

BS (4 Years) for Affiliated Colleges



Code	Subject Title	Cr. Hrs	Semester
PHY-440	SOLID STATE PHYSICS-IV	3	VIII
Year	Discipline		
4	Physics		

Course Outlines:

Ferromagnetism and Antiferromagnetism: Ferromagnetic order, curie point and the exchange integral, temperature dependence of the saturation magnetization, saturation magnetization at absolute zero, magnons, quantization of spin waves, thermal excitation of magnons, neutron magnetic scattering, ferromagnetic order, curie temperature and susceptibility of ferrimagnets, iron garnets, antiferromagnetic order, susceptibility below the Neel temperature, antiferromagnetic magnons. Ferromagnetic domains, anisotropy energy, transition region between domains, solitons, origin of domains, coercivity and hysteresis, single domain particles, geomagnetism and biomagnetism, magnetic force microscopy, magnetic bubble domains, summary.

Magnetic Resonance: Nuclear magnetic resonance, equations of motion, line width, motional narrowing, hyperfine splitting, examples: paramagnetic point defects, knight shift, nuclear quadrupole resonance, ferromagnetic resonance, shape effects in FMR, spin wave resonance, antiferromagnetic resonance, electron paramagnetic resonance, exchange narrowing, zero-field splitting, principle of master action, three-level maser, ruby laser, summary.

Books Recommended:

1. *Solid State Physics* by Ashcroft & Mermin, (1976).
2. *Introduction to Solid State Physics*, 7th Edition, by C. Kittel, (1996).
3. *Elementary Solid State Physics* by M. A. Omar, (1975).
4. *Quantum Theory of the Solid State* by J. Callaway, (1991).
5. *Principles of the Theory of Solids* by J. M. Ziman, (1969).