

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. Semester: I

Plastic Engineering

Subject Name: **Additives & Compounding of Plastics (Minor Elective-I)**

Sr.No	Course content
1.	Introduction to Additives: Introduction - Technological Requirements - Classification - Chemistry and Mechanism - Selection Criteria - General effect on Properties - Evaluation and functions of additives.
2.	Additives: Antioxidants - Stabilizers (Heat & UV) - Plasticizers - Fillers and reinforcements - Impact Modifiers - Lubricants - Slip and Anti-block agents - Processing aids - Blowing agents - Flame Retardants - Anti-static & Conductive additives - Nucleating agents - Colourants - Additives for Recycling.
3.	Compounding Techniques: Selection of Polymers and Compounding ingredients - General objectives - possibilities and limitations of mixing and compounding - Methods of incorporation of additives into polymer materials.
4.	Compounding Equipments: Mixing and mixing equipments. Principles - Operating characteristics - Machine construction - Specifications - Process control systems and working details of Batch mixers and continuous mixers - High speed mixer - Two roll mill - Banbury Mixer - Ribbon blender - Planetary mixers - Single Screw extruder - Twin Screw extruder.
5.	End use Market for Plastics: Principles of Material selection including consideration of conventional materials competitive with plastics - Case studies on material suitability (e.g., Plastic Gears, Feeding Bottle, Bowels for micro wave ovens). Survey and uses of plastics with reasons for their importance in major industries like, Agriculture, Packaging, Building, Transport, Electrical, Electronics and Telecommunications, Medical and Furniture.

Reference Books:

1. R. Gachter and H. Muller, *Plastics Additives Hand Book*, Hanser Publishers, Munich, 1993.
2. John Murphy, *The Additives for Plastics Hand Book*, Elsevier Advanced Technology, Oxford, 1996.
3. Jesse Edenbaum, *Plastics Additives and Modifiers Hand Book*, Chapman & Hall, London, 1996.
4. Ica Manas - Zloczower and Zehev Tadmor, *Mixing and Compounding of Polymers*, Hanser Publications, Munich, 1995.
5. Nicholas P. Cheremisionoff, *Polymer Mixing and Extrusion Technology*, Marcel Dekker Inc., New York, 1995.
6. A. Brydson, *Plastics Materials*, Butterworth Heinemann, Oxford, 1999