**23A56101-ENGINEERING PHYSICS**

**(Common for all branches of Engineering)**

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| **Course Category:** | | Basic Sciences & Humanities | | **Credits:** | 3 | |
| **Course Type:** | | Theory | | **Lecture-Tutorial-Practical:** | 3-0-0 | |
| **Pre-requisite:** | | Fundamental Concepts of Physics | | **Sessional Evaluation:**  **External Exam Evaluation:**  **Total Marks:** | 30  70  100 | |
| **Course Objectives** | | To bridge the gap between the Physics in school at 10+2 level and UG level engineering courses by identifying the importance of the optical phenomenon like interference, diffraction etc, enlightening the periodic arrangement of atoms in crystalline solids and concepts of quantum mechanics, introduce novel concepts of dielectric and magnetic materials, physics of semiconductors. | | | | |
| **Course Outcomes** | | Aftercompletingthecourse,studentswillbeableto | | | | |
| **CO1** | | Analyzetheintensityvariationoflightdue topolarization, interference, and diffraction. | | |
| **CO2** | | Familiarizewiththebasicsofcrystalsandtheirstructures. | | |
| **CO3** | | Explain fundamentals of quantum mechanics and applyone-dimensional motion of particles. | | |
| **CO4** | | Summarize various types of polarization of dielectricsand classify the magnetic materials. | | |
| **CO5** | | ExplainthebasicconceptsofQuantumMechanics andthebandtheoryofsolids. | | |
| **CO6** | | IdentifythetypeofsemiconductorusingHalleffect. | | |
| **Course Content** | | **UNIT I**  **WAVEOPTICS:**  **Interference:** Introduction **-** Principle of superposition –Interference of light - Interference inthin films (Reflection Geometry) & applications - Colors in thin films- Newton’s Rings-Determinationofwavelengthandrefractiveindex.  **Diffraction:**Introduction-FresnelandFraunhoferdiffractions- Fraunhoferdiffractionduetosingle slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power andresolvingpowerofGrating(Qualitative).  **Polarization:** Introduction -Types of polarization - Polarization by reflection, refraction andDouble refraction-Nicol’sPrism-Halfwave andQuarterwave plates  **UNIT II**  **CRYSTALLOGRAPHY ANDX-RAYDIFFRACTION**  **Crystallography**: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices –crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Millerindices –separationbetweensuccessive (hkl)planes.  **ray diffraction:** Bragg’s law - X-ray Diffractometer – crystal structure determination byLaue’sandpowdermethods.  **UNIT-III**  **DIELECTRICAND MAGNETICMATERIALS**  **DielectricMaterials:**Introduction-Dielectricpolarization-Dielectricpolarizability,Susceptibility, Dielectric constant and Displacement Vector – Relation between the electricvectors-Typesofpolarizations-Electronic(Quantitative),Ionic(Quantitative)andOrientationpolarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complexdilectric constant–Frequencydependence ofpolarization–dielectricloss  **Magnetic Materials:**Introduction-Magneticdipolemoment-Magnetization-Magneticsusceptibility and permeability – Atomic origin of magnetism - Classification of magneticmaterials: Dia,para,Ferro,anti-ferro& Ferri magneticmaterials-Domain conceptforFerromagnetism&Domainwalls(Qualitative)-Hysteresis-softandhardmagneticmaterials  **UNIT-IV**  **QUANTUMMECHANICSAND FREEELECTRON THEORY**  **QuantumMechanics:**Dualnatureofmatter–Heisenberg’s UncertaintyPrinciple  –Significanceandpropertiesofwavefunction–Schrodinger’stime-independentanddependentwave equations– Particleinaone-dimensionalinfinite potentialwell.  **Free Electron Theory:** Classical free electron theory (Qualitative with discussion of meritsand demerits) – Quantum free electron theory – electrical conductivity based on quantum freeelectrontheory-Fermi-Diracdistribution -Densityofstates-Fermienergy.  **UNIT-V**  **SEMICONDUCTORS**  **Semiconductors:** Formation of energy bands – classification of crystalline solids - Intrinsicsemiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsicsemiconductors:densityof charge carriers–dependenceofFermienergyoncarrierconcentrationandtemperature -Driftanddiffusioncurrents–Einstein’sequation-Halleffectanditsapplications.  **Superconductors-** Introduction – Properties of superconductors – Meissner effect – Type I andTypeIIsuperconductors–BCStheory–HighTcsuperconductors–Applicationsofsuperconductors. | | | | |

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| **Text Books & Reference Books** | **TEXTBOOKS:**   * 1. ATextbookofEngineeringPhysics-M.N.Avadhanulu,P.G.Kshirsagar&TVSArunMurthy,   S.ChandPublications,11thEdition2019.   * 1. EngineeringPhysics-D.K.BhattacharyaandPoonamTandon,Oxfordpress(2015).   2. EngineeringPhysics–K.Thyagarajan,McGrawHillPublishers   **ReferenceBooks:**   1. EngineeringPhysics-B.K.PandeyandS.Chaturvedi,CengageLearning 2. EngineeringPhysics-ShatendraSharma,Jyotsna Sharma,PearsonEducation,2018. 3. EngineeringPhysics”-SanjayD. Jain,D.SahasrabudheandGirish,UniversityPress. 4. EngineeringPhysics-M.R.Srinivasan,NewAgeinternationalpublishers(2009). |
| **Web Resources:** | **https://www.loc.gov/rr/scitech/selected-internet/physics.html** |

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| Contribution of Course Outcomes towards achievement of Program Outcomes (3-High, 2-Medium, 1-Low) | | | | | | | | | | | | | | |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | - | 1 | - | 1 | 2 | - | - |
| CO2 | 2 | 2 | - | - | 2 | 1 | - | - | - | - | - | 1 | - | - |
| CO3 | 2 | 2 | 2 | 1 | 2 | - | - | - | - | - | 1 | 1 | - | - |
| CO4 | 2 | 2 | 1 | - | 2 | 1 | - | - | - | - | - | 2 | - | - |
| CO5 | 2 | 2 | - | 1 | 2 | - | - | 1 | - | - | - | 1 | - | - |
| CO6 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | - | 1 | - | - | 2 | - | - |