bending of beams: Neutral surface and neutral plane, expression for bending moment of a beam (Derivation), Application example: single cantilever (Derivation), I-Shaped girders & twisting couples. Numericals. **(L1,L2,L3)**	**9 Hours**

Module IV : **Dielectric properties of materials:** Dielectric materials: polar and non-polar dielectrics. Dielectric constant and loss. Types of polarization mechanism. Equation for internal field in liquids and solids (1D case & 3D solid). Classius-Mossoti equation. Description of solid, liquid & gaseous dielectrics with one example. Qualitative explanation of application of dielectrics in transformer. Numericals. **(L1,L2,L3)**	**8 Hours**
Module V: **Conductor and Superconductors:** Classification of solids, Electrical conduction, Classification of conducting materials. Concept of Fermi energy & Fermi level in solids, Expression for density of states. Fermi-Dirac statistics (Qualitative), Temperature dependence of resistivity in super conductors, Meissner effect, Types of super conductors, High temperature super conductors, applications of super conductors: Magnetic Levitation. Numerical **(L1,L2,L3)**	**8 Hours**

Question paper pattern: The SEE question paper will be set for **100 marks** and the marks scored by the student will be finally reduced to **50**.

- The question paper will have ten full questions carrying 20 marks each.
- There will be two full questions (with a maximum of four sub questions) from each module
- The students will have to answer five full questions selecting one from each module

Text books:

1. Engineering physics – S. P. Basavraju, Subhas Stores- 2011 Edition
2. V Rajendran, "Engineering Physics", Tata McGraw Hill Company Ltd, New Delhi-2012.

Reference Books:

1. S Mani Naidu, "Engineering Physics", Pearson India Limited-2014.
2. Engineering Physics-Gaur and Gupta-Dhanpat rai Publications-2017
3. A Marikani, "Engineering Physics", PHI Learning Private Limited Delhi-2013.
4. Wiley Precise Text, "Engineering Physics", Wiley India Private Ltd, New Delhi. Book Series-2014.
5. S. O. Pillai" Solid State Physics" New Age International Sixth Edition.

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO): At the end of the course student will be able to:
21PH12/22	CO1	Analyze the working principle of laser and optical fibers, explain the construction and working of laser and types of optical fibers, ,formulate and evaluate the numerical aperture , summarise the application of laser and optical fibers.(PO-1)
	CO2	Classify peculiar properties of crystal structure. Apply them in crystallography using X-ray diffraction technique. (PO-2)
	CO3	Analyze elastic modulii in different cases, understand various types of oscillations and their implications and recognize the elastic properties of materials for engg. Applications.
	CO4	Interprete the fundamental properties of dielectric and ferroelectric materials. Assess internal field for solids, Summarize its applications.
	CO5	Categorize properties of materials on band theory and evaluate the density of states in solids. Discuss the properties of superconductors. Explore technological applications

Course Title: **Engineering Physics Laboratory**			
Course Code	**21PHL11/21**	Credits: 01	CIE: 50
Number of Laboratory Hours/Week	**02**		SEE: 50
Total Number of Laboratory Hours	**28**		SEE Hours: 03

Course Objectives:

1. Characteristics of diode and conductivity of semiconductor
2. Information of impedance, identify passive components and transfer of resistance in electronic circuits.
3. Fundamental properties of light and emission of radiation with temperature along with the behavior of light in the phenomena of interference and diffraction.
4. Information of temperature dependence of resistivity.
5. Elastic properties a material and Apprehend the concepts of interference of light, diffraction of light and Fermi energy
6. Understand the principles of operations of semiconductor devices such as semiconductor diode, and NPN transistor using simple circuits
7. Determine elastic modulii and moment of inertia of given materials with the help of suggested procedures
8. Recognize the resonance concept and its practical applications Understand the importance of measurement procedure, honest recording and representing the data, reproduction of final results

List of Experiments	**Module**
1. Y-by single Cantilever Method	Module 3
2. Co-efficiency of Viscosity by Stoke's method	Module 3
3. Sonometer (Frequency of Ac)	Module 4
4. Determination of Fermi Energy	Module 5
5. Newton's Rings	Module 1
6. Interference of Air wedge	Module 1
7. Diffraction grating by minimum deviation method	Module 1
8. Band Gap of Semiconductor	Module 1 and Module 5
9. Transistor Characteristics	General physics
10. I-V Characteristics of Zener Diode.	General physics
11. Determination of Dielectric Constant using RC circuit.	Module 4
12. Frequency response of series and parallel LCR circuit and study of quality factor.	General physics
13. Verification of Stefan's law.	General physics
14. Torsional pendulum	Module 3
15. Fly wheel	Module 3

Reference Books:

Title	Author/s/ Editor	Publishers
1. Laboratory Manual in Applied Physics -	H.Sathyaseelan	New Age International Second Edition

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO #	**Course Outcome (CO):** At the end of the course student will be able to:

21PHL11/21	**CO1**	Demonstrate the concept the physics theory course through a series of experiments.
	CO2	Share responsibilities in small teams of four to five members for operating equipments and collecting data.
	CO3	Determine the properties on optics, electrical, electronics, modern physics and material physics through series of experiments.
	CO4	Analyze the data and interpret the results
	CO5	Write a well organized laboratory report presenting the results on a clear way.