

5th Semester	RPR5D006	Plastic Mould and Die Design	L-T-P 3-0-0	3 Credits
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Module I:**(12 Hours)**

Ejection and Cooling System:

Ejection system: Constructional features of ejector grid, ejector grid layout, types of ejector elements – pin ejectors, sleeve ejectors, valve ejectors, D-pin ejectors; stripper plate ejection technique; types of sprue pullers, calculation for ejector force. Cooling system: Bolster cooling systems, insert cooling systems, baffle, bubbler cooling systems, heat rod and heat pipe systems, cooling time calculation, cooling channel layout. Two Plate and Underfed Mould. Design and constructional features of two plate molds, design and constructional underfed molds.

Module II:**(08 Hours)**

Die Design:

Extrusion Die Design: Basic considerations in die design, constructional features of rod die, constructional features of in-line pipe die, cross-head pipe die, offset pipe die, constructional features of centre-fed blown film die, side-fed blown film die, spiral mandrel blown film die.

Module III:**(10 Hours)**

Heat Treatment and Finishing Operations:

Basic tools and die materials, BIS and other major coding systems, materials and heat treatments, effect of alloying elements on steel, various heat treatments like annealing, normalizing, hardening, tempering, surface hardening like carburizing, nitriding, cyaniding, carbo-nitriding etc., cutting tool geometry, mold fabrication techniques like spark erosion, milling, finishing operations like grinding, polishing, honing, buffing, lapping, super finishing, depth of cut and power required for machining, costing of molds and mold maintenance.

Module IV:**(10 Hours)**

Fabrication and Manufacturing: Constructional features of basic mold components – types of locating rings, types of guide pillars, guide bush- standard guide pillars and guide bush, spigotted guide pillars and guide bush; Design features of standard mold components, materials used for mold bolsters, inserts, standard mold parts, manifold, gears, splits, wear plate, heel block, lead screw, chemical compositions of materials, understanding injection molding machine specifications, clamping tonnage and shot weight estimation, calculations for number of cavities based on clamping tonnage, shot weight, machine platen size, Calculations for cavity pressure. Feed system: Constructional features and types of sprue bush, types of runners, runner layout, calculation of runner efficiency, runner design; types of gates, gate design calculations, runner and gate fabrication techniques, runner balancing calculations.

Books:

[1] Injection Mold Design - R.C.W. Pye , fourth edition, East-west press pvt.ltd publication,

[2] *Extrusion Dies for Plastics and Rubber: Design and Engineering Computations* by

Walter Michaeli

[3] *Injection-mould Design Fundamentals*, Volume 1 by Alan Birkett Glanvill, Ernest Norman Denton, Industrial Press, 1965

[4] *Dies for plastics extrusion: principles of design and construction* by M V Joshi, Macmillan India, 1984.