Subject Code	Title of the subject	L	T	P	C	
BBSBS1021	**ENGINEERING PHYSICS**	3	0	0	3	

Course Educational Objectives

CEO1	Providing fundamental knowledge about the oscillations and waves
CEO2	To familiar with structure and different properties of materials.
CEO3	Providing knowledge of mathematical concepts to solve electromagnetic problems and fundamental information about Quantum mechanics with applications.

Course Outcomes: ***Upon successful completion of this course, students should be able to:***

CO1	Understand and analyze the concept of oscillation and wave mechanics.
CO2	Describe the principle of lasing and optoelectronics devices in communication system..
CO3	Explain the ideas of crystal structure, crystal diffraction and classification of materials.
CO4	Interpret the fundamentals of electromagnetism and deduce the electromagnetic wave equations.
CO5	Express the basics of quantum mechanics and illustrate the quantum mechanical problems.

CO-PO & PSO Mapping

COs	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2													
CO2	1	2													
CO3	1	2													
CO4	2	2													
CO5	2	2													
Avg.	1.8	2													

SYLLABUS

UNIT:1 Interaction of Wave and Matter [10 Hours]

Introduction to Oscillatory motion, Damped harmonic oscillator and its characteristics, Waves and its Characteristics, Superposition of Waves, coherent and incoherent superposition, Interference of light waves, Newton's Ring experiment, diameter of rings, determination of wavelength of unknown light and refractive index of a liquid substance.

LASER, Lasing action and characteristics & application of laser beam, construction and working of He-Ne Laser, applications of Laser. Optical fiber, Acceptance angle, Numerical aperture, Step index and Graded index fibers, Attenuations in optical fibers, Block diagram of optical fiber communication systems.

UNIT:02 Crystal Structure & Physics of Materials [10 Hours]

Crystal structure: crystal direction and plane, Miller indices, Inter planar spacing, Reciprocal Lattice and its characteristics, Reciprocal Lattice of SC, FCC and BCC, Brillouin Zone, X-ray diffraction (Basic) & Bragg's law,

Super conducting materials: Origin, type-1 and type-2, meissner's effect, critical magnetic field and current density.

Magnetic Materials: properties of Magnetic Materials (Dia, Para, Ferro) & their applications.

Di-electric materials: Polar and non-polar dielectric, types of dielectric, piezoelectric, pyro-electric and ferroelectric

Nano materials: (elementary ideas) Surface to volume ratio, grapheme, carbon nano tubes and their applications.

UNIT: 03 Electromagnetic theory (10 Hour)

Review of grad, divergence and curl, Gauss divergence theorem and Stoke's theorem (no derivations), fundamental laws of electrostatics, magneto-statics and electromagnetism, displacement current and conduction current, Maxwell's equations, Equation of continuity using Maxwell's Relations. Electromagnetic wave and its characteristics, electromagnetic wave equation for free space and in charge free conducting medium, electromagnetic energy and Poynting vector, proof of Poynting theorem.

UNIT: 04 Quantum Mechanics (10 Hours)

Introduction to dual nature: Black body radiation, photoelectric effect, Compton effect (qualitative ideas only), de-Broglie's hypothesis, Heisenberg's uncertainty principle and its application to non-existence of electron inside the nucleus and ground state energy of one dimensional harmonic oscillator, Basic postulates of Quantum Mechanics, Wave function and its characteristics, probability density , normalization, eigen values, eigen functions and expectation values, Schrödinger's equation (time dependent and time independent). Application of Schrödinger equation to one dimensional potential well and its Energy eigen values, Qualitative ideas on potential step and potential barrier with transmission probability (no derivation, only formula).

Teaching Methods: Chalk& Board/ PPT/Video Lectures

Text Books:

1. Engineering Physics by D. K. Bhattacharya and Poonam Tanden, Oxford University Press.

2. Engineering Physics, H K Malik and A K Singh, Tata McGraw Hill, MGH.

Reference Books:

1. Materials Science & Engg., V. Raghvan, Prentice Hall of India.
2. Concepts of Modern Physics, A. Beiser, S. Mahajan, S.R. Choudhary, Tata McGraw Hill.
3. Lasers & Optical engineering, P Dass, Narosa Publishers, Springer Publisher.
4. Engineering Physics by B. B. Swain and P. K. Jena, KitabMahal,Cuttack
5. Quantum Mechanics by SatyaPrakash, KitabMohal, etc. KedarNath Ram Nath Publisher

Subject Code	Title of the subject	L	T	P	C	
BBSBS1121	**ENGINEERING PHYSICS LABORATORY**	**0**	**0**	**2**	**1**	

Course Educational Objectives

CEO1	Providing fundamental information on basic instruments and their uses.
CEO2	To familiarize with different apparatus and applications to different experiments.

Course Outcomes: ***Upon successful completion of this course, students should be able to:***

CO1	Understand the concepts of oscillation and waves through experimental observation.
CO2	Study and explain the experimental observation of interference and diffraction pattern
CO3	Interpret the fundamental characteristics of various materials and semiconductor materials through experiments
CO4	Analyze the quantum concept of light by experimental observation.

CO-PO & PSO Mapping

COs	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2		1	1											
CO2	2		1	1											
CO3	2		1	1											
CO4	2		1	2											
Avg.	2		1	1.25											

List of Experiments:

1. Determination of the acceleration due to gravity by using Bar/Kater's pendulum.
2. Verification of the laws of transverse vibration by using sonometer.
3. Determination of Rigidity modulus of a wire by Static/Dynamic method.
4. Determination of wavelength of light by Newton's Rings apparatus.
5. Determination of no. of lines of a diffraction grating plate.
6. Determination of slit width of a double slit.
7. Determination of plank's constant using photo-voltaic cell.
8. Determination of band gap energy of PN junction (Ge/Si) diode.
9. Determination of the resistivity of a semiconductor with temperature by four- probe method.
10. Determination of dielectric constant of given solid by Lecher wire method.
11. Determination of coefficient of Thermal conductivity (**K**) of a metal (Cu) by using Searle's apparatus.
12. Study of mono-chromaticity and divergence of the given laser beam.
13. Study of reflection and total internal reflection by optical fibers.
14. Study of B-H curve of ferromagnetic substance.
15. Study the Hall Effect.

Practical Text Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.
3. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.