I Year I Semester	L	T	P	C
Code: 20PH1001	3	0	0	3

ENGINEERING PHYSICS

Course Objectives:

Physics curriculum which is re-oriented to the needs of non-circuital branches of graduate engineering courses offered by RAGHU Engineering College (A), Visakhapatnam that serves as a transit to understand the branch specific advanced topics. The course is designed to:

1. Impart concepts of mechanics required to identify forces and moments in mechanical systems by vector representation – extend Newton's second law for inertial and non-inertial frames of reference-study different types of harmonic oscillatory motions.
2. Study the structure-property relationship exhibited by solid materials within the elastic limit.
3. Impart knowledge in basic concepts of LASERs along with its Engineering applications-Familiarize types of sensors for various engineering applications
4. Explore the knowledge of magnetic and dielectric materials and their utility in appliances.

UNIT-I: MECHANICS (12hrs)

Introduction - Basic Laws of Vectors and Scalars - Conservative and Non-Conservative Forces –Show that F = - Grad V - Newton's Laws in Inertial and Non inertial frames of reference - Non-Inertial Frames of reference - simple harmonic oscillator and solution of differential equation -Damped Harmonic motion –Damped harmonic oscillator and solution of differential equation and Q-factor-Forced oscillations and general solution of its differential equation-Resonance (amplitude resonance).

Learning Outcome:

The students will be able to

- Identify forces and moments in mechanical systems using scalar and vector techniques
- Extend Newton's second law for inertial and non-inertial frame of reference
- Explain simple harmonic motion and damped harmonic motions

UNIT-II: ELASTICITY (10hrs)

Introduction - Stress and Strain - Hooke's Law – Stress - Strain Curve -Different types of moduli (Y,n,K) and their relations – Poisson's ratio and expression for Poisson's ratio in terms of Y,n, K – Bending of Beams – Bending moment of a Beam- Depression of Cantilever beam.

Learning Outcome:

The students will be able to

- Understand the elasticity and plasticity concepts, Study types of moduli and their relation
- Analyze the concepts of shearing force and moment of inertia

UNIT-III: COUSTICS & ULTRASONICS (10 hrs)

Introduction – Reverberation – Reverberation Time - Sabine's Formula-Absorption Coefficient and its Determination –Factors Affecting Acoustics of Buildings and their Remedies.

Production of Ultrasonics by Magnetostriction and Piezoelectric Methods - Non-Destructive Testing - Pulse Echo System Through Transmission and Reflection Modes - Applications.

Learning Outcome:
The students will be able to

- Analyze acoustic properties of typically used materials in buildings
- Recognize sound level disruptors and their use in architectural acoustics
- Use of ultrasonics in flaw detection using NDT technique

UNIT-IV: LASERS (9hrs)

Characteristics of laser – Spontaneous and Stimulated Emission of Radiation-Population Inversion – Einsteinare Coefficients & Relation between them and their Significance-Pumping Mechanisms – Ruby Laser (Solid Laser)–Helium- Neon Laser (Gas Laser).

Learning Outcome:

The students will be able to

- Understand the basic concepts of LASER light Sources
- Study Different types of laser systems

UNIT- V: MAGNETISM & DIELECTRICS (12 hrs)

Introduction – Magnetic Dipole Moment - Magnetization-Magnetic Susceptibility and Permeability – Origin of Permanent Magnetic Moment-Bohr Magnet on Classification of Magnetic Materials (Dia, Para and Ferro) – Domain theory of Ferromagnetism - Hysteresis - Soft and Hard Magnetic Materials - Applications of Ferromagnetic Materials.

Introduction-Dielectric Polarization-Dielectric Polarizability, Susceptibility and Dielectric Constant-Types of Polarizations - Electronic and Ionic (Quantitative), Orientation Polarizations (Qualitative) – Frequency Dependence of Polarization - Applications of Dielectrics

Learning Outcome:

The students will be able to

- Classify the magnetic materials based on susceptibility and their temperature dependence.
- Apply the concept of magnetism to magnetic devices.
- Explain the applications of dielectric and magnetic materials.
- Explain the concept of dielectric constant and polarization in dielectric materials.

Text Books:

1. "Engineering Mechanics" by Manoj K Harbola, Cengage Publications 2nd Eds.
2. "A text book of Engineering Physics" by PG Kshirsagar & MN Avadhanulu, S Chand Ltd.
3. "Engineering Physics" by R K Gaurand SL Gupta, Dhanpat Rai Publications.
4. "Sensor and Transducers" by Ian R Sinclair, Elsevier (Newnes) 3rd Eds.

Reference Books:

1. "Engineering Physics" by M R Srinivasan, New Age International Publishers.
2. "Lectures on Physics" by Richard P Feynman, Pearson Publishers, New Millennium Eds.
3. "Lasers and Non-linear Optics" by BB Laud, New Age International Publishers(3rdEds.)