Graphic Era HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

DEPARTMENT OF PHYSICS

1. **Subject Code**: TPH 101/201 **Course Title:** Engineering Physics
2. **Contact Hours**: L: 3 T: --- P: --- **Semester**: I / II
3. **Credits:** 3
4. **Pre-requisite**: Basic Knowledge of Physics
5. **Course Outcomes**: After completion of the course students will be able to

1. Define the wave nature of light through different phenomenon.
2. Extend the knowledge of Laser, fiber optics and polarization in engineering problems.
3. Understand the concept of theory of relativity.
4. Examine the behavior of Electromagnetic Waves (EM) using Maxwell Equations.
5. Explain the properties of Superconductors.
6. Discuss quantum theory of radiation and applications of Schrodinger wave equations.

UNIT	CONTENTS	Contact Hrs
Unit/Module-I	**Interference:** Conditions of interference, Spatial and temporal coherence, Bi-prism experiment, interference in wedge shaped film, Newton's rings. **Diffraction:** Fraunhofer diffraction at single slit and n-slits (Diffraction Grating). Rayleigh's criteria of resolution. Resolving power of grating.	**9**
Unit/Module- II	**Polarization:** Basic theory of double refraction, Malus law, Ordinary and Extra-ordinary ray, Production and detection of plane, circularly and elliptically polarized light, specific rotation and polarimeters. **Laser:** Spontaneous and Stimulated emission of radiation, Einstein Coefficients' Principle of laser action. Construction and working of Ruby and He-Ne laser photovoltaic effect.	**9**

	Fiber Optics: Introduction to Fiber Optics, types of fiber, acceptance angle and cone, numerical aperture	
Unit/Module-III	**Special theory of relativity:** Inertial and non inertial frames, Galilean transformation, Michelson-Morley experiment, Einstein postulates of special theory of relativity, Lorentz transformation equation, length contraction, time dilation, variation mass of velocity, Mass energy relation.	**8**
Unit/ Module-IV	**Superconductivity:** Essential properties of Superconductors, zero resistivity, Type I, Type II superconductors and their properties. **Electromagnatism:** Displacement current, Three electric vectors (**E**, **P**, **D**), Maxwell's equations in integral and differential forms. Electromagnetic wave propagation in free space.	**8**
Unit/ Module-V	**Quantum Mechanics:** Quantum concept and radiation, Wave particle duality (de-Broglie concept of matter waves), Heisenberg's uncertainty principle, Schrodinger's wave equation in one dimension under a conservative force field, wave function and its significance, Eigen values and Eigen functions for particle confined in one dimensional infinite potential box (rigid box).	**8**
	Total	**42**

Text Books:

- Ajoy Ghatak, "Optics", 4th Edition, Tata Mc Graw Hill, 2009
- N. Subrahmanyam Brijlal & M. N. Avadhanulu, "Optics :", 24th Edition, S. Chand, 2010
- A. Beiser, "Concepts of Modern Physics", Tatac Mc Graw Hill
- Resnick, Krane, Halliday, "Physics (vol I&II)", 5th Edition, Wiley, 2007
- Robert Resnick, "Introduction to Special Relativity", Wiley Publishers, 2007

Reference Books:

- John R. Taylor, Chris D. Zafiratos, Michael A. Dubson, "Modern Physics", 1st Edotion, Pearson Education , 2007

- Gerd Keiser, “Optic Fiber Communication” 5th Edition, Tata Mc. Graw Hill, 2017
- Alastair I M Rae, Jim Napolitano, “Quantum Mechanics” 6th Edition, Wiley, 2015
- David J. Griffiths, “Introduction to Electrodynamics”, 3rd Edition, Prentice, 2011
- Charles P. Poole, Jr. Frank J. Owens , “Introduction to Nanotechnology”, Wiley, 2017
- Hug D. Young & Roger A. Freedman, “University Physics”, 12th Edition, Pearson Publication, 2008
- Alan Giambattista, Betty Mc. Carthy Richardson, Robert C Richardson, “Fundamentals of Physics”, 1st Edition, Tata Mc Graw Hill, 2009

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DEPARTMENT OF PHYSICS

1. **Subject Code**: PPH 151/251 **Course Title**: Physics Lab
2. **Contact Hours**: L: 0 T: 0 P: 2

. **Semester**: I / II

3. **Credits:** 1
4. **Pre-requisite**: Basic Knowledge of Experiments in Physics
5. **Course outcomes:** After the completion of the course students will be able to

   1. Find the electrical and magnetic properties of materials and extend the knowledge of nanotechnology using electroplating.

   2. Understand the principle and characteristics of photo devices and optical fiber.

   3. Apply the methods of calibration to analog instruments.

   4. Determine the wavelength of light and specific rotation of optically active substance through the experiments based on phenomena of optics.

Students have to perform any twelve experiments:

1. To determine the wavelength of monochromatic light by Newton's ring experiment.
2. To determine refractive index of transparent liquid by Newton's ring experiment.
3. To determine the specific resistance of the constantan wire using Carey- Foster's bridge.
4. To determine the wavelength of monochromatic light using Fresnel Biprism experiment
5. To determine the energy band gap of given semiconductor by Four-probe method.
6. (a) To determine the wavelengths of spectral line of Mercury light using plane transmission grating.

   (b) To determine the wavelengths of given Laser light using plane transmission grating.

7. To study the variation of magnetic field with distance along the axis of circular coil carrying current and to determine the radius of coil.
8. To determine the magnetic susceptibility of a paramagnetic substance by Quincke's method.
9. To determine the specific rotation of Sugar Solution using Half Shade Polarimeter.
10. To study the characteristics of Solar Cell
11. a) To calibrate Voltmeter by using potentiometer.
    b) To calibrate Ammeter by using potentiometer.
12. To determine Planck's constant by photoelectric method and study the variation of intensity with distance.
13. To determine the electro chemical equivalent of Copper.
14. To Verify Law of Malus.
15. To study Hall Effect and determine the hall voltage, hall coefficient, current density and carrier mobility of a given semiconductor.
16. To determine the numerical aperture and acceptance angle of an optical fiber.