ENGINEERING PHYSICS

Course Objectives:

Physics curriculum which is re-oriented to the needs of all branches of graduate engineering courses, that serves as a transit to understand the branch specific advanced topics.

- > To impart in-depth knowledge of Physics related to different engineering applications
- To introduce advances in science and technology for engineering applications

Course Outcomes:

- 1. Imparts 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. Studies the structure-property relationship exhibited by solid materials within the elastic limit.
- 3. Design and understand acoustics and remedies for an acoustically good hall/auditorium. Apply the knowledge of Ultrasonic's via Non-Destructive Testing in industries.
- 4. Imparts knowledge in basic concepts of LASERs along with its Engineering applications- Familiarize types of sensors for various engineering applications.
- 5. Explores the knowledge of magnetic and dielectric materials and their utility in appliances.

UNIT-I: MECHANICS

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).

UNIT-II: ELASTICITY

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.

UNIT-III: COUSTICS & ULTRASONICS

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

Production of Ultrasonic's by Magneto striation and Piezoelectric Methods - Non-Destructive Testing- Pulse Echo System through Transmission and Reflection Modes - Applications.

UNIT-IV: LASERS

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

UNIT-V MAGNETISM & DIELECTRICS

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.

Text Books:

- 1. "Engineering Mechanics" by Manoj K Harbola, Cengage Publications 2nd Eds.
- 2. "A text book of Engineering Physics" by P G Kshirsagar& M N Avadhanulu, S Chand Ltd
- 3. "Engineering Physics" by R K Gaur and S L 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 B B Laud, New Age International Publishers (3 rd Eds.)