

Paper-I

- 1. Fibres-I:** Textiles fibres & their classification, general properties of fibres, cultivation/production, structure & properties of cotton, jute, linen, wool, silk, & other natural fibres, identification of fibres by different methods, molecular weight & its determination, concept of orientation & crystallinity, concept of Tg & Tm & its determination.
- 2. Principal of Yarn and Fabric Manufacture:-** Objectives of ginning, mixing & carding process, drafts (actual & mechanical) and draft constant, quality of web and neps etc., Objectives of Draw frame, passage of material on modern draw frame machine, Concept of draft, Comber, speed frame, ring frame, drafting twisting and winding on ring frame, double apron drafting system on ring frame, warping process, winding process, brief description of modern sizing machine, Passage of material on handloom and power loom, Comparison between shuttle and shuttleless looms.
- 3. Testing:** Objective of testing & sample size, methods & principles involved in testing of fibre properties, like moisture, length, fineness, tensile strength, maturity, yarn testing : count, strength, tenacity, unevenness, hairiness, principle involved in testing of various fibre & yarn properties.
- 4. Preparatory process of Textiles:-** Natural and added impurities in grey fabric, singeing- its object and various types of singeing, introduction to various preparatory processes for cotton, wool, silk, nylon, polyester, acrylic and their blends. wool: scouring, decatizing, desizing- its objects, various desizing methods with its advantages & disadvantages, scouring of cotton fabric: conventional and bio-scouring, Kiers –various types of kiers and their working. Objectives of bleaching, various types of bleaching agent such as NaOCl, CaOCl₂ and H₂O₂, NaClO₂. Bleaching chemistry and mechanism, batch wise, semi continuous and continuous bleaching processes: J-box, Continuous bleaching range (CBR). methods used for determination of degradation of cotton during scouring and bleaching such as copper no., methylene blue absorption method, cuprammonium fluidity etc. optical whitening agent and their applications. objectives of mercerization, physical and chemical changes in cotton due to mercerization, various methods of determination of efficiency of mercerization.
- 5. Technology of Dyeing:-** Classification of dyes according to the methods of application, general theory of dyeing, various method of dyeing- Batch, Semi continuous, Continuous dyeing. dyeing of cellulosic fibres with direct dyes, reactive dyes., vat dyes, solublised vat dyes, sulphur dye, dyeing of protein fibres – silk and wool with different types of acid dyes –its advantages and limitations, metal complex dyes- 1:1, 1:2, metal complex, chrome dyes-pre, post & simultaneous mordanting, basic dyes., dyeing of synthetic fibres: polyester-carrier, HTHP& thermosol method, acrylic dyeing with basic dye, dyeing of nylon and their blends, problems associated with dyeing, common fault and their remedies, mechanism of dyeing, role of fibre structure in dyeing, heat of dyeing, entropy of dyeing, kinetics of dyeing –diffusion coefficient, diffusion in steady state and non steady state, rate of dyeing.
Mass coloration of man made fibres viz, polyester, nylon, acrylics, viscose, Dyeing machinery- Jet dyeing m/cs, Beam dyeing, Soft flow m/cs, Infra colour dyeing m/cs, closed jiggers and continuous dyeing ranges, Control and rectification of various problems

in High temperature dyeing, thermo fixation process – pad liquor preparation, dyeing theory of nylon, leveling agents, swelling agents, faults and remedies in nylon dyeing.

6. **Textile Chemicals and Quality Testing:-** Quantitative chemical analysis of textile fibres and their blends, quantitative estimation of bleaching agents and dyes. colour fastness of dyes on textiles (wash, light, rubbing, hot press, perspiration) using National and International standards (BIS, AATCC, ISO), evaluation of wet treatments. evaluation of various chemicals, auxiliaries used in wet processing plants, analysis of fresh water and effluent, measurement of viscosity of chemical ingredients, printing paste, instruments used in chemical analysis. process and quality control in wet processing.

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Syllabus for Govt. Polytechnic (Diploma Sector)

Post: Lecturer Syllabus Textile Chemistry

Paper-II

- 1- Fibre:-** Regenerated & synthetic fibres, concept of polymerization & manufacturing process of regenerated & synthetic fibres by melt, dry, wet & dry-jet wet spinning methods, structure & properties of regenerated & synthetic fibres & their uses, High performance fibres, their manufacture, properties & application.
- 2- Fabric testing:** gsm, thickness, cover, air permeability, moisture & water transmission, wetting & wicking properties, compressibility, tensile, tear & bursting strength, abrasion & pilling resistance.
- 3- Chemistry of Dyes and Colour Chemistry:-** Colour and chemical constitution, Classification of dyes based on constitution, Different types of chromophores., unit organic process/operation- sulphonation, nitration, amination and halogenation, synthesis of major dye intermediates, azo dyes: Diazotisation and coupling reactions, azoic colours, acid dyes, mono azo dye; diasazo, nitro, diphenylamine and anthraquinone dyes; acid mordant dyes, azo metal complex dyes, direct dyes. vat dyes: indigoid, anthraquinonoid and polycyclic quinonoid dyes; solubilised vat dyes. sulphur dyes and sulphurised vat dyes, reactive dyes: chlorotriazine and other halo heterocyclic compounds, vinyl sulphone based dyes, high fixation, highly substantive dyes, neutral fixing reactive colours, pigments- phthalocyanine pigments, other organic and inorganic pigments, optical brightening agents- fluorescence and phosphorescence, fluorescent brighteners for different fibres.
- 4- Theory of dyeing and Colour Measurement:-** Evolution of theories of dyeing. fundamentals of kinetics and thermodynamics of dyeing, diffusion of dyes, methods for measurement of diffusion coefficient, effect of fibre structure on dyeability and diffusion of dyes, thermodynamic parameters like affinity and heat of dyeing, thermodynamics of dyeing cotton with direct dye, glass transition temperature and its influence on dyeing. source of natural light, sources of artificial light, CIE illuminants, absorption & scattering of light. Beer-Lambert law, Kubelka-Munk's Equation. Computer aided Colour matching and recipe prediction.
- 5- Technology of Printing:-** Introduction to printing, methods and styles of printing, classification of printing thickeners and methods of thickeners paste preparation, emulsion thickeners, synthetic thickeners, and mechanism of viscosity build up in emulsion and synthetic thickeners, Rheological behavior of thickeners., preparation of cloth for print paste preparation, wetting agents, hygroscopic chemicals dispersing agents, oxidative and reducing agents etc., precautions. methods of printing - block printing, roller printing, roller engraving and chroming, Screen printing- preparation of screens, rotary screen printing, rotary screen preparation-manual and photosensitive, its method of application, merits and demerits. Faults and prevention in printing methods, General methods of print fixation, and machines used for after treatment of printing goods steaming, ageing, curing etc., Pigment printing of cotton, binder emulsion, print paste recipe and steps involved., Various styles of printing- direct, resist & discharge style of printing of cotton using direct, reactive, vat and indigosol colours.

Printing of wool and silk with different dye classes such as reactive, acid, metal complex dyes using the above styles. Printing of synthetic and blends- Printing in different styles on polyester, nylon, acrylic and their blends such as P/V, P/C, wool/acrylic, wool/nylon and different types of union fabrics cotton/wool, cotton/silk etc with different dye classes., Other techniques of printing like raised, metal and flock printing, Poly chromatic dyeing, foam printing, bubble printing etc. Spray printing, Tie and dye, Batik printing, Brasso printing.

Transfer printing- fundamental principles of transfer printing, Sublimation transfer printing of polyester, machines used. Digital printing - Inkjet printing, concept and practice. , Printing of non wovens -carpets, hosiery goods and bonded goods, camouflage printing.

- 6- **Technology of Finishing:-** Objective of textile finishing, principle of finishing of cotton, wool, silk and linen. Classification of finishing – (a) Mechanical, Chemical, finishes. Finishing machines – mangle & their function, drying machines, mechanical finishes- Stentering, calendaring, Sanforising, decatizing, embossing, seuding, compacting, raising., Beetling of linen, crimping of silk & rayon, finishing of woollen fabrics- dry wet decatizing, crabbing, felting, milling, permanent setting, shrink proofing, and special finishing of silk. Heat setting -objects, types of setting, mechanism of temporary set and permanent set, structural changes brought about by heat setting, heat Setting conditions of various yarns and fabrics, industrial practices of heat setting of polyester and its blends, various methods to determine the degree of heat setting, softeners and hand builders - desirable properties and various classes of softeners, properties, comparison of various softeners, classification of stiffeners, examples and their application, energy efficient technology-low liquor application, spraying, powder coating and foam technology, blow ratio, foam generator, stabilizer, applicator.

Mechanism of creasing and theory of antcrease finish, wash-n-wear, low and no formaldehyde cross linking agents, application of BTCA and CA, Evaluation of wrinkle resistance, concept and mechanism of flame retardancy, flammability of textile fibres. concept of LOI. flame retardant and flame proof finishes on natural fibres, synthetics and blends, phosphorylation and phosphonylation, use of halogen derivatives, evaluation of flame retardancy, soil release finish – mechanism of soiling, steps of soil release and theory, different soil release finishes, soil repellency, fluorocarbons and teflon finish, standard test methods for the finish effect, water proofing and water repelling, mechanism of water repellency, chemistry and application of silicones, testing of water repellence Antimicrobial finishing, chemistry of various antimicrobial finishes, application and evaluation., Nano Finishes:- Concept of nano phase materials, various types of nano finishes, characterization and their application in textiles: e.g. self cleaning, anti bacterial, UV protection nano finishes.