

GUJARAT TECHNOLOGICAL UNIVERSITY

TEXTILE PROCESSING (28)

MANUFACTURING & APPLICATIONS OF POLYMERIC MATERIALS

SUBJECT CODE: 2162808

B.E. 6th SEMESTER

Type of course: Textile Processing Engineering

Prerequisite: Zeal to learn the subject

Rationale: All the types of textile wet processing auxiliaries like textile softeners, coating and bonding material, Printing Binders, Blanket adhesives, Synthetic thickeners, Stiffening agents, Sizing agents, Soil release agents, flocculating agents, super absorbent materials, etc. This subject includes the manufacturing techniques of various polymeric materials applied in textile wet processing along with their properties.

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	2	5	70	20	10	20	10	20	150

Content:

Sr. No.	Course content	Total Hrs.	% Weightage
1	Manufacturing processes/techniques of following polymeric materials and their applications in textile industries.	02	3.5
2	Polyethylene as textile softeners, coating and bonding material, etc.	03	5.5
3	Polyethylene Glycols such as PEG 200,400,600 etc and other polyols.	02	3.5
4	Polyethoxylates and Polypropylene oxide condensates such as Nonyl Phenol Ethoxylates, Castor Oil Ethoxylates, oleic acid ethoxylates etc and Polypropylene oxides and their copolymers.	04	7
5	Polyacrylates such as Poly(Ethyl and Butyl) acrylates, Polyacrylic acids and their salts, polyacryl amides, Polymethyl methacrylate etc and their copolymers as Printing Binders, Blanket adhesives, Synthetic thickeners, Stiffening agents, Sizing agents, Soil release agents, flocculating agents, super absorbent materials, etc.	10	18
6	Vinyl polymers such as polyvinyl alcohol, polyvinyl acetate, polyvinyl chloride etc as stiffening agent, photochemicals, sizing adhesives, coating, lamination and bonding agents.	04	7
7	Silicones such as dimethyl and methyl hydrogen siloxanes, amino silicones, carboxy silicones, epoxy silicones, hydroxyl silicones, etc. as softeners, water repellants, antifoaming agents, etc.	09	16
8	Aminoplasts such as UF, DMEU, DMDHEU, MF, PF etc as anticrease finishing agents, Fixers, adhesives, etc.	09	16
9	Polysaccharides and their derivatives as printing thickeners, scouring aids, finishing agents, etc.	03	5.5
10	Miscellaneous polymers such as polyurethanes, polycarbonates, polystyrenes, polyesters, etc.	05	9
11	Recent developments in polymeric materials and their application techniques in textile processing.	05	9

Suggested specification table with marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
11	14	21	07	08	09

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

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Synthetic Polymers – Feldman, Bardalata
2. Polymers and Resins– Brage Golding
3. Commercial Polymer Blends – L. A. Utracki
4. Chemistry of Organic Textile Chemicals – V. A. Shenai

Course outcome:

After learning the content of the subject the students will be able to:

1. Learn different manufacturing techniques for polymeric materials.
2. Know the chemistry of polymeric substances when present alone or in combination.
3. Understand the role of them in textile wet processing.
4. Develop new auxiliaries to get best process result.

List of Experiments:

1. Preparation and performance studies of polyacrylic acid.
2. Preparation and performance studies of acrylic based binders.
3. Preparation and performance studies of polysol.
4. Preparation and performance studies of Urea formaldehyde.
5. Preparation and performance studies of DMDHEU.
6. Preparation and performance studies of phenol formaldehyde resin.
7. Preparation and performance studies of melamine formaldehyde resin.
8. Preparation and performance studies of silicone softeners.
9. Preparation and performance studies of amino silicones for various applications.
10. Preparation and performance studies of polyacrylamide.
11. Preparation and performance studies of water repellent compounds.

Design based Problems (DP)/Open Ended Problem:

1. To prepare and evaluate combinations of softening agent suited one for all type of textiles.
2. To prepare and evaluate best quality binder to be applied with various varieties of pigments.
3. To compare the performance of different types of softeners.
4. To minimize the application concentration of various silicones for suitable application.
5. To develop best resin for better crease recovery for linen fabrics.

Major Equipments:

Bunsen burner, Water heating bath, Weighing balance, Microscope, oven, viscometers, padding mangle etc.

List of Open Source Software/learning website:

1. <http://www.wto.org/>
2. <http://www.wtin.com/>
3. <http://textileinformation.blogspot.in/>
4. <http://www.fibre2fashion.com/>
5. <http://textilelearner.blogspot.in/>

6. <http://www.fashion-era.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.