Engineering Physics

Course Code	23BS1203	Year	I	Semester	II
Course Category	Basic Science	Branch	ECE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	----
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	**Interpret** the fundamental concepts of optical sources, structure and properties of various solid materials.L2
CO2	**Apply** the principles of lasers, optical fibers and semiconductors in engineering aspects. L3
CO3	**Apply** the concepts of quantum mechanics, Dielectrics, Magnetic materials and crystal physics for engineering applications. L3
CO4	**Examine** the nature of communication system and semiconducting materials. L4
CO5	**Analyze** the theory of solids deduce various analytical parameters. L4

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2												1
CO2	3												1
CO3	3												1
CO4		3											1
CO5		3											1

Syllabus		
Unit No.	**Contents**	**Mapped CO**
1	**Lasers**: Characteristics of lasers –Absorption, spontaneous and stimulated emission of radiation – population inversion – pumping mechanisms – Ruby, Helium-Neon & Semiconductor lasers –Applications of lasers. **Fiber optics**: Principle of optical fiber –structure of optical fiber-Acceptance angle and numerical aperture – Types of optical fibers-Attenuation in optical fibers – optical fiber in communication system-applications of optical fiber.	CO-1,2,4
2	**Crystallography:** Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes. **X-ray Diffraction**: Bragg's law- X-ray Diffract meter–crystal structure determination by Laue's and powder methods.	CO-1,3,5
3	**Dielectric Materials:** Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors-Types of polarizations-Electronic(Quantitative), Ionic(Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss **Magnetic Materials:** Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferro magnetism & Domain walls (Qualitative)- Hysteresis-soft and hard magnetic materials.	CO-1,3,5
4	**Quantum Mechanics:** Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function–Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well. **Free Electron Theory:** Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy	CO-1,3,5
5	**Semiconductors:** Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature-Drift and diffusion currents–Einstein's equation–Hall effect and its applications.	CO-1,2,4

Learning Resources
Text Books
1. A Textbook of Engineering Physics, M. N. Avadhanulu, P. G. Kshirsagar & T V S Arun Murthy, S. Chand Publications, 11th Ed. 2019. 2. Engineering Physics - D.K.Bhattacharya and PoonamTandon, Oxford press, 2015
Reference Books
1. B.K.Pandey and S. Chaturvedi, Engineering Physics- Cengage Learning, 2021. 2. Shatendra Sharma, Jyotsna Sharma, Engineering Physics –Pearson Education, 2018. 3. Sanjay D. Jain, D. Sahasrabudhe and Girish, Engineering Physics - University Press. 2010 4. M.R.Srinivasan, Engineering Physics- New Age international publishers, 2009.
e-Resources 1. https://www.loc.gov/rr/scitech/selected-internet/physics.html