

GUJARAT TECHNOLOGICAL UNIVERSITY

BRANCH NAME: Rubber Technology (26)
SUBJECT NAME: RUBBER EQUIPMENT DESIGN-II (RED-II)
SUBJECT CODE: 2172601
B.E. Semester-VII

Type of course: (B. E. Rubber Technology)

Prerequisite: NA

Rationale: Na

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks						Total Marks
L	T	P		Theory Marks			Practical Marks			
			ESE (E)	PA (M)		ESE (V)		PA (I)		
				PA	ALA	ESE	OEP			
3	0	3	6	70	20	10	20	10	20	150

Sr. No	Course Content	Total Hrs	% Weightage
1.	Design Of Extruder: Major Components, Process Design & Mechanical Design of Single Screw Extruder, Part design, Screw design & theory, Flow Mechanisms, Design of Extruder Heads, Hopper Design, Cold Feed Extruder : Feed Cylinder Strength, Structure, Feed Pocket, the Liner, Feed Roller, Extension Barrel, Effects of Screw & Barrel Temperature, Iddon High Intensity Mixing Screw, Pin Extruder, Transfer Mix Extruder, Gear Extruder, Single Roller Die Extruder ,Recent Developments etc..	13	25
2.	Mould Design: Introduction, Materials for moulds, General considerations & computations, Mold shrinking cooling, Mold durability, Mold making processes and machines used. Planning of the mould lay-out partition line locations, nozzle runner, coring, air vents & other details, Cavity and cavity finish, Ejection, Crosslinking factors, other factors affecting molding, Anisotropy, Shrinkage, Thermal consideration, Pressure Considerations Cryogenic deflashing, Design Consideration for Compression & Transfer Moulding, Thermal & Mechanical Factors. Etc...	13	25
3.	Die Design: Planning the general arrangements of the die, different parts, selection of dies for hot & cold extrusions, dies for extrusion of tube, pipe, & sheeting, machine capacity calculations, Function of the die, Practical Die Design,	13	25

	the Streamlining of Extrusion dies, Die Geometry, Materials for die constructions, General Design Rules , etc...		
4.	Design Of Injection Molding Machine: Major components, Process design & Mechanical design, Effects of Machine Controls & Design: The reciprocating screw injection moulding process and controls, Effects of injection moulding machine processing variables: Effect of : screw speed, barrel temperature, screw back pressure, injection pressure, nozzle orifice diameter, injection ram speed, Mould Temperature, Other Machine Controls: screw cooling, pressure control and timing, Nozzle temperature, Nozzle design, Mould Design : Mould heating, Mould layout, Cavity layout, Runner design, Gate design, Mould Venting, Flash less Moulding, Ejection, Shrinkage, Mould faces, Screw design, Operation of ram injection machine, FIFO principles , Trouble Shootings etc...	13	25

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks				
Remembrance R Level	Understanding U Level	Application A Level	Analyze N Level	Evaluate E Level
14	14	14	14	14

Reference Books:

- Rubber Products Manufacturing Technology By: Anil K. Bhowmick
- Rubber Processing & Production Organisation By: Philip K. Freakley.
- Calendering & Extrusion Technology By: Arun V. Apte.
- Extrusion Technology By: Rapra Report
- Injection molding of Rubber By : M. A. Wheelay

Course Outcome:

After learning the course the students should be able to:

- Able to learn about the Flow Mechanisms in extruder.
- Compare the different types of extruder in their working.
- Know about the Cross linking factors and factors affecting it for compression and transfer moulding.
- Understand the importance of Design Consideration for Compression & Transfer Moulding.
- Understand about the Practical Die Design.
- Learn about the materials for die constructions.
- Able to learn about Effects of Machine Controls & Design for Injection Moulding Machine.
- Know about the effects of injection moulding machine processing variables.
- Learn about FIFO Principles and its importance.

List of Experiments:

Tutorials/Presentation/Practicals based on above topics.

Design based Problems (DP)/Open Ended Problem:

- Extrusion of Silastic Silicone Rubber.
- Steps for designing the rubber components..
- Simulation of rubber injection molding machine..

Major Equipments:

Extruder, Semi Hydraulic Press, different molds and dies, etc.

List of Open Source Software/learning website:

- <http://www.mnrubber.com/>
- <https://www.dowcorning.com.cn>
- <http://www.allsealsinc.com/>

<http://www.robinsonrubber.com/>

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.

