

## Polymer Processing

- 1.1 Course Number: CH393  
 1.2 Contact Hours: 3-0-0 Credits: 9  
 1.3 Semester-offered: 3<sup>rd</sup> Year-Even  
 1.4 Prerequisite: NA
2. **Objective:** The objective of this course is to review the design and manufacture of polymer products, with particular emphasis on material selection and processing technology.
3. **Course Content:**

Unit wise distribution of content and number of lectures

Unit	Topics	Sub-topic	Lectures
1	Introduction	Introduction to polymer processing, Review of elastomers, Thermoplastic polymers	3
2	Plastics Additives and Compounding	Antioxidants, metal deactivators, stabilizers, plasticizers, lubricants, processing aids, impact modifiers, fillers and reinforcements, colorants, flame retardants, anti-static agents, blowing agents, nucleating agents, compound development and compounding of plastics	10
3	Principle of Mixing and Mixers	Introduction, Mechanism of mixing, practical mixing variables. Types of mixers: roll mills, internal batch mixers, sigma mixers, High speed mixer, blending, Kneading and granulating equipment	3
4	Extrusion	Principle of extrusion, Screw design, Qualitative and quantitative aspects of mechanism of screw extrusion and effects of screw and die design, Breaker plates and screens, Screw speed and Temperature on output and quality of extrudate	10
5	Injection Unit	Types injection unit & elements of plasticizing process, Non-conventional injection blow moulding, Compression moulding Rotational moulding, thermoforming	10
6	Calendaring and Milling	Introduction, calendar roll, calendar configuration and operations	4

Total	40
-------	----

#### 4. Readings

##### 4.1 Text Books:

1. Handbook of Plastic Processes/ Harper/ Wiley Interscience, 2006
2. Principles of Polymer Processing/ Tadmor & Gogos/ Wiley Interscience, 2013.

##### 4.2 Reference Books:

1. Stanley Middleman, Fundamentals of Polymer Processing, McGraw-Hill Education, 1977
2. Z.Tadmor and C.G.Gogos "Principles of Polymer processing" WileyInterscience, 2006
3. T.A. Osswald, "Polymer processing fundamentals", Hanser, 1998
4. J.R. Fried, "Polymer Science and Technology", 3<sup>rd</sup> Ed. Prentice Hall, 2014

5. **Outcome of the Course:** After the successful completion of the course the students will be able to understand the engineering properties of elastomers, thermoplastics, blends, composites and specialty polymers in terms of processing characteristics and end-use performance and they are also to understand Industrial processing operations such as extrusion, molding, mixing Calendaring and Milling.