24PH103 PHYSICS FOR ENGINEERS		
Course Category: Physics (PH)	**Program Core (PC)**	**Credits:**
Course Type:	**Theory**	**Lecture-Tutor** **Practice:**
Pre-requisites: 10+2 Physics		**Continuous A** **Summative As** **Total Marks:**

Course Description:

Physics is an interdisciplinary field that serves as a bridge between basi applying physical principles to solve engineering problems. This course enc such as crystallography, X-ray diffraction, and crystal structure determ principles and applications of lasers and optical fibers. Additionally, mechanics, synthesis, characterization, and application of Nanomaterials, in

Course Objectives:

1. Introduce the fundamentals of crystal structure and the techniques f X-ray diffraction.
2. Elucidate the core principles of lasers and optical fibers, highlightin in science and technology.
3. Discuss the foundational concepts of mechanics and their formaliza applications.
4. Develop skills to understand and apply the principles of physical p engineering problems.
5. Explain how the dimensionality of materials at the Nanoscale influ with exploring numerous industrial applications.

Course Outcomes:
At the end of the course, the students will be able to

CO	Course Outcomes
CO1	Describe various types of crystal structures and their characterizatio
CO2	Identify different types of lasers and optical fibers, and their applicat
CO3	Explain the basic concepts of mechanics as applicable to engineering
CO4	Demonstrate the physical properties of solids and their interrelations
CO5	Identify the fabrication methods of Nanomaterials and carbon na their applications in engineering and technology.

Course articulation matrix

COs	POs									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	**H**									
CO2	**H**		**M**							
CO3	**H**	**L**								
CO4	**H**									
CO5	**H**				**L**					

(1-Low,2-Medium,3-High)

Course Content

UNIT-I

Crystallography and Characterization of Mater

Crystallography: Space lattice, basis, unit cell and lattice parameters, Brav (3 Dimensional), coordination number, packing fraction of SC, FCC, and B

separation between successive (hkl) planes.
Characterization of Materials: Introduction, diffraction of X – rays, deriv
Bragg's X – ray spectrometer, determination of crystal structure by powder

UNIT-II

Lasers and Optical Fibers

Lasers: Introduction, characteristics of laser, basic principles of lasers (abs
emission and stimulated emission), requirements of lasers (pumping, popul
resonance cavity), solid state laser (Ruby), applications of lasers.
Optical Fibers: Introduction, fundamentals of optical fiber, propagation of
types of optical fiber, numerical aperture, fractional refractive index change
optical fibers in communication and its advantages.

UNIT-III

Kinematics of Particle Motion

Kinematics of Rectilinear Motion: Displacement, velocity, and accelerati
with uniform acceleration, and motion with variable acceleration.
Kinematics of Curvilinear Motion: Rectangular components of velocit
and tangential acceleration, motion of projectiles.

UNIT-IV

Properties of Solids

Properties of Solids: Motion of a particle in a central force field, Kep
applications, Hooke's law, stress – strain relation, elastic moduli, relation
Poisson's ratio, expression for Poisson's ratio in terms of elastic constant
modulus by static torsion.

UNIT-V

Nanomaterials

Nanomaterials: Introduction to Nanomaterials, general properties of Na
the Nanoscale (surface to volume ratio, quantum confinement effect), fa
using plasma arcing and chemical vapour deposition methods, characteriza
SEM and TEM, Carbon nano tubes, SWNT, MWNT, formation of Carbon
laser ablation, properties of Carbon nano tubes, Applications of CNTs & na

Text Books:

1. Avadhanulu, M. N. (2019). A textbook of engineering physics (11th ed.)
2. Tayal, A. K. (2006). Engineering Mechanics: Statics and Dynamics (13
   Publications.

Reference Books:

1. Halliday, D. Resnick, R., & Walker, J. (2020). Fundamentals of Physics (1
   Sons.
2. Pandey, B.K., & Chaturvedi, S. (2021). Engineering Physics (1st ed.). Cen
3. Sharma, S., & Sharma, J. (2018). Engineering Physics (1st ed.). Pearson E
4. Srinivasan, M. R. (2009). Physics for Engineers (1st ed.). New Age Interna

Web Resources:

1. X – ray crystallography and Diffraction, NPTEL– Ranjit Kumar Ray, Pro

Madras, https://onlinecourses.nptel.ac.in/noc22_mm39/preview

2. Introduction to LASER, NPTEL – M. R. Shenoy, Professor, IIT – Delhi, h nptel.ac.in/noc21_ph01/preview
3. Fiber Optics, NPTEL – Vipul Rastogi, Professor, IIT – Roorkee, https://on noc20_ph07/preview
4. Mechanics, NPTEL – Anjani Kumar Tiwari, Professor, IIT – Roorkee, https://onlinecourses.nptel.ac.in/ noc24_me148/preview.
5. Mechanics of Solids, NPTEL – Priyanka Ghosh, Professor, IIT Kanpur, https://onlinecourses.nptel.ac.in/noc22_ce46/preview.
6. Introduction to Nanoscience and Nanotechnology, NPTEL – Swayam, Sw University of Kerala, https://onlinecourses.swayam2.ac.in/cec24_cy03/pre