JAWAHARLAL NEHRUTECHNOLOGICALUNIVERSITY: KAKINADA

KAKINADA–533003, Andhra Pradesh, India

R-19 Syllabus for ME JNTUK

I Year-I Semester		L	T	P	C
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ENGINEERING PHYSICS (BS1108)					

Prerequisite Course: Fundamental concepts of basic physics

Course Objectives:

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) Tap the Simple harmonic motion and its adaptability for improved acoustic quality of concert halls- impart concepts of flaw detection techniques using ultrasonics.
3) Study the structure- property relationship exhibited by solid materials within the elastic limit.
4) Impart knowledge in basic concepts of LASERs along with its Engineering applications- Familiarize types of sensors for various engineering applications
5) Explore the knowledge of magnetic and dielectric materials and their utility in appliances.

Course Outcomes:

Upon completion of the course, the student will be able to achieve the following outcomes.

Cos	Course Outcomes	POs
1	Analyse frame of references and understand the types of oscillations and their characteristic.	3
2	Understanding the factors effecting the acoustics of buildings and propagation of EM waves in different media.	1
3	Study types of moduli and characteristics of bending of beams	1
4	Able to understand the production of Lasers and different types of sensors with applications	2
5	Gain the knowledge of magnetic and dielectric behavior of various materials to apply in industry and engineering.	1

Syllabus:

UNIT-I:

MECHANICS: Basic laws of vectors and scalars, rotational frames-conservative and non – conservative forces , F = - grad V, Newton's laws in inertial and linear accelerating non-inertial frames of reference, rotating frame of reference with constant angular velocity, Harmonic oscillator ; damped harmonic motion ; Forced oscillations and resonance.

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:

ACOUSTICS & ULTRASONICS: Introduction – Reverberation - Reverberation time - Sabine's formula (Derivation using growth and decay method) – absorption coefficient and its determination- factors affecting acoustics of buildings and their remedies.

Production of ultrasonics by Magnetostriction and piezoelectric methods – Detection of ultrasonic's - acoustic grating - Non-Destructive Testing- pulse echo system through transmission and reflection modes - Applications.

Outcome:

The students will be able to

- Explain how sound is propagated in buildings
- 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-III:

ELASTICITY:, stress, strain, Hooke's law, stress-strain curve, generalized Hooke's law with and without thermal strains for isotropic materials, different types of moduli and their relations, bending of beams – Bending moment of a beam – Depression of cantilever.

Outcome:

The students will be able to

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

UNIT-IV:

LASERS & SENSORS: Characteristics–Spontaneous and Stimulated emission of radiation – population inversion - Einstein's coefficients & Relation between them and their significance - Pumping Mechanisms - Ruby laser – Helium Neon laser – Applications.

SENSORS (qualitative description only): Different types of sensors and applications; Strain and Pressure sensors- Piezoelectric, Magnetostrictive sensors, Temperature sensor - bimetallic strip, pyro electric detectors.

Outcome:

The students will be able to

- Understand the basic concepts of LASER light Sources
- Study Different types of laser systems
- Identify different types of sensors and their working principles

UNIT-V:

MAGNETISM & DIELECTRICS: Introduction – Magnetic dipole moment – Magnetization-Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Bohr Magneton - Classification of magnetic materials (Dia, Para and Ferro) – Domain concept 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), Orientational polarizations (qualitative)-Lorentz internal field – Claussius-Mossoti equation- Frequency dependence of polarization - Applications of dielectrics.

Outcome:

The students will be able to

- Explain the concept of dielectric constant and polarization in dielectric materials.
- Summarize various types of polarization of dielectrics.
- Interpret Lorentz field and Claussius-Mosotti relation in dielectrics.
- Classify the magnetic materials based on susceptibility and their temperature dependence.
- Explain the applications of dielectric and magnetic materials.
- Apply the concept of magnetism to magnetic devices.

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 & Company 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 (3rd Eds.).