SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR

I B. TECH, I Semester	**L**	**T**	**P**	**C**
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Branch: MECHANICAL ENGINEERING.
PHYSICS (18HS0850)

Objectives:

- Will understand properties of electromagnetic waves.
- Will recognize the basic concepts related Maxwell equations and properties of magnetic materials.
- Will recognize the various basic terms related to Waves, Optics and Acoustics.
- Will recognize the basic concepts related properties of Lasers..
- To understand the fundamentals Nano materials.

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Unit –I: ELECTROMAGNETIC WAVES.

The wave equation- plane electromagnetic waves in vacuum their transverse nature and polarization – relation between electric and magnetic fields of an electromagnetic wave – energy carried by an electromagnetic wave and examples – Momentum carried by electromagnetic waves and resultant pressure – Reflection and transmission of electromagnetic waves from a non conducting medium-vacuum interface for normal incidence.

Unit – II: ELECTROMAGNETISM AND MAGNETIC PROPERTIES OF MATERIALS.

Laws of electrostatics, electric current and the continuity equation, laws of magnetism. Ampere's, Bio-Savart, Faraday's laws and Lenses law – electromagnetic breaking and its applications - Maxwell's equations.

Magnetization - permeability and susceptibility - classification of magnetic materials, ferromagnetism - magnetic domains and hysteresis - applications.

Unit – III: WAVES, OPTICS & ACOUSTICS

Mechanical and electrical simple harmonic oscillators - damped harmonic oscillator - forced mechanical and electrical oscillators.

Interference in thin films by reflection - Newton's rings - Farunhofer diffraction from a single slit - Diffraction gratings and characteristics of grating spectrum.

Reverberation- Reverberation time (qualitative treatment) - Factors affecting acoustics of buildings and their remedies.

Unit – IV: LASERS.

Properties of laser beams: mono-chromaticity, coherence, directionality and brightness Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne), solid-state lasers (Neodymium) , applications of lasers in science, engineering and medicine.

UNIT-V: PHYSICS OF NANOMATERIALS.

Introduction, significance of nano scale – surface area and quantum confinement-Quantum dot, quantum well -Quantum wire -Synthesis of nanomaterials- Top Down Process-Ball Milling ; Bottom Up Process: Sol-Gel method– CNT-Properties of Graphene-Applications.

Reference books:

1. H. J. Pain, "The physics of vibrations and waves", Wiley, 2006.
2. E. Hecht, "Optics", Pearson Education, 2008.
3. O. Svelto, "Principles of Lasers", Springer Science & Business Media, 2010.
4. Halliday and Resnick, Physics.
5. W .Saslow, Electricity, magnetism and light.
6. Engineering Physics – K.Thyagarajan, MCGrawHill Education Private Ltd, New Delhi.

Course outcomes:

Studies will be familiar with

- Able to explain properties of electromagnetic waves.
- Some of the basic concepts related Maxwell equations and properties of magnetic materials.
- Various basic terms related to Waves, Optics and Acoustics.
- Some of the basic concepts related properties of Laser.
- Understand the importance of Nanotechnology.