ENGINEERING PHYSICS

II Semester: CSE / IT/ECE/EEE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS006	Foundation	3	1	3	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: 42				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Develop strong fundamentals of nano materials.
II. Meliorate the knowledge of theoretical and technological aspects of lasers.
III. Correlate principles with applications of the quantum mechanics, dielectric and magnetic materials.
IV. Enrich knowledge in modern engineering materials like semiconductors

COURSE LEARNING OUTCOMES (CLOs):

1. Recall the basic principles of physics.
2. Apply the concepts and principles in solving the problems of physics.
3. Acquire knowledge of basic terms related to dielectric material and different polarization mechanisms.
4. Review the properties of different magnetic materials and magnetization based on orientation of domains.
5. Understand the basic principles involved in the production of Laser light .
6. Describe the construction and working of different types of Laser systems.
7. Explain the basic principles, properties and applications of nanomaterials.
8. Develop knowledge about different techniques of producing nanomaterials.
9. Interpret and verify dual nature of matter wave concept using Davisson & Germer's experiment.
10. Estimate the energy of the particles using Schrödinger's wave equation and apply it to particle in potential box.
11. Recollect the conductivity mechanism involved in semiconductors and calculate carrier concentrations.
12. Discuss about energy gap, direct, indirect band-gap semiconductors and Hall Effect.
13. Correlate different concepts of physics with day to day life applications.
14. Understand the technical importance of dielectric, magnetic and semiconductor materials.
15. Identify the modern engineering devices based on nano materials and Lasers.

Unit-I	DIELECTRIC AND MAGNETIC PROPERTIES	Classes: 09
Dielectric properties: Basic definitions, electronic, ionic and orientation polarizations-qualitative; Internal field in solids; Magnetic properties: Basic definitions, origin of magnetic moment, Bohr magneton, classification of dia, para and ferro magnetic materials on the basis of magnetic moment, domain theory of ferro magnetism on the basis of hysteresis curve.		
Unit -II	**LASERS**	**Classes: 09**
Lasers: Characteristics of lasers, spontaneous and stimulated emission of radiation, metastable state, population inversion, lasing action, Einstein's coefficients, ruby laser, He-Ne laser, semiconductor diode laser and applications of lasers.		
Unit -III	**NANOMATERIAL**	**Classes: 09**
Nanomaterial: Origin of nanomaterial, nano scale, surface to volume ratio, quantum confinement; Properties of nanomaterials: Physical, chemical, electrical, optical, magnetic and mechanical. Bottom-up fabrication: Sol-gel; Top-down fabrication: Chemical vapour deposition; Applications of nanomaterials, characterization by XRD, TEM.		
Unit -IV	**QUANTUM MECHANICS**	**Classes: 09**
Quantum mechanics: Waves and particles, De Broglie hypothesis, matter waves, Heisenberg's uncertainty principle, Davisson and Germer experiment, Schrodinger's time independent wave equation, physical significance of the wave function, infinite potential well and its extension to three dimensions.		
Unit -V	**SEMICONDUCTOR PHYSICS**	**Classes: 09**
Semiconductor physics: Fermi level in intrinsic and extrinsic semiconductors, calculation of carrier concentration in intrinsic and extrinsic semiconductors, energy gap, direct and indirect band gap semiconductors, Hall effect.		

Text Books:

1. Dr. K. Vijaya Kumar, Dr. S. Chandralingam, "Modern Engineering Physics", Chand & Co. New Delhi, 1st Edition, 2010.
2. P. K. Palanisamy, "Engineering Physics", Scitech Publishers, 4th Edition, 2014.

Reference Books:

1. V. Rajendran, "Engineering Physics", Tata Mc Graw Hill Book Publishers, 1st Edition, 2010.
2. R. K. Gaur, S. L. Gupta, "Engineering Physics", Dhanpat Rai Publications, 8th Edition, 2001.
3. A. J. Dekker, "Solid State Physics", Macmillan India ltd, 1st Edition, 2000.
4. Hitendra K. Malik, A. K. Singh, "Engineering Physics", Mc Graw Hill Education, 1st Edition, 2009.

Web References:

1. http://link.springer.com/book
2. http://www.thphys.physics.ox.ac.uk
3. http://www.sciencedirect.com/science
4. http://www.e-booksdirectory.com

E-Text Books:

1. http://www.peaceone.net/basic/Feynman/
2. http://physicsdatabase.com/free-physics-books/
3. http://www.damtp.cam.ac.uk/user/tong/statphys/sp.pdf
4. http://www.freebookcentre.net/Physics/Solid-State-Physics-Books.html