Course Code	Course Title						Core / Elective
20BS104PH	**ENGINEERING PHYSICS** (Common to all B.E Courses)						**Core**
Prerequisite	Contact Hours Per Week				CIE	SEE	Credits
	L	T	D	P			
	3	1	-		40	60	4

Course Objectives:

1. To understand the concept of solid-state materials and the evolution of quantum mechanics.
2. Inculcate the knowledge of energy band in solids and their classifications.
3. Acquire the knowledge of optical fiber and lasers for engineers
4. to analyze the importance of dielectric materials and magnetic material
5. Analogy of engineering materials and their applications

Course outcomes:

1. Classify crystal and apply schrodinger wave equation to quantum mechanical system
2. Understand semiconductor physics and their appropriate applications
3. Develop the usage of different lasers and inculcate the importance of optical fibre
4. Distinguish the significance of dielectric and magnetic materials
5. Apply the basics principles of new engineering materials

CO-PO ATRICULATION MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2										2
CO2	2	2										2
CO3	2	2										2
CO4	2	2										2
CO5	2	2										2

UNIT-I

Crystallography: Introduction to crystallography, Miller Indices (Cubic system), Inter planar spacing (Cubic system), Bragg's law ,powder diffraction method, Classification of point defects ,Schottky defects and Frankel defects,

Wave Mechanics: Matter waves-de- Broglie wavelength, properties of wave function, Physical significance,Heisenberg uncertainity principle and Schrodinger time dependent and time in- dependent wave equation. Particle in potentia1 l-D box.

UNIT-II

Band Theory of Solids: Classical free electron theory (qualitative), kronig Penney model (qualitative treatment),origin of energy band formation in solids, classification of conductors, semiconductors, and insulators.

Semiconductors: , Intrinsic and Extrinsic semiconductors and conductivity in intrinsic semiconductors, Formation of P-N junction diode and its I-V characteristics, Hall effect and its applications**,** semiconductor opto electronic devices(LED,photo diode,solar cell)

UNIT–III

Lasers: Characteristics of Lasers, spontaneous and stimulated emission of radiation, Einstein's Coefficients, population inversion, Ruby Laser, Helium Neon Laser, Semi-Conductor Laser and applications of lasers.

Fiber Optics: Propagation of light through an optical fiber, Acceptance angle, Numerical aperture (NA), Types of Optical fibers and Refractive index profiles, Fiber drawing process (double Crucible Method), Losses in optical fibers, applications of optical fibers.

UNIT-IV

Dielectric Materials: Dielectrics, Types of polarizations, Electronic, Ionic, Orientational and Space charge polarizations, Expression for ionic and Electronic polarizability, Frequency and temperature dependence of dielectric polarizations, Determination of dielectric constant by capacitance Bridge method, Ferro electricity, Barium titanate, Applications of Ferroelectrics.

Magnetic Materials: Classification of magnetic materials: dia , para , ferro , anti ferro and ferromagnetic materials, Weiss molecular field theory of ferromagnetism, Magnetic domains, Hysteresis curve, soft and hard magnetic materials, Ferrites: Applications of ferrites.

UNIT-V

Superconductivity: Introduction, General properties of super conductors, Meissner effect, Type 1 and Type II superconductors, BCS theory (qualitative). Introduction to HighT_c, superconductors, Applications of superconductors.

Introduction to Nano materials: Introduction to nano materials- properties of nano materials, synthesis of nano materials by ball milling and pulsed laser deposition , characterization techniques (XRD, EDS) and application of nano materials and their health hards

Suggested Reading:

1. B.K.PandeyandS. Chaturvedi Engineering PhysicsCengage Learning2012
2. A.K.Bhandhopadhya, NanoMaterials, New AgeInternational, 1" Edition, 2007
3. M.S.AvadhanuluandP.G.Kshirusagar,Engg.Physics, S.Chand&Co.1"Edition, 1992
4. C.M.SrivastavaandC.Srinivasan-ScienceofEngg Materials, New AgelInternational.
5. R.KGaurandS.LGupta-Engineering Physics, DhanpathraiPublications, Newedition.
6. Sanjay DJain& Girish G Sahasrabudhe-Engineering Physics, University Press.

Course Code	Course Title						Core / Elective
20BS152PH	**ENGINEERING PHYSICS LAB** (Common to all B.E Courses)						Core
Prerequisite	Contact Hours Per Week				CIE	SEE	Credits
	L	T	D	P			
	-	-	3	3	25	50	1.5

Course Objectives:

1. Enhance the experience of fundamental functioning, analyzing and characterization of different experiments.
2. Develop skills in the design and development of various electronic devices.
3. Create interest in working with lasers and semiconductor devices.

Course Outcomes:

1. Apply the basic principles of lasers and optical fibers to determine wavelength and numerical aperture.
2. Remember the basics of electrical properties and apply to semiconductors.
3. Evaluate the carrier concentration of semiconductor materials by applying Hall effect principle.
4. Apply the basic knowledge of semiconductors and understand the I-V characteristics of p-n junction diode, solar cell and Thermistors.
5. Analyze the recombination and carrier generation and recombination from LED and photodiode experiments
6. Understand the concept of resonance from Melde's experiment

Course Description:

This is the basic science lab which is common for all branches of first year B.E. with facilities for the group of 30 students to carry out experiments independently. The lab is well-equipped and enables students to understand the fundamentals of Engineering Physics.

The basic focus in the Engineering Physics Laboratory is to develop scientific temper and encourage students to innovate in diverse technical areas for better understanding of technical and engineering problems. Students will attend labs where they will see principle of Physics in action.

List of Experiments:

1. Determination of wavelength of a LASER-Diffraction Grating
2. Determination of Numerical aperture of an optical fiber
3. I-V Characteristics of a p-n junction diode
4. Characteristics of LED
5. Photodiode characteristics
6. Hall effect
7. Thermistor - Characteristics
8. Energy gap of a material of a p-n junction
9. Solar Cell-characteristics
10. Newton rings.
11. **Magnetic susceptibility (Gouys or Quinck's method)**
12. **Magnetic hysteresis loop tracer**
13. **Electrical conductivity by four probe method**
14. **Estimation of Errors**
15. **Young's and Rigidity Modulus of the material of the spiral spring**

Note: Minimum 8 experiments should be conducted in the semester**.**

Text books:

1. N.K. De, "Basic Electrical Engineering" Universities press, 2015.
2. J.B. Guptha, "Fundamentals of Electrical Engineering and Electronics" S.K. Kataria& Sons Publications, 2002.
3. J.B. Guptha, "Utilization of Electric Power and Electric Traction" S.K. Kataria& Sons Publications, 2010.