

**SARDAR PATEL UNIVERSITY**  
**Programme & Subject: M.Sc (Physics)**  
**Semester: III**  
**Syllabus with Effect from: June - 2014**

<b>Paper Code: PS03EPHY02</b>	<b>Total Credit: 4</b>
<b>Title Of Paper: Magnetic &amp; Optical Properties in Condensed Matter</b>	

Unit	Description in detail	Weightage (%)
I	Luminescence :Introduction, Excitation and emission, The Franck-Condon principle, Radiation-less transitions, Temperature dependence of luminescence, Decay mechanisms-Temperature independent 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, The Gudden-Pohl effect, The Destriau effect, carrier injection luminescence. Characteristic and non-characteristics of luminescence, applications.	25%
II	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 and its temperature dependence, General importance of Mossbauer effect, Mossbauer effect and lattice dynamics, quadruple interactions, magnetic hyperfine interactions, isomer shift.	25%
III	Optical properties: Propagation of light in conducting media, 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.	25%
IV	Magnetism :Ferromagnetic order, Curie point, temperature dependence of saturation magnetization, 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. Resonances: Magnetic resonance, paramagnetic resonance, resonance with relaxation, nuclear magnetic resonance, line width, hyperfine splitting, Knight Shift, nuclear quadruple resonance, ferromagnetic resonance, anti-ferromagnetic resonance, spin wave resonance, electron paramagnetic resonance.	25%

**Basic Text & Reference Books:-**

- Solid State Physics by C. Kittel
- Solid State Physics by A. J. Dekker
- Principles of theory of Solids by J. M. Ziman



- Introduction to Semiconductor theory by A. I. Anselm
- Solid State Physics by Streetman
- Principle of Solid State Physics by R.A. Levy
- Solid State Physics by S.O. Pillai
- Mossbauer effect by V. G. Bhide
- Mossbauer effect and applications by G.K. Weirdeim
- Solid State Physical Electronics by Aldert van der Ziel.
- Molecular Structure and Spectroscopy by G. Aruldas

