

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

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

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, complex modulus and complex compliance, relationship between complex moduli and stress relaxation modulus, relaxation strength.	25%
III	Experimental studies of 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 of 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

