

X SARDAR PATEL UNIVERSITY
Programme & Subject: M.Sc (Physical Chemistry)
Semester: III
Syllabus with Effect from: June - 2013

Paper Code: PS03ECHE06	Total Credit: 4
Title Of Paper: Mechanical and Electrical Properties of Polymers-I	

Unit	Description in detail	Weightage (%)
I	Mechanical properties of polymer; introduction, general considerations, objectives, different types of mechanical behavior, elastic solids and polymer, state of stress and strain, generalized Hook's law. Behavior of polymers in rubber like state; finite strain elasticity, generalized definition of strain and stress, strain-stress relationship, use of strain energy function, experimental studies of finite elastic behaviors in rubbers.	25%
II	Statistical molecular theories of the rubber like state, thermodynamic considerations, statistical considerations. Linear viscoelastic behavior; viscoelastic behavior, mathematical treatment of linear viscoelastic behavior, dynamical measurements, the complex modulus and complex compliance, the relationship between the complex moduli and the stress relaxation modulus, the relaxation strength	25%
III	Experimental studies of the linear viscoelastic behaviors of polymers: general introduction, time-temperature equivalence and superposition, transition state theories, WLF equation. Relaxation transition and their relationship to molecular structure: relaxation transitions in amorphous polymers, glass transition in amorphous polymer and relaxation transition in crystalline polymers	25%
IV	Electrical properties of polymer: volume resistivity dielectric break down, dielectric constant, dielectric loss dissipation factor, electrostatic charging, dielectric behaviors of polar and non polar polymers in an alternating field varying frequency and temperature, relaxation time and temperature dependence, conductivity and temperature dependence, factor affecting dielectric behavior polymers. Conducting polymers: chronology, synthesis, characterization, doping, mechanism of conduction	25%

Basic Text & Reference Books:-

- Mechanical properties of solid polymers, I.M. Ward Wiley-Interscience, John-Wiley and sons Ltd. New York
- Mechanical properties of polymers, L.E. Nielsen Reinhold publishing co., Chapman and hall Ltd. London
- Electrical properties of polymers, A.R. Blythe Cambridge University press, Cambridge
- "Electrical properties" in encyclopedia of polymer science and technology John Wiley and sons. Inc. New York.
- Physical chemistry of polymers, A. Tager Mir publishers, Moscow

