U18 PHI1201/ U18PHI2201	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: Understand the principles of motion and rotation of a rigid body in the plane.

CO2: Enhance the fundamental knowledge in properties of matter and its applications relevant to various streams of engineering and technology.

CO3: To introduce the phenomenon of heat and account for the consequence of heat transfer in engineering systems.

CO4: To apply the concepts of electrostatics and dielectrics for various engineering applications.

CO5: To understand the basics of magnetostatics and magnetic materials.

CO6: To introduce and provide a broad view of the smart materials and Nano science to undergraduates.

Pre-requisites :

High School Education

COs	Programme Outcomes(POs)												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S		M									M	M	
CO2	S		M									M	M	
CO3	S		M									M	M	
CO4	S		M									M		M
CO5	S		M									M		M
CO6	S		M	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 contents

KINEMATICS & RIGID BODY MOTION **9 Hours**

Definition and motion of a rigid body in the plane; Rotation in the plane; Kinematics in a coordinate system rotating and translating in the plane; Angular momentum about a point of a rigid body in planar motion; Euler's laws of motion, their independence from Newton's laws, and their necessity in describing rigid body motion; Examples.

PROPERTIES OF MATTER AND MATERIALS TESTING **9 Hours**

Properties of matter: Hooke's Law Stress - Strain Diagram - Elastic moduli - Relation between elastic constants - Poisson's Ratio - Expression for bending moment and depression - Cantilever - Expression for Young's modulus by Non uniform bending and its experimental determination.

Materials testing: Mechanism of plastic deformation, slip and twinning – types of fracture – Vickers Hardness test - fatigue and creep test.

HEAT **9 Hours**

Specific heat capacity, thermal capacity. Temperature rise. Coefficient of linear thermal expansion. Methods of measurement of thermal expansion. Thermal stresses in composite structures due to non-homogeneous thermal expansion. Applications -The bimetallic strip. Expansion gaps and rollers in engineering structures. Thermal conductivity: differential

equation of heat flow. Lee's disc apparatus for determination of thermal conductivity. Thermal Insulation. Convection and radiation. Applications to refrigeration and power electronic devices.

ELECTROSTATICS & MAGNETOSTATICS 10 Hours

ELECTROSTATICS : Maxwell's equation for electrostatics – E due to straight conductors, circular loop, infinite sheet of current - electric field intensity (D) - Electric potential - dielectrics - dielectric polarization - internal field – Clasious - Mosotti equation - dielectric strength - applications.

MAGNETOSTATICS: Maxwell's equation for magnetostatics - B in straight conductors, circular loop, infinite sheet of current - Lorentz force, magnetic field intensity (H) – Biot–Savart's Law – Ampere's Circuit Law –Magnetic flux density (B) – magnetic materials – Magnetization – Applications.

NEW ENGINEERING MATERIALS AND NANO TECHNOLOGY 8 Hours

New Engineering Materials: Metallic glasses – preparation, properties and applications – Shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications - advantages and disadvantages of SMA.

Nano Materials: synthesis - Ball milling - Sol-gel - Electro deposition — properties of nano particles and applications. – Carbon Nano Tubes – fabrication by Chemical Vapour Deposition - structure, properties & applications.

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

REFERENCES

1. Engineering Mechanics (2nd ed.), Harbola M. K., Cengage publications, New Delhi, 2009.
2. Introduction to Mechanics, Verma M. K. (CRC Press), University Press, 2000.
3. Heat and Thermodynamics, Brijlal and Subrahmanyam, 2nd Edition, 2010 S.Chand and Company, New Delhi,
4. Engineering Electromagnetics, W. H. Hayt and John A. Buck, 6th Edition, Tata McGraw Hill, New Delhi, 2014.
5. Electromagnetic Field Theory, 5th Edition, Gangadhar K.A. and Ramanathan P.M., Khanna Publishers, New Delhi, 2013.

6. Problems and Solutions in Electromagnetics, 1st Edition, J.A. Buck and W. H. Hayt, Tata McGraw Hill, New Delhi, 2010.
7. Engineering Physics, Rajendran V., Tata McGraw-Hill Education Pvt. Ltd., 2010
8. Nano – the Essentials, Pradeep T., McGraw-Hill Education, Pvt. Ltd., 2007.

Lab component:

LIST OF EXPERIMENTS (Any ten experiments)

1. Determination of thermal conductivity of a bad conductor - Lee's disc
2. Measurement of Moment of Inertia and Rigidity modulus of the wire -Torsional Pendulum
3. Hysteresis curve
4. Determination of band gap of a semiconductor
5. Determination of compressibility of a given liquid - Ultrasonic Interferometer
6. Determination of coefficient of viscosity of a given liquid by Poisulie's flow method
7. Determination of thickness of thin sheet – Air wedge
8. Determination of frequency of an electrically maintained turning fork – Melde's string
9. Determination of wavelength of mercury source using grating - Spectrometer
10. Determination of solar cell parameters
11. Determination of Young's Modulus – Non-uniform bending
12. Determination of specific resistance - Carry – Foster Bridge

Experiments for Demonstration:

1. Hall effect
2. Hardness Test
3. Four probe experiment
4. Laser experiments - Determination of wavelength of light, Numerical aperture and acceptance of optical fibre

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

REFERENCES

1. Laboratory Manual of Engineering Physics, Dr. Y. Aparna & Dr. K. Venkateswara Rao, V.G.S Publishers.
2. Practical Physics, G.L. Squires, Cambridge University Press, Cambridge, 1985.
3. Great Experiments in Physics, M.H. Shamos, Holt, Rinehart and Winston Inc., 1959.
4. Experiments in Modern Physics, A.C. Melissinos, Academic Press, N.Y., 1966.