**17SH1202 - ENGINEERING PHYSICS**

**(Common to CE & ME)**

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| **Course Category** | Basic Science | **Credits** | 3 |
| **Course Type** | Theory | **Lecture-Tutorial-Practical** | 3 - 0 -0 |
| **Prerequisite** | Fundamental concepts of Physics | **Sessional Evaluation** | 40 |
| **Semester End Exam Evaluation** | 60 |
| **Total Marks** | 100 |

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| **Course**  **Objectives** | 1. Explain the structure of crystalline solids and their uses in X-ray diffraction techniques. 2. Basic properties of magnetic materials and the uses in Science & Technology. 3. Explain and provide the knowledge about semiconductors and their use in electronic devices. 4. Describe the basic principles of communication system and their uses in communication filed. 5. Describe the characteristics of lasers and their fibers construction and applications in Science & Technology. 6. Understand the behavior of these nanomaterial’s, quantum phenomena and the limitations of basic physical laws. | |
| **Course Outcomes** | CO1 | Understand the structure of crystalline solids and their applications in X-ray diffraction. |
| CO2 | Understand the concept of magnetization and polarization and applications of magnets and dielectric materials in various disciplines. |
| CO3 | To know the properties of semiconductor materials by projecting the view of energy bands. |
| CO4 | Understand the concept of communication system with its applications in the field of Science & Technology. |
| CO5 | Understand the utilization of laser technology in various disciplines and know the concept of optical fiber and its applications. |
| CO6 | Basic ideas about superconductors and Nano materials with their uses in various fields of Science & Technology. |

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| **Course**  **Content** | **UNIT-I**  **CRYSTALLOGRAPHY AND X-RAY DIFFRACTION:**  **Crystallography:** Introduction – Space lattice – Unit cell – Lattice parameters – Bravia’s lattice – Crystal systems – Packing fractions of SC, BCC and FCC – Planes in crystals – Miller indices – Inter planar spacing in cubic crystals.  **X-ray diffraction:** X-ray diffraction in crystals - Bragg’s law of diffraction – X-ray diffraction techniques - Laue method - Powder method (Debye-Scherer method).  **UNIT-II**  **DIELECTRICS AND MAGNETIC MATERIALS:**  **Dielectric properties:** Basic definitions, electronic, ionic (quantitative) and orientation polarizations (qualitative) – Internal fields in solids, Classius – Mossotti equation.  **Magnetic materials:** Introduction and basic definitions – Origin of magnetic moments – Classification of magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials – Hysteresis – Soft and hard magnetic materials – Applications of magnetic materials.  **UNIT-III**  **SEMICONDUCTORS AND SEMICONDUCTOR DEVICES:**  **Semiconductors:** Intrinsic and extrinsic semiconductors – Electrical conductivity in semiconductors – Drift and diffusion currents – Einstein relations – Hall effect and its applications – Direct and indirect band gap semiconductors.  **Physics of semiconductor devices:** Formation of PN Junction – I-V characteristics of PN junction diode – LED – Photo diode – Solar cell.  **UNIT-IV**  **COMMUNICATION SYSTEMS:** Communication System – Principles of basic communication system – Digital communication system – Analog communication system - Basic steps for analog/digital conversion – Sampling theorem. System-Signal bandwidth of signal – Signal impairment – Modulation – Different types - Demodulation process.  **UNIT-V**  **LASERS AND OPTICAL FIBERS:**  **Lasers:** Introduction – Characteristics of lasers – Spontaneous and stimulated emission of radiation – Condition for Population inversion – Ruby Laser - He-Ne Laser – Applications of Lasers.  **Optical fibers:** Introduction – Construction and working principle of optical fiber – Acceptance angle –Numerical aperture – Types of optical fibers – Block diagram of optical fiber communication system – Applications of optical fibers.  **UNIT-VI**  **SUPERCONDUCTIVITY AND PHYSICS OF NANOMATERIALS:**  **Superconductivity:** Introduction – Effect of magnetic field – Meissener effect – Type I and Type II superconductors – Flux quantization – BCS theory (Qualitative treatment) –Applications of superconductors.  **Physics of Nanomaterials:** Introduction – Significance of Nano scale and types of Nano materials – Physical properties: Optical, thermal, mechanical and magnetic properties – Synthesis of nanomaterial’s by top down and bottom up approaches: Ball mill, chemical vapour deposition and Sol gel – Applications of Nanomaterials. |
| **Textbooks**  **&**  **Reference**  **Books** | **TEXT BOOKS:**   1. “Principles of electronics” by V.K.Mehtha, Tata McGraw Hill. 2. “Solid State Physics” by S.O.Pillai, New Age Publications (Labs edition). 3. “Introduction to Solid State Physics” by Charles Kittel, Wiley India Pvt Ltd, 7th Edition. 4. “Engineering Physics” by R.K.Gaur & S.L.Gupta, Dhanpat Rai Publications.   **REFERENCES BOOKS:**   1. “Modern Engineering Physics” by Dr. K. Vijaya Kumar, Dr. S. Chandra Lingam, S.Chand & Company ltd. 2. “Applied Physics” by P.K. Palanisamy: SciTech Publishers. 3. “Engineering Physics” by Dr. K.T. Tyagarajan, V.Rajendran, and Tata McGraw Hill. |