AMTE-16 CHEMICAL PROCESSING OF TEXTILE MATERIALS-I

UNIT-1 CHEMICAL STRUCTURE OF FIBRES

1.1 Cotton, wool, PET polyester, Nylon 6 and 6,6,
1.2 Poly acrylonitrile poly propylene and poly urethane;
1.3 Action of chemicals on FIBREs - Effect of alkalis, acids, oxidizing agents and reducing agents on cotton and viscose, wool, silk and the above synthetic FIBREs;
1.4 Natural and other impurities in textiles and their basic properties;
1.5 Singeing - Methods of singeing and their comparison, detailed study on gas singing, evaluation of singing efficiency and bio polishing;
1.6 Desizing - methods of desizing and their comparison, desizing of natural and synthetic FIBREs and their blends, evaluation of desizing efficiency;
1.7 Heat setting - principle and heat setting of PET and nylon fabrics.

UNIT-2 SCOURING

2.1 Chemistry involved in scouring of cotton, wool, silk and synthetic FIBREs,
2.2 Process details on scouring of these FIBREs,
2.3 Assessment of scouring efficiency and bio scouring;
2.4 Bleaching - Fundamentals on bleaching agents,
2.5 Bleaching of cotton with sodium hypochlorite and hydrogen peroxide,
2.6 Bleaching of wool, assessment of efficiency of bleaching;
2.7 Mercerization - role of alkali concentration, stretch and temperature,
2.8 Effect of mercerization on structural, lustre, tensile and dyeing properties,
2.9 Steps involved in mercerization process,
2.10 Assessment of efficiency of mercerization; carbonization of wool; degumming of silk
2.11 Methods and their comparison,
2.12 Process details on the methods and assessment of efficiency of degumming.

UNIT-3 PRINCIPLE, CONSTRUCTION AND WORKING OF CHEMICAL PROCESSING MACHINES

3.1 Loose stock machine;
3.2 Hank and package processing machines;
3.3 Yarn singeing machine; Woven and knitted fabric singeing machines;
3.4 Stretching devices; Shearing and raising machines; Kiers; Mangles;
3.5 Jiggers; Winch; Jet and soft flow machines;
3.6 Yarn mercerizer, Chain and chainless mercerizers;
3.7 Continuous scouring and bleaching machines;
3.8 Washing ranges, Hydro extractors; Detwisters; Dryers; Stenters.

UNIT-4 CALENDERING

4.1 Various objectives, construction and working of Calendering machines;

4.2 Crease proofing
4.3 Mechanism of creasing, crease proofing with formaldehyde based agents namely urea
4.4 Formaldehyde precondensate and dimethylol dihydroxy ethylene urea,
4.5 Drawbacks of these agents,
4.6 Advantages of low formaldehyde and free formaldehyde crease proofing agents,
4.7 Crease proofing with butane tetra carboxylic acid,
4.8 Assessment of crease proofing efficiency; Shrink proofing - Assessment of shrinkage,
4.9 Principle of belt shrinking and compacting, construction and working of shrink proofing machines, assessment of shrink proofing process;
4.10 Softening - Role played by softeners, methods of softening, chemical softeners and their classification, chemistry and application of cationic and silicone softeners,
4.11 Assessment of efficiency of softeners, end-uses;
4.12 Wool finishing - Wet and dry setting of wool and their assessment;
4.13 Principle of Milling and milling machines, assessment of milling operation.

UNIT-5 WATER AND OIL REPELLANT FINISHES

5.1 Mechanisms of repellency,
5.2 Durable and non-durable finishing agents,
5.3 Basics of silicone and fluorocarbon finishes, assessment of repellent finishes;
5.4 Fire retardant finish - Mechanisms of flame retardancy,
5.5 Durable and non-durable retardants for cotton and polyester, assessment of flame retardancy;
5.6 Antimicrobial finish - Mechanisms, controlled release and bound antimicrobials, assessment of the finish; introduction to use of nanotechnology in finishing.

References Books:

1. Shenai V. A., "Technology of Textile Finishing", B.I. Publication, Mumbai, 1989.
2. Menachem Lewin and Stephen B. Sello., "Handbook of FIBRE Science and Technology: Volume I: Chemical Processing of FIBREs and Fabrics-Fundamentals and Preparation" and Volume II: Functional finishes, Marcel Dekker, Inc., 1983
3. Karmakar S. R., "Chemical Technology in the Pre-treatment Process of Textiles", Elsevier sciences B.V.,1999