**PH 529: Non-Equilibrium Statistical Mechanics (3-0-0: 3)**

**Introduction**

Correlation functions, Response functions, the harmonic oscillator, dissipation, elastic waves and phonons. **[6L]**

**Diffusion**

Fick’s law, Brownian motion, Langevin theory, Fokker-Planck and Smoluchowski equations. **[10L]**

**Fluctuation dissipation**

Fluctuation dissipation theorem, examples of magnetic systems in presence of a magnetic field. Inelastic scattering, Onsager relations, Neutron scattering, scattering of charged particles and photons.

**[10L]**

**Linear response**

Linear response theory, current-current correlator, Kubo formula, Spin Dynamics, Ferro and Antiferromagnets, Vortices in XY model, Crystal growth, Grain boundaries, dislocation and melting.

**[10L]**

**Text Books & References**

1. R. K. Pathria and P. D. Beale, “Statistical Mechanics”, Academic Press.

2. P. V. Panat, “Thermodynamics and Statistical mechanics”, Narosa.

3. V. Balakrishnan, “Elements of Nonequilibrium Mechanics”, Ane Books Pvt. Ltd.

4. L. E. Reichl, “A Modern Course in Statistical Physics”, Wiley - VCH.

4. Chaikin &Lubensky, “Principles of Condensed Matter Physics”, Cambridge University Press.