GUJARAT TECHNOLOGICAL UNIVERSITY

PLASTIC TECHNOLOGY (23)

MANUFACTURING OF PLASTICS MATERIAL-2

SUBJECT CODE: 2142306

B.E. 4th SEMESTER

Type of Course: Core

Prerequisite: NA

Rationale: NA

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
				Theory Marks			Practical Marks			
L	T	P	C	ESE (E)	PA (M)		ESE (V)		PA (I)	
					PA	ALA	ESE	OEP		
3	0	2	5	70	20	10	20	10	20	150

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	Manufacturing Technologies for Thermoplastics :Addition and Condensation Polymerisation in detail with applications ; Industrial methods of polymerization such as bulk, solution, suspension, emulsion. Layout and arrangement of polymer plant. Developments in the automation of polymer plants.	15	20
2	Unit Operations in Plastic Materials Manufacture : Distillation, Absorption, Stripping,Extraction, Leaching,Crystallization,etc. Stiochiometry related to the unit operations. Industrial Problems.	10	15
3	Manufacture of Commodity plastic Materials : PE [HIGH PRESSURE AND LOW PRESSURE PROCESSES] complete with plant layout and design Engg; Manufacture of Polystyrene resins with layout ; Manufacture of PP [homo polymer and Copolymer grades] with layout ; Manufacture of PVC resins [suspension grade], Manufacture of ABS resins , etc. Applications and Advantages and Disadvantages of each resin.	15	30
4	Manufacture of Engineering Thermoplastic Materials : Manufacture with plant layout for Nylon-6, / 66 resins ., PEEK, PPS , PC, Acetal Copolymers ,PET , PTFE, etc. Applications and Advantages and Disadvantages of each resin.	14	35

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks				
R Level	U Level	A Level	N Level	E Level
15	20	15	10	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. Shreve's Chemical Process Industries
2. Dryden " Outlines of Chemical Technology"
3. R.Sinha , " Outlines of Polymer Technology"
4. Polymer Production, by Maya & Smith
5. Polymer Materials, by J. A. Brydson
6. Encyclopedia of Polymer Science & Tech., Vol 1-23, by Mark & Overberger
7. Handbook of Plastic Technology, Vol 1, by Allen W. S.
8. Metallocene based Polymers Vol II, by J. Scheries & W. Kaminsky
9. Polymeric Materials, by G. W. Ehrenstein
10. Polyolefins, by J. L. White & D. Choi
11. Industrial Polymers, by E. A. Campo

Course Outcomes:
After successful completion of the course students should be able to:

1. Read the flowsheet for manufacture of thermoplastics
2. Know the unit operations for manufacture of thermoplastic materials

List of Experiments:

1. Flowsheet for naptha cracking
2. Flowsheet and understanding of manufacture of LDPE by High pressure process
3. Flowsheet and manufacture of HDPE
4. Manufacture of PP
5. Manufacture of Styrene based plastics
6. Manufacture of Acrylics
7. Manufacture of Acetal copolymer
8. Manufacture of Engineering thermoplastics like PEEK, PPS
9. Manufacture of Nylon plastics
10. Manufacture of PVC.

Design based Problems (DP)/Open Ended Problem:
Design of Reactor to manufacture plastics in laboratory

List of Open Source Software/learning website:
www.sciencedirect.com
www.plasticsnet.com
www.rapra.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.