Sankalchand Patel University

Faculty of Science & Humanities

Master of Science (Physics) (Sem-3)

In Effect from Academic Year 2022-23

Subject Code:1SC2050304	**Subject Title: Magnetic and Optical Properties of Condensed matter Physics**

COURSE OBJECTIVE:

Physics is a science to understand the nature. This course is designed to get basic understanding of the physical world.

LEARNING OUTCOMES:

- To get basic concepts of Magnetic and optical properties of condensed matter Physics

Teaching scheme (hours) per week		**Credit**		**University Examination**		**Internal Examination**		**Total**
Theory	**Practical**	**Theory**	**Practical**	**University Assessment**	**Practical**	**Internal Assessment**	**Practical**	
4	**--**	**4**	**--**	**60**	**--**	**40**	**--**	**100**

Unit	**Content**	**Lectures**	**Weight (%)**
1	Luminescence :Introduction, Excitation and emission, The Franck-Condon principle, Radiationless transitions, Temperature dependence of luminescence, Decay mechanisms-Temperatureindependent exponential decay, Temperature dependent exponential decay, power-law decay, Thermo luminescence and glow curves, Thallium activated alkali halides, emission spectra,concentration dependence of the luminescence efficiency, The sulphide phosphors, electroluminescence, carrier injection luminescence, Applications..	15	25
2	Mossbauer effect : Introduction, Resonant absorption, recoil energy, natural broadening, Doppler broadening, cross-section of resonance processes, attempts to observe resonance fluorescence, mechanism of Mossbauer effect, the experiment of Mossbauer effect, Debye-Waller factor andits temperature dependence, General importance of Mossbauer effect, Mossbauer effect and lattice dynamics, quadruple interactions, magnetic hyperfine interactions, isomer shift**.**	15	25
3	Optical properties: Propagation of light in conducting media, Anamalous skin effect, Drude model, absorption processes, exciton absorption, free carrier absorption, absorption processes involving impurities, photoconductivity, response time and gain factor, p-n junction photovoltaic cells, characteristics and applications, photovoltaic detectors. Dielectrics: Polarizability and its dependence on frequency, dielectric constant and dielectric loss, effect of alternating fields, complex dielectric constants of non-polar solids, dipolar relaxation, energy absorption and losses, some important insulating materials.	15	25
4	Magnetism :Ferromagnetic order, Curie point, temperature dependence of saturationmagnetization, magnons, thermal excitation of magnon, neutron magnetic scattering,ferrimagnetic order, Curie temperature and susceptibility of ferrimagnets, anti-ferromagnetic order, susceptibility below Neel temperature, anti-ferromagnetic magnons, Magneto-Achostic effect. Resonances: Magnetic resonance, paramagnetic resonance, resonance with relaxation, nuclearmagnetic resonance, line width,	15	25

	hyperfine splitting, Knight Shift, nuclear quadruple resonance, ferromagnetic resonance, anti-ferromagnetic resonance, spin wave resonance, electron paramagnetic resonance, cyclotron resonance and size effect, the de Haas-Van Alphen effect.		

Basic Reference book:

1. SolidState Physics by C. Kittel
2. SolidState Physics by A.J.Dekker
3. Principles of theory of Solids by J.M.Ziman
4. Introduction to Semiconductor theory by A.I.Anselm
5. SolidState Physics by Streetman
6. Principle of SolidState Physics by R.A. Levy
7. SolidState Physics by S.O. Pillai
8. Mossbauer effect by V.G.Bhide
9. Mossbauer effect and applications by G.K. Weirdheim
10. Solid State Physical Electronics by Aldert van der Ziel.
11. Molecular Structure and Spectroscopy by G. Aruldhas
12. Solid State Physics by N. W. Aschroft and N.D. Mermin