2 UG : BOS-2021

w.e.f July 2021

Prescribed for: Common for all branches of UG

BSPH-401 PHYSICS LTPC/3104

Course Outcomes:
After successful completion of the course, the students should be able to

CO1: Be familiar with basic knowledge and terms about waves and oscillations, Quantum mechanics, Laser and fibre optics, Electronic, Dielectric, magnetic and superconducting properties of materials and their applications in various engineering problems

CO2: Know the conceptual physics and its use in solving the physical problems.

CO3: Apply the principles/laws of physics for various engineering applications.

CO4: Describe the acquired knowledge of physics in his /her words.

CO5: Identify the reasons for physical happenings.

CO/PO Mapping
(S/M/W/N indicates strength of correlation) S-Strong, M-Medium, W-Weak, N-None

COs	Programme outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	W	W	W	N	W	N	N	S	S	W	S
CO2	S	S	S	M	S	N	M	N	S	W	N	M
CO3	S	W	M	W	W	S	S	N	S	M	S	S
CO4	S	S	W	N	W	M	N	N	S	S	W	W
CO5	M	W	S	W	N	N	S	N	S	W	M	S

C/BOS

7/7/21

Head
Department of Physics
Sant Longowal Inst of Engg. & Tech.
LONGOWAL (Sangrur)

BSPH-401 **PHYSICS** **LTPC/3104**

UNIT-I

Waves & Oscillations: Simple harmonic motion, damped and forced simple harmonic oscillator, Mechanical and electrical simple harmonic oscillators, damped harmonic oscillator – heavy, critical and light damping, energy decay in a damped harmonic oscillator, quality factor, forced mechanical and electrical oscillators (equation, transient and steady state behavior, phase difference between force and displacement), electrical and mechanical impedance. **8Hrs**

Quantum Mechanics: Need of quantum mechanics, de-Broglie hypothesis, wave packet; particle, group and phase velocities and their relationships, properties of wave function, Schrödinger's time independent and time dependent wave equations, energy and momentum operators, Eigen values and Eigen functions, expectation values of physical quantities (position, momentum and energy), application of time independent wave equation for a particle in a box (one dimension). **8Hrs**

Lasers & Fibre Optics: Absorption of radiation, spontaneous and stimulated emission of radiation, Einstein's coefficients, basic requirements of laser system - population inversion, optical pumping; Helium-Neon and Ruby lasers, Applications of laser, basic theory and physical structure of optical fiber, acceptance angle and numerical aperture, fiber materials, types of fibers, losses in optical fibers and basic ideas about optical sensors. **8Hrs**

UNIT-II

Electronic Materials: Free electron theory of metals (qualitative idea only) its successes and drawbacks, Bloch's theorem for particles in a periodic potential, Energy band diagrams, Kronig-penny model (to introduce origin of band gap), Energy bands in solids, E ~ k diagram, Brillouin zone and effective mass, direct and indirect band gaps, Distinction between metals, semiconductors and insulators, Hall effect. **8Hrs**

Dielectric properties of materials: Introduction of dielectric materials, polar and non-polar dielectric, basic concept of polarization, Different types of polarization, polarizability, temperature and frequency dependence of polarizability, Clausius-Mossotti relation, dielectric breakdown, dielectric loss, ferroelectric and piezoelectric materials and their applications.**6Hrs**

Magnetic materials and Superconductivity: Origin of magnetism, basic idea of diamagnetic, paramagnetic, ferromagnetic and ferrite materials, Soft and hard magnetic materials, magnetostriction, magnetic anisotropy and applications of magnetic materials. Superconductivity, Introduction, type I and type II superconductors, Meissner's effect, isotope effect, effects of magnetic field, London's equations, penetration depth, specific heat, BCS theory (qualitative idea), high temperature superconductors, applications of superconductivity. **10Hrs**

TOTAL: 48Hrs

Recommended Books:

1. The physics of vibrations and waves, H. J. Pain, Wiley, 2006
2. Engineering Physics, H K Malik and AK Singh, Tata McGraw Hill
3. Concepts of Modern Physics, A. Beiser, Tata McGraw Hill
4. Introduction to Solids, L V Azaroff, Tata McGraw Hill
5. Introduction to Solid State Physics, Charles Kittel, Wiley India Pvt. Ltd.
6. Laser theory & Applications, K Thygrajan, A K Ghatak, Mc Millan India Ltd.
7. Materials Science, M S Vijaya, G Rangarajan, Tata McGraw Hill
8. Quantum Mechanics, D. J. Griffiths, Pearson Education

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BSPH-402 Physics Lab LTPC/0021

Course Outcomes:

After successful completion of the applied physics laboratory course, students should be able to:
CO1: verify the theoretical formulations/ concepts of physics experimentally
CO2: know the art of recording the observations of an experiment scientifically.
CO3: learn by doing.
CO4: handle and operate the various elements/parts of an experiment.
CO5: justify the importance of an experiment in engineering & technology.

CO/PO Mapping
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COs	Programme outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	N	N	M	M	N	N	N	S	S	N	S
CO2	S	S	N	S	S	N	N	S	S	S	N	S
CO3	M	M	N	S	W	N	N	N	S	S	N	S
CO4	S	N	W	W	M	N	N	M	S	N	S	S
CO5	W	N	N	M	N	S	S	N	S	S	M	S

List of Experiments

1. To determine the frequency of a tuning fork using sonometer.
2. To determine the frequency of an electrically maintained tuning fork by Melde's experiment.
3. To investigate resonance in forced oscillations and to find the spring constant.
4. To verify the inverse square law of radiation using Photoelectric effect.
5. To determine the value of Planck's constant and photoelectric work function of the material of the cathode using photoelectric cell.
6. To determine the frequency of an unknown signal by drawing the Lissajous patterns for various frequency ratios and evaluative the phase difference between two sinusoidal signals applied to X and Y inputs of cathode ray oscilloscope.
7. Determination of the value of e/m of an electron by helical method/Thomson method.
8. To determine the numerical aperture (NA) of a given multimode optical fibre by using laser beam.
9. To determine the Hall voltage, Hall coefficient and the carrier concentration of the given material.
10. To find the band gap of the semiconductor material using diode in reverse bias.
11. To determine the wavelength of He-Ne laser by diffraction method.
12. Use of Michelson-Morley interferometer for determining the wavelength of He-Ne laser.
13. To find the Curie temperature of the given ferrite material.
14. To calculate the dielectric constant of the given dielectric material.
15. To study the V-I characteristics of a photo–voltaic cell (solar cell).
16. To determine the specific rotation of sugar solution using Laurent's half-shade polarimeter

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