GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. Semester: II

Plastic Engineering

Subject Name: **POLYMERIC NANOCOMPOSITES (Major Elective-III)**

Sr.No	Course content
1.	**Introduction:** Importance and emergence of nanotechnology, challenges, current and future research. Size dependence of properties, crystal structure, energy bands, insulators, semiconductors and conductors, gaps of semiconductors, Fermi surfaces, localized particles.
2.	**Preparation of Nanocomposites**: Polymer Nanocomposites, Nanocomposites Preparation and Synthesis, Polymer Matrics : Thermoplastics, Thermosets, Elastomers, Natural and Biodegradable Polymers
3.	**Rheology of Nanocomposites**: Rheology of Multiphase Systems, Rheology of Polymer / clay Nano composites, Recent studies on Rheaology, Measure Techniques, Steady shear Rheology, Dynamic Rheology, Non Linear Viscoelastic properties, Extensional Rheology, Rheological modeling of Nanocomposites.
4.	**Processing of Nanocomposites**: Extrusion, Injection Moulding, Blow Moulding, Foaming, Rotational Moulding
5.	**Structure and Properties Characterization:** Scattering Techniques, Microscopic Techniques, Spectroscopic Techniques, Spectroscopic Techniques, Chromatography, Solid-state characterization: Mechanical Testing, Thermal Characterization
6.	**Application of Polymer Nanocomposites** : Thermoplastics, Thermosets, Biodegradable Polymers.

Reference Books:

1. Luigi Nicolis & Gianfranco Carotenuto "Metal -Polymers Nanocompsites" A John Wiley & Sons, Inc Publication 2005
2. Y.C. Ke & P. Stroeve " Polymer-Layered Silicate and Silica Nanocomposites-Elsevier, 2005
3. L.A. Utracki " Clay-Containing Polymeric Nanocomposites" Rapra Technology Limited, 2004
4. Robert K, Ian H, Mark G, Nanoscale Science and Technology, John Wiley & sons Ltd.,2005
5. Edward l Wolf. - Weinheim, Nanophysics and Nanotechnology: An Introduction to

Modern Concepts in Nanoscience, c2004, Wiley
6. S. N. Sahu, R. K. Choudhury, and P. Jena, Nano-scale Materials: From Science to Technology, Nova Science Publishers, 2006.