# 17SH1102 - ENGINEERING PHYSICS

(Common for EEE, ECE, CSE & IT Branches)

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| **Course Category:** | Basic Sciences | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture - Tutorial - Practical:** | 3-0-0 |
| **Prerequisite:** | Fundamental Concepts of Physics | **Sessional Evaluation:**  **Univ. Exam Evaluation:**  **Total Marks:** | 40  60  100 |
| **Objectives** | Students undergoing this course are expected to   * Explain the structure of crystalline solids and their uses in X-ray diffraction techniques. * Basic properties of magnetic materials and the uses in Science & Technology. * Explain and provide the knowledge about semiconductors and their use in electronic devices. * Describe the basic principles of communication system and their uses in communication filed. * Describe the characteristics of lasers and their fibers construction and applications in Science & Technology. * Understand the behavior of these nano materials, quantum phenomena and the limitations of basic physical laws. | | |

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| **Course Outcomes** | Upon successful completion of the course, the students will be able to: | |
| 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 |
| **Course Content** | UNIT-I  **Crystallography:** Introduction, Space lattice, Unit cell, Lattice parameters, Bravias lattice, Crystal systems, Packing fractions of SC, BCC and FCC, planes in crystals, Miller indices, Interplanar 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  **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:** 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 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:** 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:** Introduction, effect of magnetic field, Meissener Effect, Type I and Type II superconductors, Flux quantization, BCS theory (Qualitative treatment), Applications of superconductors.  **Physics of Nano Materials:** Introduction, Significance of Nano scale and types of Nano materials, Physical properties: Optical, thermal, mechanical and magnetic properties, Synthesis of nano materials by Top down and bottom up approaches: ball mill, chemical vapour deposition and sol gel, Applications of nano materials. | |
| **Text Books and References** | Text Books:   1. Principles of electronics by V.K.Mehtha, Tata Mc Graw 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, 7/e 4. Engineering Physics by R.K.Gaur&S.L.Gupta, Dhanpat Rai Publications. | |
| Reference Books:   1. Modern Engineering Physics by Dr. K. Vijaya Kumar, Dr. S. Chandralingam, S.CHAND & COMPANY LTD. 2. Applied Physics by P.K. Palanisamy: Scitech Publishers. 3. Engineering Physics by Dr. K.T. Tyagarajan, V.Rajendran, Tata Mc Graw-Hill | |