22BEAS102 PHYSICS FOR AGRICULTURAL ENGINEERS

Source: https://www.furman.edu/academics/physics/program-overview/dual-degree-pre-engineering-physics/

Hours Per Week :

L	T	P	C
2	0	2	3

PREREQUISITE KNOWLEDGE: Basics of physics.

COURSE DESCRIPTION AND OBJECTIVES:

The goal of this course is to seamless consolidation of basic principles of Physics and applications.

It emphasizes on modern technological advancement relevant to latest developments in the fields of science, engineering and technology.

MODULE – 1

UNIT-1 **8L+0T+8P=16 Hours**

FERROMAGNETISM:

Dia, Para and ferromagnetism-classification. Langevin theory of dia and paramagnetism. Adiabatic demagnetization. Weiss molecular field theory and ferromagnetism. Curie-Weiss law.

UNIT-2 **8L+0T+8P=16 Hours**

WAVE FUNCTION:

Wave particle quality, de-Broglie concept, uncertainty principle. Wave function. Time dependent and time independent Schrodinger wave equation, Qualitative explanation of Zeeman effect, Stark effect and Paschan Back effect, Raman spectroscopy. Statement of Bloch's function. Bands iii solids, velocity of Bloch's electron and effective mass.

PRACTICES:

- To find the frequency of A.C. supply using an electrical vibrator
- To find the low resistance using Carey Foster bridge without calibrating the bridge wire
- To determine dielectric constant of material using De Sauty's bridge
- To determine the value of specific charge (e/m) for electrons by helical method
- To study the induced e.m.f. as a function of velocity of the magnet
- To obtain hysteresis curve (B-H curve) on a C.R.O. and to determine related magnetic quantities
- To study the variation of magnetic field with distance along the axis of a current carrying circular coil and to detuning the radius of the coil

MODULE-2

UNIT -1 **8L+0T+8P=16 Hours**

SEMICONDUCTORS:

Distinction between metals. insulators and semiconductors. Intrinsic and extrinsic semiconductors, law of mass action. Determination of energy gap in semiconductors. Donors and acceptor levels. Superconductivity, critical magnetic field. Meissner effect. Isotope effect. Type-I and II superconductors, Josephson's effect DC and AC, Squids. Introduction to high Tc superconductors.

SKILLS:

- ✓ *Evaluate the relation between electricity and magnetism.*
- ✓ *Realize the phenomenon of geometrical and physical optics.*
- ✓ *Analyze semiconducting and dielectric materials.*

UNIT-2 **8L+0T+8P=16 Hours**

ILLUMINATION:

Spontaneous and stimulated emission, Einstein A and B coefficients. Population inversion, He-Ne and Ruby lasers. Ammonia and Ruby masers, Holography-Note. Optical fiber. Physical structure. basic theory. Mode type, input output characteristics of optical fiber and applications. Illumination: laws of illumination, luminous flux, luminous intensity, candle power, brightness.

PRACTICES:

- To determine the energy band gap in a semiconductor using a p-n Junction diode;
- To determine the slit width from Fraunhofer diffraction pattern using laser beam;
- To find the numerical aperture of optical fiber.
- To set up the fiber optic analog and digital link;
- To study the phase relationships in L.R. circuit;
- To study LCR circuit;
- To study the variations of thermo emf of a copper-constantan thermo-couple with temperature;
- To find the wave length of light by prism.
- F-test.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Apply Super conductors upon their classification	Apply	2	1, 2, 6, 7, 9
2	Apply the characteristics of Lasers to realize their applications	Apply	2	1, 2, 3, 4, 6
3	Apply the knowledge of Optical fibres to sensors and communication	Apply	2	1, 2, 3, 4, 6
4	Analyze the magnetic materials and to apply principles of quantum mechanics	Analyze	1	1, 2, 3, 4, 7
5	Evaluate the energy band gap in semiconductors	Evaluate	1	1, 2, 3, 4, 6

TEXT BOOKS:

1. Brijlal and Subrahmanyam., " Text Book of optics"., S. Chand and Co., New Delhi, 2014.
2. Sarkar Subir Kumar., "Optical State Physics and Fiber Optics. S. Chand and Co.", New Delhi, 2012.

REFERENCE BOOKS:

1. Gupta S L, Kumar V Sharma R C, "Elements of Spectroscopy" Pragati Prakasam, Meeruth, 2019.
2. Saxena B S and Gupta R C, "Solid State Physics" Pragati Prakasam, Meeruth, 2008.
3. Srivastava B N, "Essentials of Quantum Mechanics" Pragati Prakasam, Meeruth, 2020.
4. Vasudeva D N, "Fundamentals of Magnetism and Electricity" S. Chand and Co., New Delhi, 2010.