

INSTITUTE	DIPLOMA STUDIES
PROGRAM	DIPLOMA ENGINEERING (CHEMICAL ENGINEERING)
SEMESTER	5
COURSE TITLE	POLYMER TECHNOLOGY
COURSE CODE	09CH2506
COURSE CREDITS	4

Objective:

- 1 To learn various quantitative methods to manufacture various polymer products

Course Outcomes: After completion of this course, student will be able to:

- 1 Summarize properties of various polymers
- 2 Apply unit operations to manufacture Rubber, Plastic and Fiber
- 3 Apply Different Polymer Processing Techniques

Pre-requisite of course: Basics of chemical process industries

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	Properties of Polymers Polymerization, Types: Bulk polymerization, Solution polymerization. Suspension polymerization, Emulsion polymerization. Molecular weight, Crystallinity and Glass transition temperature. Properties of Plastics: Electrical Resistance, Chemical Resistance, Thermal Stability, Biodegradability. Properties of Rubbers: Elasticity, Electric Conductivity, Resistance to fatigue. Properties of Fibers: Resiliency, Elongation, Strength.	12
2	Rubbers Classification of Rubber and its Properties, Various types of rubber, Applications and Manufacturing of: Ethylene Propylene Terpolymers Butyl rubber Polyurethane, Silicone rubber	8
3	Plastics Properties, applications and manufacturing of: Polyethylene by high pressure ICI process for LDPE, Polyethylene by Ziegler low pressure process for HDPE, Polypropylene, Polystyrene, ABS, Polytetrafluoro Ethylene (PTFE /Teflon), Urea Formaldehyde	10

Contents : Unit	Topics	Contact Hours
4	Fibres Properties, applications and manufacturing of: Viscose rayon fibres, Cellulose Acetate fibre, Nylon-6, Glass fibres	6
5	Processing of polymers Nylon-6 and Nylon 6 6 and their difference, Mastication, Mixing, Moulding, Extrusion, Calendaring, Vulcanization, Compounding Coating	6
Total Hours		42

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Experiment 1 Prepare classification chart based on properties and uses.	2
2	Experiment 2 Demonstrate thermosetting and thermoplastic properties	2
3	Experiment 3 Test the effects of solvents on plastic, rubber and fiber	2
4	Experiment 4 Test the effects of acids and alkalies on plastic, rubber and fiber	2
5	Experiment 5 Test effects of temperature on plastic, rubber and fiber	2
6	Experiment 6 Prepare thermo-plastics PMMA(Poly Methyl Methacrylate)	4
7	Experiment 7 Prepare Polystyrene from styrene	4
8	Experiment 8 Prepare Phenol Formaldehyde resin from Phenol	2
9	Experiment 9 Prepare Urea Formaldehyde resin from Urea	2
10	Experiment 10 Prepare Melamine Formaldehyde	2
11	Experiment 11 Prepare primary cellulose acetate from cellulose	2
12	Experiment 12 Perform Vulcanization of Rubber	2
Total Hours		28

Textbook :

- 1 Shreve's Chemical process Industries , G.T Austin, McGraw Hill , 2007

References:

- 1 Polymer science, Polymer science, V, R., Viswanathan, N.V. Sreedhar, Jayadev New Age International Pvt. Ltd., 2010
- 2 Chemical Technology, Vol. I & II, Chemical Technology, Vol. I & II, – Pandey, G.N. and Shukla, Vani books company, 2015

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking
40.00	40.00	10.00	10.00	0.00	0.00

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room
- 3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory
- 4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Supplementary Resources:

- 1 <https://nptel.ac.in/courses/104105039>
- 2 https://nitsri.ac.in/Department/Chemical%20Engineering/M3__Polymer_Technology.pdf