

III SEMESTER (Textile Chemistry)

Sub. Code	Name of Subject	Teaching Periods			Duration of Exams (Hours)	Maximum Marks Allocation			Total
		L	T	P		Internal	End Term	Practical	
3TC1	Textile Fibers	3	-	-	3	20	80	-	100
3TC2	Principles of Textile Manufacturing – I	3	-	-	3	20	80	-	100
3TC3	Physical Chemistry	3	-	-	3	20	80	-	100
3TC4	Introduction to Wet Processing	3	-	-	3	20	80	-	100
3TC5	Electronics & Microprocessors in Textiles	3	-	-	3	20	80	-	100
3TC6.1	Elective Applied Statistics	3	-	-	3	20	80	-	100
3TC6.2	Nano technology								
Total		18	-	-	-	120	480	-	600
3TC7	Textile Fiber Lab	-	-	4	3	60	-	40	100
3TC8	Electronics & Microprocessor Lab	-	-	2	3	30	-	20	50
3TC9	Principles of Textile Manufacturing Lab – I	-	-	4	3	60	-	40	100
3TC10	Introduction to Wet Processing Lab	-	-	4	3	60	-	40	100
3TC11	Discipline & Extra Curricular Activities	-	-	-	-	50	-	-	50
Total		-	-	14	-	260	-	140	400
Grand Total		18	-	14	-	380	480	140	1000

IV SEMESTER (Textile Chemistry)

Sub. Code	Name of Subject	Teaching Periods			Duration of Exams (Hours)	Maximum Marks Allocation			Total
		L	T	P		Internal	End Term	Practical	
4TC1	Principles of Textile Manufacturing – II	3	-	-	3	20	80	-	100
4TC2	Analytical Chemistry	3	-	-	3	20	80	-	100
4TC3	Theory of Dyeing	3	-	-	3	20	80	-	100
4TC4	Fabric Preparation	3	-	-	3	20	80	-	100
4TC5	Chemistry of High Polymers	3	-	-	3	20	80	-	100
4TC6.1	Elective Object Oriented Programming	3	-	-	3	20	80	-	100
4TC6.2	Applied Mechanics								
Total		18	-	-	-	120	480	-	600
4TC7	Principles of Textile Manufacturing – II	-	-	4	3	60	-	40	100
4TC8	Analytical Chemistry Lab	-	-	4	3	60	-	40	100
4TC9	Experimental Process Lab	-	-	4	3	60	-	40	100
4TC10	Object Oriented Programming Lab Or Applied Mechanics Lab	-	-	2	3	30	-	20	50

4TC11	Discipline & Extra Curricular Activities	-	-	-	-	50	-	-	50
Total		-	-	14	-	260	-	140	400
Grand Total		18	-	14	-	380	480	140	1000

TEXTILE FIBERS
[3TC1]

[Common with

3TT4, 3TE3]

Class B. Tech. (Textile Chemistry)	Evaluation
Schedule per week Lectures : 3 Practical : 4	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the Subject
I	<ul style="list-style-type: none"> • Definition and classification of textile fibers with reference to their utilization in textile industry • Introduction to impurities in natural fibers
II	<ul style="list-style-type: none"> • Cultivation and retting practices • Fiber morphology • Physical and chemical properties of natural cellulosic fibers viz. cotton, jute, flex, rammie, hemp, sunn, coir. • Varieties of cotton
III	<ul style="list-style-type: none"> • Varieties, sorting and grading of wool • Morphological structure of wool • Physical and chemical properties of wool fiber
IV	<ul style="list-style-type: none"> • Varieties of silk • Rearing of silk worm, cocooning, silk reeling, throwing and weighting • Varieties of silk yarns and fabrics • Morphology, physical and chemical properties of silk fiber
V	<ul style="list-style-type: none"> • Brief outline of manufacturing process and properties of regenerated fibers viz. viscose rayon, cellulose, triacetate, cupraammonium rayon, polynosics • Brief manufacturing process and properties of important synthetic fibers viz. Polyester, Nylon, Acrylics • Introduction to some newly developed fibers viz. Lycra, Spandex, Polybutylene, Terephthalate, Lyocell, Casein

PRINCIPLES OF TEXTILE MANUFACTURING – I
[3TC2]

Class B. Tech. (Textile Chemistry)	Evaluation
Schedule per week Lectures : 3 Practical : 4	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the Subject
I	<ul style="list-style-type: none"> • System of expressing yarn linear density • Introduction to Cotton, Woolen and Worsted systems of yarn production • Outline of various other spinning systems

II	<ul style="list-style-type: none"> • Basic principle of opening, cleaning • Carding, combing, drawing • Ring spinning, rotor spinning
III	<ul style="list-style-type: none"> • Doubling, roving • Twist and twist multiplier and • Numerical problems related to these mechanisms
IV	<ul style="list-style-type: none"> • Introduction to non-conventional spinning systems viz. air jet, open end, frictions spinning
V	<ul style="list-style-type: none"> • Properties and end uses of ring spun, rotor spun and air jet spun yarns • Brief description of fancy yarns, ply cable yarn, core spun yarn • Sewing thread, slub yarn, grindle and mélange yarn

PHYSICAL CHEMISTRY
[3TC3]

Class B. Tech. (Textile Chemistry)	Evaluation
Schedule per week Lectures : 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the Subject
I	<ul style="list-style-type: none"> • Classification, difference between colloidal solution, true solution and suspension. Preparation, properties and purification • Origin of charge, coagulation and protective action • Application of colloids
II	<ul style="list-style-type: none"> • Theoretical properties of colloidal systems interfacial phenomena particle kinematics, electrical properties, viscosity characteristics and studies • Lyophobic and Lyophilic solutions, gels and emulsions • Adsorption and absorption characteristics of adsorption • Types of adsorption, Langmuir adsorption, application of adsorption
III	<ul style="list-style-type: none"> • Thermo Chemistry: Heat of reaction at constant volume and pressure • Kirchoff's equation • Heat of combustion, Neutralization and formation • Laws of thermo-chemistry
IV	<ul style="list-style-type: none"> • Electro-Chemistry: Phenomena of electrolysis • Faraday's Laws of electrolysis • Conductance of electrolytes • Effect of dilutions, pressure and temperature on conductance • Migration of ions, Transport number • Kohlrausch's law and its application • Electro chemical cells
V	<ul style="list-style-type: none"> • Kinetics of homogeneous reactions • First and second order reactions • Theory of catalysis • Acid -Base catalysis some industrial processes by different catalysts

INTRODUCTION TO WET PROCESSING
[3TC4]

Class B. Tech. (Textile Chemistry)	Evaluation
Schedule per week Lectures : 3 Practical : 4	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the Subject
I	Pretreatments: <ul style="list-style-type: none"> • Elementary knowledge of processing • Impurities in raw cotton, wool and silk • Adventitious impurities in Grey fabrics made out of cotton, wool and silk • Objects of different processes involved e.g., singeing, desizing, scouring, bleaching
II	Processing Sequence: <ul style="list-style-type: none"> • Processing sequence in conversion of Grey cotton goods into semi bleached, full bleached and color bleached fabrics • Chemical used in these processes • Introductory knowledge of machinery used in scouring and bleaching of cotton fabric
III	Dyeing: <ul style="list-style-type: none"> • General method of dyeing by important classes of dyes on natural and man-made fibers e.g., direct, acid, basic, vat, azoic, sulphur and disperse dyes • Chemicals/auxiliaries used in dyeing • Introductory knowledge of dyeing machines • Colour measurement and fastness properties
IV	Printing: <ul style="list-style-type: none"> • Introduction to various methods of printing of textiles, instruments and machinery used • Introduction to various styles of printing viz. direct, discharge, resist
V	Finishing: <ul style="list-style-type: none"> • Object of finishing and application of various type of finishes • Elementary knowledge of finishing machines

ELECTEONICS & MICROPROCESSORS IN TEXTILES
[3TC5]

[Common

with 3TT5]

Class B. Tech. (Textile Chemistry)	Evaluation
Schedule per week Lectures : 3 Practical : 2	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the Subject
I	<p>Semiconductor Diodes: Introduction, characteristics and their applications</p> <ul style="list-style-type: none"> • Ideal diode • PN semiconductor diode • Diode equivalent circuits • Zener diode • Light diodes
II	<p>Field Effect Transistors:</p> <ul style="list-style-type: none"> • Introduction, Construction and characteristics of JFETS • Transfer characteristics • BJT, their characteristics and applications. <p>Transistor Amplifiers:</p> <ul style="list-style-type: none"> • Classification of amplifiers • Biasing and compensation techniques • R-C coupled amplifier, tuned amplifier, operational amplifier their characteristics and applications • Digital to analog and analog to digital conversion
III	<p>Operational Amplifiers (OpAmp):</p> <ul style="list-style-type: none"> • Introduction, Block diagram, parameters of OpAmp IC 741 • OpAmp in inverting and non-inverting configuration • Some applications of OpAmp <p>Semiconductor Devices:</p> <ul style="list-style-type: none"> • Introduction of silicon controlled rectifier • GTO • TRIAC, DIAC • Injunction transistors, IGBT
IV	<p>Cathode Ray Oscilloscope:</p> <ul style="list-style-type: none"> • Introduction, Cathode ray tube – theory and construction <p>Transducers:</p> <ul style="list-style-type: none"> • Introduction, resistive, Inductive, capacitive transducers. • Construction and working principle of strain gauge, LVDT, RVDT • Summing devices, measurement of linear displacement • Pressure measuring using transducers • Construction and working of thermocouple and thermistor, measurement of temperature using them <p>Data Acquisition Systems:</p> <ul style="list-style-type: none"> • Introduction, components and uses
V	Process control:

	<ul style="list-style-type: none">• Application of microprocessors in process control with special emphasis on textiles• Minimum microprocessor based system requirement• Examples of process control from textile and garment manufacturing engineering
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ELECTIVES

APPLIED STATISTICS [3TC6.1]

[Common with

3TT6.1 & 3TE6.1]

Class B. Tech. (Textile Technology)	Evaluation
Schedule per week Lectures : 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the Subject
I	<ul style="list-style-type: none"> • Curve fitting (least square method) • Fitting of straight line • Second degree parabola • Exponential and logarithmic curves
II	<ul style="list-style-type: none"> • Correlation and regression • Partial and multiple correlation, • Multiple regression
III	<ul style="list-style-type: none"> • Probability • Probability distributions • Binomial, Poisson • Normal distribution, application aspects of normal distribution • Hypergeometric distribution
IV	<ul style="list-style-type: none"> • Estimation of parameters • Testing of hypothesis • t-test • F-test • Chi-square test
V	<ul style="list-style-type: none"> • Quality control • Control charts (X, R & P), action & warning limits • Interpretation of control charts

NANO TECHNOLOGY [3TC6.2]

[Common with

3TT6.1 & 3TE6.1]

Class B. Tech. (Textile Technology)	Evaluation
Schedule per week Lectures : 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the Subject
I	Introduction and fundamental science behind Nano technology: <ul style="list-style-type: none"> • Definition, description about size and measures, electron, atoms and ions, molecules • Molecular recognition • Quantum mechanics and quantum ideas and some Nano challenges
II	Measuring instruments of Nano structures: <ul style="list-style-type: none"> • Scanning probe instruments, spectroscopy, electrochemistry, electron microscopy

	<ul style="list-style-type: none"> • Tools to make Nano structures – lithography methods, scanning probe instruments • Nano scale crystal growth, polymerization • Nano bricks and building blocks
III	Points and places of interest: <ul style="list-style-type: none"> • Smart materials, sensors • Nano scale bio-structures • Optics, fabrication, modeling, electronics
IV	Applications: <ul style="list-style-type: none"> • Nano polymer, Nano tubes, Nano fibers • Nano catalyst and consumer goods
V	<ul style="list-style-type: none"> • Nano business • Nano ethics • Nano resource

**FOURTH
SEMESTER
B. Tech. (Textile Chemistry)**

PRINCIPLES OF TEXTILE MANUFACTURING – II
[4TC1]

Class B. Tech. (Textile Chemistry)	Evaluation
Schedule per week Lectures : 3 Practical : 4	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the Subject
I	Weaving preparation: <ul style="list-style-type: none"> Object and basic principles of working of winding, warping, drawing-in and sizing machines
II	Weaving mechanism: <ul style="list-style-type: none"> Classification of weaving machines Basic mechanism of a plain loom and passage of warp through loom Plain tappet shedding motion, climax dobby Side lever under-pick motion, sley beat up motion Cimmco semi positive let off motion Five wheel and seven wheel take up motion
III	Fabric Defects: <ul style="list-style-type: none"> Brief introduction of basic defects like starting mark, box mark, broken pick, slack and tight selvage, missing end (chira), reed marks, stains, temple mark Specification for standard woven fabric Calculations: <ul style="list-style-type: none"> Weight of warp, weft and fabric Production of loom
IV	Non Conventional Looms: <ul style="list-style-type: none"> Introduction to non conventional looms e.g. Projectile, Ravier, Jet looms etc.
V	Fabric Structure: <ul style="list-style-type: none"> Methods of fabric presentation weave repeat unit drafts and lifting plan constructions Construction of elementary weaves e.g. plain, twill, satin and sateen weaves Plain weave derivatives, weaves constructed on twill bases namely Herring bone waved and broken twills Brief introduction to set theory

ANALYTICAL CHEMISTRY
[4TC2]

Class B. Tech. (Textile Chemistry)	Evaluation
Schedule per week Lectures : 3 Practical : 4	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the Subject
I	<ul style="list-style-type: none"> Preparation, properties and uses Hydrogen ion concentration and its determination using: (1) Hydrogen-Electrode. (2) Glass-Electrode
II	Oxidation - Reduction: <ul style="list-style-type: none"> Oxidizing and reducing agents e.g., Peroxide, Chlorite, Hydro sulphite, Potassium permanganate, Potassium dichromate

III	<p>Chromatography:</p> <ul style="list-style-type: none"> • Chromatographic methods of separation, adsorption, exchange and gas chromatography • Solvent exchange
IV	<p>Crystallography:</p> <ul style="list-style-type: none"> • Introduction, classification of crystals • Crystal structure by X-ray diffraction, Bragg method • Rotating crystal method and • Powdered method
V	<p>Spectroscopy:</p> <ul style="list-style-type: none"> • Fundamental principles of spectroscopy, • Instrumentation and brief out lines of UV, IR and NMR spectroscopy, their applications in textiles

THEORY OF DYEING [4TC3]

Class B. Tech. (Textile Chemistry)	Evaluation
Schedule per week Lectures : 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the Subject
I	<ul style="list-style-type: none"> Physical and Chemical principles involved in the application of Dyestuff e.g. Direct, Basic, Acid, Vat, Disperse, Azoic, Pigment dyes etc. to textile materials
II	<ul style="list-style-type: none"> Various isotherms Thermodynamics and Kinetics of Dyeing
III	<ul style="list-style-type: none"> Theories of dyeing e. g. Absorption, Electrochemical, Colloidal and Solid solution, free volume, static pore theory etc.
IV	<ul style="list-style-type: none"> Classification and recent development in dyes e.g. Direct, Reactive etc. Relation between colour and chemical constitution Relation between substantively and chemical constitution of dyes Compatibility of dyes
V	<ul style="list-style-type: none"> Concept of solubility parameters Mechanism of carrier in PET dyeing Diffusion coefficient and its measurement

FABRIC PREPARATION [4TC4]

Class B. Tech. (Textile Chemistry)	Evaluation
Schedule per week Lectures : 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the Subject
I	<ul style="list-style-type: none"> Impurities in raw cotton and Grey cloth and chemical process involved in their removal Shearing: Object of shearing, principles of working of shearing machines Singeing: Object of singeing, different types of singeing machines and their working
II	<ul style="list-style-type: none"> Desizing: Different methods of desizing, rapid desizing Scouring: Scouring of cotton in Kiers, J-boxes, continuous methods, solvent scouring etc, different types of washing machines
III	<ul style="list-style-type: none"> Bleaching: Mechanism of bleaching using various bleaching agents viz. bleaching powder, sodium hypo-chlorite, peroxides etc. Effect of pH on bleaching, semi continuous and continuous methods, faults and remedies. Short sequences, combined preparatory processes, low temperature preparatory processes

	<ul style="list-style-type: none"> • Rapid bleaching, modifications in bleaching plant, bleaching machines viz. kiers, J-boxes, bleaching cisterns, scutchers etc. • Chlorine free bleaching
IV	<ul style="list-style-type: none"> • Scouring and bleaching of jute, Linen, wool and silk • Optical brighteners
V	<ul style="list-style-type: none"> • Mercerization: Methods and equipments for yarn and fabric mercerization • Factors affecting efficiency of mercerization • Physical and chemical changes in cotton • Mercerization of cotton and PC blends • Causticization. • Hot mercerization, Liquid ammonia treatment of cotton

CHEMISTRY OF HIGH POLYMERS
[4TC4]

Class B. Tech. (Textile Chemistry)	Evaluation
Schedule per week Lectures : 3	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the Subject
I	<ul style="list-style-type: none"> Terms, definitions and scope of polymer chemistry, plastic, fibers and rubbers. Chemistry of polymerization viz. chain polymerization, step polymerization etc
II	<ul style="list-style-type: none"> Kinetics of polymerization-chain polymerization, cationic polymerization, anionic polymerization, Poly-condensation with special reference to polyester, polyamide, phenol formaldehyde, urea formaldehyde, epoxy resin, etc
III	<ul style="list-style-type: none"> Types of molecular weights, Measurement of molecular weights and molecular weight dependent properties Poly-dispersity
IV	<ul style="list-style-type: none"> Chemical and geometrical structure of polymer molecule Transitions and its measurement Differential scanning calorimetry (DSC), Thermo-gravimetric analysis (TGA)
V	<ul style="list-style-type: none"> Polymer solutions Thermodynamics of polymer dissolution Florry and Huggins theory of polymer solutions. Chemical Composition of fibrous polymers viz. cellulose, wool ,silk

ELECTIVES

OBJECT ORIENTED PROGRAMMING
[4TC6.1]

[Common

with 4TT6.1]

Class B. Tech. (Textile Technology)	Evaluation
Schedule per week Lectures : 3 Practical : 2	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the Subject
I	Principles of object oriented programming <ul style="list-style-type: none"> Beginning with C++ Tokens, Expression and Control structures Main function, call by reference, inline, friend Classes and objects
II	Function in C++ <ul style="list-style-type: none"> Nesting of member function Private member function Array within a class Static data member Static member function
III	Constructors and Destructors

	<ul style="list-style-type: none"> • Copy constructor • Multiple constructor in a class • Destructor
IV	Operator Overloading <ul style="list-style-type: none"> • Unary • Binary
V	Inheritance: Extending Classes <ul style="list-style-type: none"> • Single inheritance • Multiple inheritance • Multi level inheritance • Working with files

APPLIED MECHANICS
[4TC6.2]

[Common with
4TT6.2 & 4TE4]

Class B. Tech. (Textile Technology)	Evaluation
Schedule per week Lectures : 3 Practical : 2	Examination Time = Three (3) Hours Maximum Marks = 100 [Mid-term (20) & End-term (80)]

Units	Contents of the Subject
I	Strength of materials <ul style="list-style-type: none"> • Behavior of common materials in tension & compression • Characteristic strain-stress curves of engineering materials • Hook's law • Elastic-limit working stress, ultimate stress, factor of safety • Poisson ratio • Elastic constants & their relationship
II	Shearing & Bending <ul style="list-style-type: none"> • Center of gravity, Moment of Inertia of area of symmetrical, un-symmetrical & built-up sections • Simple beams subjected to transverse loading • Shear force and bending moment diagram • Theory of bending • Normal stress due to bending
III	Torsion of shaft: <ul style="list-style-type: none"> • Torsional shear stresses in solid, hollow & stepped circular shafts • Angular deflection & power transmission capacity • Application to close coil helical spring
IV	Fluid Mechanics – I: <ul style="list-style-type: none"> • Basic definitions & fluid properties: definition of fluid, incompressible and compressible fluids • Mass density, specific weight, relative density, specific volume • Ideal fluid, viscosity, Newtonian & Non-Newtonian fluids • Kinematics & conservation of mass: flow classification, fluid velocity & acceleration • Continuity equation for one dimensional and three dimensional fluid flow
V	Fluid Mechanics – II: <ul style="list-style-type: none"> • Fluid momentum: momentum theorem, application of momentum equation • Bernoulli equation • Application of Bernoulli equation: orifice meter, venturi meter • Flow through pipe • Head losses due to sudden enlargement, contraction, entrance, exit, obstruction, bend and pipe fitting • Power transmission by fluid