

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: VIII

PLASTIC TECHNOLOGY

Subject Name: **NANO TECHNOLOGY AND ADVANCED APPLICATION OF PLASTICS**

Sr. No	Course Content	Total Hrs.
1.	Introduction:- The Way into the Nanoworld, From Micro- to Nano-techniques, Definition of Nanostructures, Insight into the Nanoworld, Intervention into the Nanoworld, Building Blocks in Nanotechnology, Interactions and Topology, The Microscopic Environment of the Nanoworld	6
2.	Molecular Basics:- Particles and Bonds, Chemical Bonds in Nanotechnology, Van der Waals Interactions, Dipole–Dipole Interactions, Ionic Interactions, Metal Bonds, Covalent Bonds, Coordinative Bonds, Hydrogen Bridge Bonds, Polyvalent Bonds, Chemical Structure, Binding Topologies, Building Blocks of Covalent Architecture ,Units for a Coordinative Architecture, Building Blocks for Weakly Bound Aggregates, Assembly of Complex Structures through the Internal Hierarchy of, Binding Strengths , Reaction Probability and Reaction Equilibrium.	8
3.	Microtechnological Foundations Planar Technology, Preparation of Thin Layers, Layer Deposition from the Gas Phase, Layer Deposition from the Gas Phase, Evaporation, Sputtering, Chemical Vapor Deposition, Galvanic Deposition, Deposition by Spinning (Spin Coating, Shadow-mask Deposition Techniques, Preparation of Ultrathin Inorganic Layers and Surface-bound, Nanoparticles Ultrathin Layers by Vacuum Deposition Processes, Deposition of Ultrathin Films from the Liquid Phase, Deposition of Ultrathin Films from the Liquid Phase, In Situ Generation of Ultrathin Inorganic Films by Chemical Surface, Modification, Immobilization of Nanoparticles, In Situ Formation of Inorganic Nanoparticles, Structure Generation and Fabrication of Lithographic Masks	12
4.	Preparation of Nanostructures Principles of Fabrication, Subtractive and Additive Creation of Nanostructures, Nanostructure Generation by Lift-off Processes, Principles of Nontechnical Shape-definition and Construction, Nano-mechanical Structure Generation, Scaling Down of Mechanical Processing Techniques, Local Mechanical Cutting Processes , Surface Transport Methods, Nanolithography, DUV- and Vacuum-UV Lithography, EUV and X-ray Lithography & Nanostructure Generation by Accelerated Single Particles.	6
5.	Nontechnical Structures Nano-structures and Nano-materials, Semiconductors & Biopolymers	2
6.	Characterization of Nanostructures Geometrical Characterization, Layer Thickness and Vertical Structure Dimensions, Lateral Dimensions & Structures that Assist Measurement. Characterization of Nano Structures by using SEM, TEM, AFM, FTIR etc	4
7.	Technical Nanosystems About Nanosystems, Systems with Nano-components & Entire Systems with Nanometer Dimensions.	4

Text Books:

1. An Introduction to Nanotechnology By Michael Kohler and Wolfgang Fritzsche

Reference Books:

2. Introduction to Nanotechnology by Charles P.Poole Jr. and Frank J.Owens; John Wiley and Sons, Inc.
3. Nanoparticles by Vincent Rotello