Applied Physics

Course Code	19BS1204	Year	I	Semester	II
Course Category	Basic Sciences	Branch	ME	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Nil
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	**Estimate** forces and moments in mechanical systems using scalar and vector techniques.
CO2	**Apply** the concepts of strain, internal force, stress and equilibrium to deformation of solids.
CO3	**Explain** the fundamental theory for the analysis of heat transfer processes in solids and liquids and to apply basic principles of heat transfer in design of refrigerators and heaters.
CO4	**Describe** the fundamental principles of acoustics with emphasis on physical mechanisms, law and relationships.
CO5	**Outline** the basic principle and operation of different types of *sensors.*

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3											3	
CO2	3	2											3	
CO3	3	2											3	
CO4	3	2											3	
CO5	3	2											3	

Syllabus		
Unit No.	**Contents**	**Mapped CO**
I	**Mechanics:** Basic laws of vectors and scalars; Rotational frames; Conservative and non-conservative forces; F = - grad V; Central forces; Elliptical, parabolic and hyperbolic orbits; Non-inertial frames of reference; Centripetal acceleration; Harmonic oscillator; Damped harmonic motion; Forced oscillations and resonance. Degrees of freedom.	CO1
II	**Elasticity:** Concepts of elasticity and plasticity, stress and strain, Hooke's law, different moduli of elasticity, Poisson's ratio, strain energy, stress-strain diagram, elastic behavior of a material, factors affecting elasticity, relation between different moduli of elasticity, determination of elastic moduli	CO2
III	**Thermal Properties:** Transfer of heat energy; Thermal expansion of solids and liquids; Expansion joints - bimetallic strips; Thermal conduction, convection and radiation and their fundamental laws; Heat conductions in solids; Thermal conductivity - Forbe's and Lee's disc method: theory and experiment; Applications (qualitative only): heat exchangers, refrigerators, ovens and solar water heaters.	CO3

IV	**Acoustics:** Characteristics of sound waves; Weber-Fechner Law; Absorption coefficient, determination of absorption coefficient; Reverberation time; Sabine's formula, derivation of Sabine's formula using growth and decay method; Intensity of sound; Acoustics of Buildings, Acoustic requirements of a good auditorium.	CO4
V	**Sensors:** Sensors (qualitative description only); Different types of sensors and applications; Strain and pressure sensors - Piezoelectric, magnetostrictive sensors; Fibre optic methods of pressure sensing; Temperature sensor - bimetallic strip, piezoelectric detectors; Hall-effect sensor; Smoke and fire detectors.	CO5

Learning Resources
Text Books
1. D. Kleppner and Robert Kolenkow "An Introduction to Mechanics– II" Cambridge University Press, 2015. 2. A Textbook of Engineering Physics, Volume-I By M.N. Avadhanulu& T.V.S. Arun Murthy S Chand. 3. Ian R Sinclair, Sensor and Transducers 3/e, 2001, Elsevier (Newnes)
Reference Books
1. M K Varma "Introduction to Mechanics"-Universities Press,2015. 2. PrithwirajPurkait, BudhadityaBiswas and ChiranjibKoley, Chapter 11 Sensors and Transducers, Electrical and Electronics Measurements and Instrumentation, 1/e., 2013 McGraw Hill Education (India) Private Limited, 2013.
e- Resources & other digital material
http://nptel.ac.in/courses.phphttp://jntuk-coeer http://freevideolectures.com/Course/3048/Physics-of-Materials/36