GUJARAT TECHNOLOGICAL UNIVERSITY
B. E. SEMESTER: V
PLASTIC TECHNOLOGY

Subject Name: **Injection Molding Technologies**
Subject Code: **152301**

Teaching Scheme				Evaluation Scheme		
Theory	**Tutorial**	**Practical**	**Total**	**University Exam (Theory) (E)**	**Mid Sem Exam (Theory) (M)**	**Practical (I)**
3	0	3	6	70	30	50

Sr. No.	**Course content**
1.	**Introduction:** Injection moulding, Machine types, Process description & variables, Applications.
2.	**Machine:-** **Injection unit** • Nozzle and internal heated nozzle, Screw and screws for elastomers, Screw output. • Auxiliaries for Injection End, Screw torque, Wear & wear protection of screw, Cause of wear, Wear protection of plasticizing unit, Steel selection for wear resistance component, Wear protection by repair, Wear protection by design, Accessories for Injection unit, Purging agent, Injection molding cycle. **Clamping Unit** • Hydro mechanical clamping, Full electrical clamping unit, Accessories for clamping unit, Tonnage calculations. **Processing Parameters** • The inside story of injection moulding, Determination of injection rate, Determination of power requirement, Pressure requirement for injection, Hydraulic pump, Trimming the process, Switching system and process variables, Mechanical system and process variables, Independence of process variables.
3.	**Process:** • Understanding the injection molding process: Melt temperature, Plasticizing, Screw rpm, Reaction pressure, Mould feeling speed profile, Switch over pressure profile, Optimization of process, Over packing, Injection time, Mould temperature, Optimization of heat flow in mould, Cooling time, Various polymers with chemical names and mfg. Orientation. • Screw conveying-basic principles, screw conveying considerations, raw material selection criteria, Effect of process variables on product, Orientation and its importance in moulding, Measurement and control of orientation, How orientation can be used to advantage, Non-oriented conditions and internal stresses, Trouble shooting in detail: Shrinkage, warpage, short shots, etc.

4.	**Importance of Microprocessor in Inj. Moulding Machine:** • Hydraulic control valves - Proportional valves for pressure and flow control-Hydraulics in IMM - Microprocessor control - Stroke control - Temperature control. • Close loop and open loop control-Multi micro processor system-Capabilities of FM microprocessor control system-Quality monitor-Trades in IMM control. • Quick change system-QMC system-After sales services through modems Various trend reports-Process data acquisition.
5.	**Pressure profile in cavity and PVT diagram.**
6.	**Close loop and open loop control in injection moulding.**
7.	**Injection moulding for Thermo set** • Thermo set plastics • Characteristics • Thermo set IMM • Features of machines
8.	**Start-up and shutdown procedure for injection moulding m/c**
9.	**Tie-bar less machines**
10.	**Gas Injection Moulding:** Why this process, Comparison of products to blow moulding, Raw material selection criteria, Machine requirements, Variables and their effect on product.

Practical and Term Work:

Based as per the syllabus prescribed.

Reference Books:

1. Injection moulding theory and practice by I. Rubin—Blow moulding handbook by Lee.
2. Injection moulding M/c by Wheelen, -Plastics Engg. Handbook by Jeol Frados.
3. Plastics material and Processes by Schwartz and Goodman.
4. Injection moulding machine by Johannaber.
5. A Guide to Injection Moulding of Plastics by Bolur.