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

Engineering Physics

Name of Department: - Physics

1. Subject Code: **TPH 101/201** Course Title: **Engineering Physics**
2. Contact Hours: **L:** 3 **T:** 0 **P:** 0
3. Examination Duration (Hrs): **Theory** 3 **Practical** 0
4. Relative Weight: **CIE** 25 **PRS** 0 **MSE** 25 **SEE** 50 **PRE** 0
5. Credits: 3
6. Semester: I/II
7. Category of Course: DSC
8. **Pre-requisite**: Basic Knowledge of Physics

9. **Course Outcome:**	After completion of the course the students will be able to**:** **CO1:** Define the wave nature of light through different phenomenon. **CO2:** Extend the knowledge of Laser, fiber optics and polarization in engineering problems. **CO3:** Understand the concept of theory of relativity. **CO4:** Discuss quantum theory of radiation and applications of Schrodinger wave equations and Quantum Computing **CO5:** Examine the behavior of superconductors and Explain the Maxwell's equations and nanomaterials.

10. **Details of the Course:**

UNIT	CONTENTS	Contact Hrs
Unit/Module-I	**Interference:** Conditions of interference, Spatial and temporal coherence, Bi-prism, 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, elliptically and circularly 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. **Fiber Optics:** Introduction to fiber optics; types of fiber, acceptance angle and cone angle, numerical aperture.	**9**
Unit/Module-III	**Special theory of relativity:** Inertial and non-inertial frames, Galilean transformation, Michelson-Morley experiment (qualitatively), Einstein postulates of	**8**

	special theory of relativity, Lorentz transformation equations, length contraction, time dilation, variation of mass with velocity, mass-energy relation.	
Unit/ Module-IV	**Quantum Mechanics:** Quantum concept and radiation, Wave particle duality (de-Broglie concept of matter waves), Heisenberg's uncertainty principle, wave function and its significance, Schrodinger's equations, Schrodinger's wave function for a particle confined in one dimensional infinite potential box (rigid box), Eigen values and Eigen functions. **Quantum computers:** Introduction to quantum computing, Principle, Nanocomputing, prospects and challenges.	**8**
Unit/ Module-V	**Superconductivity:** Essential properties of superconductors, zero resistivity, Type I, Type II superconductors and their properties. **Electromagnetism:** Displacement current, Maxwell's Equations in differential form. **Nano Physics**: Density of states, Nanostructures, fabrication, and characterization techniques (qualitatively).	**8**
	Total	**42**

Text Books:

S.No.	**Name of Authors/Books/Publishers/Place of Publication**	Edition	Year of Publication/ Reprint
1.	Ajoy Ghatak, "Optics", Tata Mc Graw Hill.	4thEdition	2009
2.	N. Subrahmanyam Brijlal& M. N. Avadhanulu, "Optics:", S. Chand.	24thEdition	2010
3.	A. Beiser, "Concepts of Modern Physics", Tata Mc Graw Hill.	1stEdition	
4.	Resnick, Krane, Halliday, "Physics (vol I&II)", Wiley.	5th Edition	2007
5.	Robert Resnick, "Introduction to Special Relativity", Wiley Publishers.	1stEdition	2007
6.	N. David Mermin, Quantum computer Science, Cambridge University Press.	1stEdition	2007
7.	Adam Smith, "The Beginner's guide to quantum computing & mechanics", A. Smith Media.	1stEdition	2022
	Reference Books	1stEdition	
1.	John R. Taylor, Chris D. Zafiratos, Michael A. Dubson, "Modern Physics", Pearson Education.	1stEdition	2007
2.	Gerd Keiser, "Optic Fiber Communication", Tata Mc. Graw Hill.	5thEdition	2017
3.	Alastair I M Rae, Jim Napolitano, "Quantum Mechanics" Wiley.	6thEdition	2015
4.	David J. Griffiths, "Introduction to Electrodynamics", Prentice.	3rd Edition	2011
5.	Charles P. Poole, Jr. Frank J. Owens, "Introduction to Nanotechnology", Wiley.		2017
6.	Hug D. Young & Roger A. Freedman, "University Physics", Edition, Pearson Publication.	12thEdition	2008