

# GUJARAT TECHNOLOGICAL UNIVERSITY

## B.E. SEMESTER : VIII

### PLASTIC TECHNOLOGY

Subject Name: **PLASTIC MOULD AND DIE DESIGN-II**

Sr. No.	Course Contents	Total Hrs
1.	INTRODUCTION TO FULLY AUTOMATIC INJECTION MACHINE MOULDS: Introduction to the concept of fully auto moulds, requirements of fully automatic injection machine mould, Design features, introduction to the concept of shrinkage calculations, introduction to cooling requirement, fully automatic ejection systems, tolerance , etc.	02
2.	INTRODUCTION TO EJECTION SYSTEMS : Fully automatic ejection systems' layout, pin ejection, sleeve ejection, air ejection, stripper plate ejection, valve ejection, stripper bush ejection, ejection systems for products with undercut like internal and external undercut; auto ejection systems for threaded products, layouts in detail, ejection systems for internal undercuts other than threads in detail; calculations for design of ejection systems.	05
3.	COOLING SYSTEMS IN FULLY AUTOMATIC INJECTION MACHINE MOULDS: Cooling system layouts, requirements of a cooling system, calculations of amount of heat to be extracted from the tool per hour, cooling for Insert and integer moulds, layouts for insert cooling of Cores and Cavities, cooling for shallow and deep cores and cavities, cooling for multi impression moulds, Concept of Heat Rods, Heat Pipes, etc.	05
4.	SPLIT MOULDS : Design of finger cams, Dog leg cams, Cam Track actuation systems, spring actuation systems, hydraulic actuation systems., Angled Lift Splits	06
5.	UNDERCUT MOULDS: EXTERNAL UNDERCUT MOULDS: Core withdrawal systems, Internal side core/Cavity assembly details, Guiding arrangement, locking details, Methods of actuation: Hydraulic, pneumatic, Cam, Spring. INTERNAL UNDERCUT MOULDS : Stripping internal undercuts, Collapsible cores , Unscrewing mouldsAxially fixed rotating Core, Rotating Core plus Extractor plate, Power and transmission systems[ Manual, Machine].	05
6.	Blow Mould Design – Materials Selection, Mould Cooling, Clamping Force, Mould Venting, Pinch-off, Head die design, Parison Diameter Calculation, Wall Thickness, Vertical-load strength, Blow ratio, Base pushup, Highlights, Rigidizing, Shapes, Design based consideration – Shrinkage, Neck and Shoulder Design, Thread and beads, Bottom Design	07
7.	SHRINKAGE /TOLERANCE CALCULATIONS FOR MOULD PARTS	03
8.	C PROGRAMS for shot capacity, plasticizing capacity, no. of impressions, cooling; projected area, Output of Extruders , etc.	04
9.	Extrusion die design–Construction features of an extruder, Process, Characteristics of Polymer melt, Die geometry, Die head Pressure, characteristics of land length to Profile thickness, Extrudate die swell, Die materials, Classification of dies- Straight- Through Dies, Cross head dies, Offset Dies, Dies for Solid Section, Dies for Hollow Profiles,	05

	Blown film dies, Flat film dies, Parison dies, Wire and cable Coating dies, Spiral mandrel die, Fish tail die, Adjustable Core die. Design of Extrusion Dies using AUTOCAD	
<b>10.</b>	Transfer Moulding – Types, principles, Design of Pot and Plunger, Feed System, Economic determination of the number of cavities, Technological determination of the number of cavities, design of mould cavity, design of loading chamber, Heat losses and energy requirement to heat the mould – Advantages and disadvantages of Transfer mould.	<b>05</b>

**Text Book :**

1. Injection Mould Design By R.G.W.Pye
2. Injection Mould Design Fundamentals By Denton And Glanvill
3. Extrusion Dies By Walter Michaeli
4. Laszlo Sors and Imre Balazs, “Design of Plastics Moulds and Dies”, elsevier, Amsterdam - Oxford - Tokyo - NY, 1989.
5. P.S.CRACKNELL and R.W DYSON, “Hand Book of Thermoplastics - Injection Mould Design”, Chapman & Hall, 1993.

**Reference Books:**

1. INJECTION MOULDING HANDBOOK BY ROSATO AND ROSATO
2. Hanser, GASTROW Injection moulds, Peter Unger.