PHY-111: APPLIED PHYSICS

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hrs

COURSE CONTENTS:

Unit	Contents	No. of hours
I	**Theory of Relativity:** Inertial and non- inertial frames of reference, earth as an inertial frame of reference, Michelson and Morley experiment, Postulates of special theory of relativity, Galilean and Lorentz transformations, Time dilation and length contraction, Relativistic kinematics and mass-energy equivalence. **Laser:** Introduction, Characteristics of lasers, Spontaneous and stimulated emission of radiation Einstein's coefficients, Population inversion, Ruby laser, Helium -Neon lasers & Semiconductor Lasers Applications of laser in industry, Scientific and medical fields.	10
II	**Oscillations:** Simple harmonic motion (SHM), Differential equation of SHM, Energy of SHM, Damped and Forced Oscillations, Relaxation Time, Quality Factor, Resonance, Sharpness of Resonance. **Fiber Optics:** Fundamental ideas about optical fiber, Propagation mechanism, Acceptance angle and acceptance cone, Numerical aperture, Propagation Mechanism and communication in fiber, Single and Multi-Mode Fibers, Step index and Graded index fiber, Attenuation and losses, Applications of optical fibers.	10
III	**Quantum Mechanics:** De Broglie waves, Phase and Group velocity concept, Uncertainty principle and its applications, Wave function, Postulates of quantum mechanics, Derivation of Schrodinger equation for time independent and time dependent cases and its applications viz. Particle in one dimensional box. **X-rays:** X-rays production, hard and soft x-rays, Continuous and characteristics x-rays, Bremsstrahlung effect	10
IV	**Electrodynamics:** Equation of continuity, displacement current, Maxwell's equations, wave equation for electromagnetic radiation, electromagnetic wave propagation in free space and isotropic dielectric medium, Poynting vector & Poynting theorem.	10

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	Superconductivity: Introduction and discovery of superconductivity, Meissner effect, Type-I and type-IIP superconductors, Isotope effect, BCS theory (qualitative). High temperature superconductors, Applications of superconductivity.	

Text Books:

1. "Engineering Physics", H.K Malik & A.K Singh, Tata McGraw-Hill.
2. Ajoy Ghatak, "Quantum Mechanics: Theory and Applications", Tata McGraw-Hill.
3. Satya Prakash and Vibhav saluja, "Engineering Physics", Pragti Prakashan Meerut.
4. "Applied Solid State Physics", Wiley India Pvt Ltd.

Reference Books:

1. Ajoy Ghatak, "Optics", Tata McGraw-Hill.
2. N. Subrahmanyam, Brij Lal, M.N. Avadhanulu, "Optics", S. Chand & Co. Ltd.
3. Anuradha De, "Fiber optics and laser Principles and Applications", New Age International.
4. Arthur Beiser, "Concepts of Modern Physics", Tata McGraw-Hill.
5. David J Griffiths, "Introduction to electrodynamics", Prentice Hall of India, New Delhi