CC143: ENGINEERING PHYSICS

CREDITS = 5 (L=3, T=0, P=2)

Course Objective:

1. To understand fundamental principles of engineering physics specifically concern to Quantum physics, Acoustics, Ultrasonic, Laser, optical fiber Nanomaterial's, and their engineering applications.

2. To provide problem solving experience and learning of concepts through it in engineering physics, in both the classroom and the laboratory learning environment.

Teaching and Assessment Scheme:

Teaching Scheme			Credits	Assessment Scheme				
L	T	P	C	Theory		Practical		Total Marks
				ESE	CE	ESE	CE	
3	0	2	5	70	30	30	20	150

Course Contents:

Unit No.	Topics	Teaching Hours
1	**Quantum Physics:** Introduction, Black Body Radiation and Distribution Law, Wien's Law of Displacement, Rayleigh – Jean's Formula, Plank's Black Body Radiation.Wave and Particle Duality, De- Broglie's hypothesis of Matter, Properties of Matter waves, Heisenberg Uncertainty Principle, Compton Effect, Numerical.	09
2	**Nonlinear optics:** LASER: Introduction, Characteristics of laser radiation, Spontaneous and stimulated emission , Working of LASER with basic idea about Population Inversion, Pumping mechanism, Optical Resonators, Nd : YAG LASER, Applications of LASER: Medical, Industrial, Communication and other. Fiber optics: Introduction of Optical Fiber, Advantages of Optical Fiber, Total Internal Reflection, Numerical Aperture and Acceptance angle, Modes of Propagation, Types of Optical Fiber, Applications of optical fiber.	12

Unit No.	Topics	Teaching Hours
3	**Superconductivity:** Introduction to Superconductivity, General properties of superconductor Types of Superconductors, High Temperature Superconductors (only Definition), BCS Theory for Superconductivity, Applications of Superconductor.	06
4	**Acoustics and Ultrasonic:** Introduction, Classifications and Characteristics of Sound, Introduction to absorption Co-efficient, Factors affecting acoustics of building and their remedies. Ultrasonic:Properties of Ultrasound Waves, Generations of Ultrasound by Piezoelectric Method and Magnetostriction, Detection Methods of Ultrasonic waves, Velocity Determination By Ultrasonic Waves, Applications of Ultrasonic, and NDT using Ultrasonic.	12
5	**Nanophysics:** Nanoscale, Surface to volume ratio, Surface effects on nanomaterials, Quantum Size effect, Electron Confinement, Advantage and Disadvantage of Nanomaterials, Carbon Nanotubes, Applications.	06
	TOTAL	**45**

List of References:

1. Sears and Zemansky, *"University Physics*", 13th Edition, Pearson Education, 2012
2. M.N. Avadhanulu and P.G. Kshirsagar, "*A Text Book of Engineering Physics*", S. Chand Publication, New Delhi. 2009
3. S. L. Gupta and Sanjay Gupta, "*Modern Engineering Physics*", 1st Edition, Dhanpat Rai Publications, New Delhi. 2011
4. B. K. Pandey and S. Chaturvedi, "*Engineering Physics*", 1st Edition, Cengage Learning, 2012

Course Outcomes (COs):

At the end of this course students will be able to …

1. Apply the Basic Laws of Physics in the area of Quantum Mechanics, to understand the concepts of wave particle duality, black body Radiation De-broglie's hypothesis and uncertainty Principle.
2. Understand the working principle of a Laser and Optical Fiber communication, their components, working of different Laser systems and their engineering applications

3. Apprise observation, experiment and theory work together to continue to expand the frontiers of knowledge of the Engineering Physics in the field of superconductivity
4. Understand the basics of Acoustics and Ultrasonics and their applications
5. Understand basic concepts of Nanophysics and their various applications.
6. Ability to identify engineering problems related to Engineering Physics.