ACADEMIC YEAR: 2019 – 2020 ONWARDS

U18PHI1202/ U18PHI2202	Engineering Physics (Common to All B.E., B .Tech.)	L	T	P	J	C
		3	0	2	0	4

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Enhance the fundamental knowledge in properties of matter and its applications relevant to various streams of Engineering and Technology.

CO2: Understanding the phenomenon of heat and transfer mechanism in engineering systems.

CO3: Acquire knowledge in the basic concepts of quantum mechanics and electron microscopy.

CO4: Imbibe the concept of lasers, optical fibers and their applications in engineering.

CO5: Introduce and provide a broad view of acoustics.

CO6: Apply the NDT techniques and modern engineering tools necessary for Engineering practice.

Pre-requisties:

High School Education

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	M									M
CO2	S	M	M									M
CO3	S	M		M								M
CO4	S	M		M								M
CO5	S	M										M
CO6	S	M	M									M

Course Assessment methods

Direct
1. Continuous Assessment Test I, II (Theory component) 2. Cooperative learning report, Assignment; Group Presentation, Project report, Poster preparation, 3. Pre/Post - experiment Test/Viva; Experimental Report for each experiment (Lab component) 4. Model examination (Lab component) 5. End Semester Examination (Theory and Lab component)
Indirect
1. Course-end survey

Theory Component content:

1. PROPERTIES OF MATTER (9)

Hooke's Law - Elastic moduli - Relation between elastic constants - Poisson's Ratio – Stress - Strain Diagram and its uses – factors affecting elastic modulus – Bending of beams – Expression for bending moment and depression - Cantilever - Depression of a cantilever - experimental determination of Young's modulus by Non uniform bending – I shape girders.

2. THERMAL PHYSICS (9)

Transfer of heat energy – conduction, convection and radiation – thermal expansion of solids and liquids – expansion joints – bimetallic strips – theory of heat conduction in solids – rectilinear flow of heat – determination of thermal conductivity of a bad conductor - Lee's & Charlton's disc method - Thermal Insulation – classification and properties – heat exchangers - applications – domestic refrigerator – microwave oven.

3. MODERN PHYSICS (9)

Planck's concept (hypothesis) - Compton effect - Expression for Compton shift (Theory and Experiment) - Concept of matter waves - Physical significance of wave function - Schrödinger's wave equation - Time independent and time dependent equation - Eigen values and Eigen function - Particle in a box (one dimension) - Scanning Electron Microscope (SEM) - Transmission Electron Microscope (TEM).

4. APPLIED OPTICS (10)

LASERS: Absorption and emission - Spontaneous emission - Stimulated emission - Population inversion - Sources of excitation - Active medium - Resonant cavity - Einstein's theory of stimulated emission - Nd-YAG laser - CO_2 laser - Semiconductor lasers - Applications – holography, cutting, welding and drilling.

FIBER OPTICS: Structure of optical fiber - principle and propagation of light in optical fibers - Numerical aperture and acceptance angle - Types of optical fibers - Applications - Fiber optic communication system, Fiber endoscope.

5. ACOUSTICS AND ULTRASONICS (8)

ACOUSTICS: Sound basic definitions - Reverberation - Reverberation time - Sabine's formula (Derivation) - Absorption coefficient and its determination - Factors affecting the acoustics of the buildings and their remedies.

ULTRASONICS: Production of ultrasonic waves - Magneto-striction and Piezoelectric methods - Properties - Detection - Thermal and Knut's methods, Determination of velocity of ultrasonic waves in liquids using acoustic grating – application - A, B, C- scan.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

Lab component Contents:

LIST OF EXPERIMENTS

1. Non-uniform bending – Determination of Young's modulus
2. Compound Pendulum – Determination of acceleration due to gravity
3. Spectrometer – Determination of wavelength of mercury source using grating
4. Air wedge - Determination of thickness of thin sheet
5. Semiconductor Laser:
    a. Determination of wavelength of laser
    b. Determination acceptance angle and numerical aperture of an optial fibre.
    c. Determination of particle size
6. Melde's string – Determination of frequency of a turing fork
7. Determination of band gap of a semiconductor
8. Luxmeter – Determination of efficiency of solar cell
9. Lee's disc – Determination of thermal conductivity of a bad conductor
10. **B-H Curve apparatus – Determination of magnetic susceptibility of a solid material.**

Experiments for Demonstration:

1. Hall effect
2. Hardness Test
3. Four probe experiment
4. Ultrasonic interferometer – Determination of velocity of sound and compressibility of a liquid

Theory: 0	**Tutorial: 0**	**Practical: 30**	**Project: 0**	**Total: 30 Hours**

BOOKS FOR REFERENCE:

A Textbook Of Sound by N.S. Subrahmanyam

1. Concepts of Modern Physics, Arthur Besier, Shobhit Mahajan, S. Rai Choudhury, 7th Edition, Mc-Graw Hill Education, New Delhi, 2015.
2. A text book of Engineering Physics, M N Avadhanulu, S. Chand Publishing, 1992.
3. Engineering Physics, G. Senthil Kumar, VRB Publishers Pvt. Ltd., Chennai.
4. Properties of matter, Brijlal and Subrahmanyam, S. Chand & Co Ltd., New Delhi, 2004.
5. Heat Thermodynamics and Statistical Physics, Brij Lal & Subrahmanyam, S. Chand & Co Ltd, New Delhi, 2002.

6. Quantum Mechanics, Satya Prakash, Pragati Prakashan Publishers, 2015.
7. Lasers: Fundamentals and Applications, Springer Science & Business Media, K. Thyagarajan, Ajoy Ghatak, 2010.
8. Introduction to Fiber Optics, K. Thyagarajan, Ajoy Ghatak, Second Edition, Springer New York Dordrecht Heidelberg London, 2010.
9. A Textbook of Sound, Brij Lal & Subrahmanyam, Vikas Publishing, 2008.
10. Ultrasonics: Fudamentals, Technology, Applications, Second Edision, Marcel Dekker, New York, 1988.
11. Practical Physics and Electronics, C. C. Ouseph, U. J. Rao, V. VijayendranS. Viswanathan (Printers & Publishers), Pvt., Ltd.
12. Laboratory Manual of Engineering Physics, Dr. Y. Aparna & Dr. K. Venkateswara Rao, V.G.S Publishers.

BoS Coordinator Head In-charge/Physics Chairman/Bos

Principal