

**DKTE Society's  
TEXTILE & ENGINEERING INSTITUTE**

**Rajwada, Ichalkaranji 416115**

**(An Autonomous Institute)**

**DEPARTMENT: TEXTILES**

**CURRICULUM**

**B. Tech. Textile Chemistry Program**

**First Year**

With Effect From

2017-18



Promoting Excellence in Teaching  
Learning & Research

**First Year B. Tech. Textile Chemistry  
Semester-I**

Sr. No.	Course Code	Name of the Course	Group	Teaching Scheme				Credits
				Theory Hrs/Week	Tutorial Hrs/Week	Practical Hrs/Week	Total	
1	TCL131	APPLIED PHYSICS	A	3			3	3
2	TCL132	TEXTILE MATHEMATICS -I	A	3			3	3
3	TCL133	ELECTRICAL TECHNOLOGY	B	3			3	3
4	TCL134	ORGANIC CHEMISTRY-I	D	3			3	3
5	TCL135	PHYSICAL CHEMISTRY	A	3			3	3
6	TCL136	INORGANIC CHEMISTRY	A	3			3	3
7	TCP137	ELECTRICAL TECHNOLOGY LAB	B			2	2	1
8	TCP138	ORGANIC CHEMISTRY-I LAB	D			2	2	1
9	TCP139	PHYSICAL CHEMISTRY LAB	A			2	2	1
10	TCP140	INORGANIC CHEMISTRY LAB	A			2	2	1
11	TCP141	PROFESSIONAL COMMUNICATION LAB	C	1		2	3	2
		Total		<b>19</b>	<b>1</b>	<b>10</b>	<b>29</b>	<b>24</b>

**Group Details**

- A: Basic Science  
 B: Engineering Science  
 C: Humanities Social Science & Management  
 D: Professional Core Courses & Professional Elective  
 E: Free Elective  
 F: Seminar/Training/ Project

**First Year B. Tech. Textile Chemistry – Semester I**

**TCL131: APPLIED PHYSICS**

Teaching Scheme	
Lectures	3 Hrs/ Week
Total Credits	3

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
<b>Total</b>	<b>100</b>

**Course Objectives**

1. Understand significance of basic concepts of physics involved in textiles
2. Discuss the different factors from physics affecting yarn and fabric properties.
3. Explain the different principles from physics involved in textiles.
4. Explain the different methods of measurement and calculate the different quantities of physics involved in textiles.

**Course Outcomes**

At the end of the course students will be able to

1. Understand significance of basic concepts of physics involved in textiles
2. Discuss the different factors from physics affecting yarn and fabric properties
3. Explain the different principles from physics involved in textiles.
4. Explain the different methods of measurement and calculate the different quantities of physics involved in textiles.

<b>Unit</b>	<b>Course Contents</b>	<b>Hrs.</b>
<b>Unit 1.</b>	<b>Elasticity:</b> Stress, strain, Hooke's Law of elasticity. Some peculiar traits, working stress and factor of safety. Factors affecting elasticity. Young's modulus, bulk Modulus and Modulus of rigidity. Relation between $Y$ , $\eta$ and $K$ . Poisson's ratio, relation between $K$ , $\eta$ and Poisson's ratio.	<b>08</b>
<b>Unit 2.</b>	<b>Friction and Viscosity:</b> Newton's Law of viscosity, streamline & turbulent flow, critical velocity, significance of Reynold's number. Experimental determination of $\eta$ for a liquid by Poiseuille's method, Stokes law. Terminal velocity and its expression. Ostwald viscometer Applications of viscosity.	<b>08</b>

- Unit 3. Surface Tension:** Molecular theory of surface tension. Angle of contact and its characteristics. Excess pressure inside a liquid drop & soap bubble. Relation between radii of curvature, pressure & surface tension. Applications of surface tension. **06**
- Unit 4. Optics:** Laws of refraction, refractive index, total internal reflection. Magnifying power of simple and compound Microscope. Construction & working of electron microscope. Double refraction, Nicol prism. Quarter & half wave plates. **07**
- Unit 5. Photoelectric Effect:** Concept, Einstein's equation of photoelectric effect. Factors affecting the photoelectric effect. Study of various photocells. Use of photo sensors. **05**
- Unit 6. Crystallography:** Lattice, Basis, Crystal structure, seven crystal systems. Production of x-rays, Bragg's law, Bragg's x-ray spectrometer. **05**

**Reference Books**

- 1 Elements of Properties of Matter by D.S. Mathur
- 2 Engineering Physics by B.L. Theraja
- 3 Engineering Physics by R.K. Gour & Gupta
- 4 Physics for Engineers by M.R. Srinivasan
- 5 Text Book of Optics by Brijlal & Subramanyam
- 6 Optics by A.K. Ghatak

**First Year B. Tech. Textile Chemistry – Semester I**

**TCL132: TEXTILE MATHEMATICS-I**

Teaching Scheme	
Lectures	3 Hrs. /Week
Total Credits	3

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
<b>Total</b>	<b>100</b>

**Course Objectives**

1. Introduce students to mathematical methods which suits to solve the problems of matrices.
2. Prepare students so that they can understand mathematical treatments used in tracing the curves and the rules of differentiation & partial differentiation.
3. Introduce students to statistical methods which suits to statistical applications needs of Textile Math's III & IV of textile engineering.
4. Develop ability to collect, formulate & analyse textile testing data.

**Course Outcomes**

At the end of the course students will be able to

1. Solve problems related to matrices, successive differentiation, partial differentiation and its application
2. Solve the problems of successive differentiation, partial differentiation and its application
3. Collect textile testing data & classify and represent graphically also evaluate and interpret measures of central tendency and dispersion.
4. Evaluate and interpret measures of skewness and kurtosis understand mathematical models used in textile engineering

**Course Contents**

**Unit 1. Matrix:** Rank of matrix (Normal form of matrix, Echelon form of Matrix) **8Hrs.**  
 Solution of simultaneous linear equations (Homogeneous & Non Homogeneous) Characteristic equation, eigen values, eigen vectors. Caley Hamilton's theorem.

<b>Unit 2.</b>	<b>Successive Differentiation &amp; Partial Differentiation:</b> Introduction, standard results, Leibnitz rule. Introduction of p. d., total differentiation, Euler's theorem on homogeneous function. Jacobean ( $J.J'=1$ ) only, Errors & approximation.	<b>8Hrs.</b>
<b>Unit 3.</b>	<b>Curve Tracing:</b> Rules & examples of curve tracing in Cartesian and Polar Equations only.	<b>5Hrs.</b>
<b>Unit 4.</b>	<b>Introduction of Statistics:</b> Definitions of Population, Variable, Attribute, Census Survey, Sample Survey, Random sample. Raw statistical data, collection, classification, Frequency distribution, class limits & boundary, class width, mid-point. Histogram, Frequency polygon, Frequency curve. Measures of central tendency: Arithmetic Mean (A.M.), Median, Mode, Combined Mean & Computation Partition values : Quartiles deciles and percentiles & Computation	<b>7Hrs.</b>
<b>Unit 5.</b>	<b>Measures of dispersion:</b> Range, Quartile deviation, Mean deviation, Standard deviation as Absolute measures of dispersion, Coefficient of range, quartile deviation, mean deviation, coefficient of variation as Relative measures of dispersion, consistency of data & computation	<b>6 Hrs.</b>
<b>Unit 6.</b>	<b>Measures of Skewness &amp; kurtosis:</b> Skewness, types, Karl Pearson's & Bow ley's coefficient of skewness & Computation. Kurtosis definition and types only. (No Examples of Kurtosis)	<b>5 Hrs.</b>

**Reference Books**

1. A textbook of applied mathematics Vol.-I & II by P.N. & J.N. Wartikar.
2. Higher engineering mathematics by B.S. Grewal
3. A textbook of applied mathematics by Bali, Saxena&Iyengar.
4. Mathematical Statistics by J.E. Fruend.
5. Probability & Statistics for engineers by Johnson.
6. Statistical methods by Kumbhojkar

**First Year B. Tech. Textile Chemistry – Semester I**

**TCL133: ELECTRICAL TECHNOLOGY**

Teaching Scheme	
Lectures	3 Hrs. /Week
Total Credits	3

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
<b>Total</b>	<b>100</b>

**Course Objectives**

1. To understand various definitions, laws and concepts involved in electrical & magnetic circuits.
2. To understand concepts of elements & parameters in single phase & three phase AC circuits.
3. To understand working of electrical equipments like Transformer & Three phase induction Motors.
4. To explain concept of energy audit, power quality & modern methods.

**Course Outcomes**

At the end of the course students will be able to

1. Understand fundamental principles of electrical & magnetic circuit.
2. Understand to predict the behaviour of any element with respect to AC supply.
3. Design and conduct experiments, as well as to calculate the ratings & parameters of Transformer & Three phase induction Motors.
4. Understand concept of energy audit & its content related to saving.

**Course content**

<b>Unit 1.</b>	<b>Fundamentals of Electrical circuits</b>	<b>8 Hrs.</b>
	A) <b>D.C. Circuits:</b> Ohm's Law, Kirchhoff's laws, mesh and node analysis, Energy conversions between electrical, mechanical, thermal quantities.	
	B) <b>Magnetic Circuits:</b> Flux, flux density, Reluctance, field intensity, B-H curve, series magnetic circuits.	
<b>Unit 2.</b>	<b>Single Phase A.C. Circuits:</b> Generation of sinusoidal voltage, R.M.S. & Average value, form factor, phasor representation of A.C. quantities, impedance, R-L, R-C, R-L-C series circuits, powers, power factor improvement by capacitor method.	<b>8 Hrs.</b>
<b>Unit 3.</b>	<b>Three Phase A.C. Circuits:</b> Introduction to three phase supply and its necessity, Generation of three phase A.C. voltage, balanced system, relation between line and phase quantities in star and delta.	<b>7Hrs.</b>

<b>Unit 4.</b>	<b>Single Phase Transformer</b> Construction, operating principle, Types, emf equation, Transformation Ratio, operation on no load and with load, losses, efficiency, voltage regulation, applications.	<b>7 Hrs.</b>
<b>Unit 5.</b>	<b>Three Phase Induction Motor</b> Working Principle, Constructional Details, Types, Rotating Magnetic Field Theory, Torque Equation, Torque – Slip Characteristics, Speed Control Methods, Necessity of starters, Types of Starters, Variable Frequency Drive (VFD), application in Textile Industry.	<b>7 Hrs.</b>
<b>Unit 6.</b>	<b>Energy Audit</b> Introduction of energy audit, power quality, concept of energy efficient lighting system & motors.	<b>2 Hrs.</b>

**Reference Books**

1. Elements of electrical Engineering by U.A.Bakshi
2. Electrical Technology by U.A.Bakshi
3. Basic Electrical Engineering by B. H. Deshmukh.
4. A text book in electrical technology by B.L.Thareja
5. Fundamentals of Electrical Engineering by Ashfaq Husain.



**First Year B. Tech. Textile Chemistry – Semester I**

**TCL134: ORGANIC CHEMISTRY-I**

<b>Teaching Scheme</b>	
Lectures	3 Hrs. /Week
Total Credits	3

<b>Evaluation Scheme</b>	
SE-I	25
SE-II	25
SEE	50
<b>Total</b>	<b>100</b>

**Course Objectives**

1. To discuss general nature and mechanism of organic reactions.
2. To explain chemistry of aliphatic hydrocarbons and its halogen derivatives.
3. To describe chemistry of a) Alcohols, b) Aldehydes, c) Ketones, d) Carboxylic acids, e) amines, f) ethers.
4. To discuss stereochemistry and its types.

**Course Outcomes**

At the end of the course students will be able to

1. State and discuss nature, energetics and mechanism of organic reactions.
2. Understand chemistry of aliphatic hydrocarbon and halogen derivatives.
3. Understand chemistry of a) Alcohol, b) Aldehydes, c) Ketones, d) Carboxylic acids, e) Amines, f) Ether.
4. Explain stereochemistry and its significance in organic chemistry.

**Course Contents**

	<b>Hrs.</b>
<b>Unit 1. Nature of General Organic Reactions and Mechanism</b>	8
Introduction, electron displacements in molecules, bond fission, types of organic reactions, types of reagents, energetics of ionic or polar mechanisms, kinetic and thermodynamic control, reactive intermediates, and applications in textiles.	
<b>Unit 2. Aliphatic Hydrocarbons and Halogen Derivatives</b>	7
Introduction, nomenclature, classification, orbital structure, methods of preparation of aliphatic hydrocarbons and their halogen derivatives.	
a) Physical and chemical properties of alkanes, alkenes and alkynes and their applications in textiles.	
b) Methods of preparation, physical and chemical properties of monohalogen derivatives, S <sub>N</sub> 1 and S <sub>N</sub> 2 mechanisms and applications in	

	textiles.	
<b>Unit 3.</b>	<b>Aliphatic hydroxyl compounds and Ethers</b>	6
	Introduction, nomenclature, classification, orbital structure of aliphatic hydroxyl compounds, ethers and epoxies	
	a) Methods of preparation, physical and chemical properties of ethanol, ethylene glycol, glycerine, distinguishing chemical properties of 1 <sup>o</sup> , 2 <sup>o</sup> , 3 <sup>o</sup> alcohols, absolute alcohol, power alcohol, denatured alcohol and applications in textiles.	
	b) Important methods of preparation, physical and chemical properties of ether and crown ethers and their applications in textiles.	
<b>Unit 4.</b>	<b>Aldehydes, Ketones and Carboxylic Acids</b>	6
	Introduction, nomenclature, classification, orbital structure of aldehydes, ketones and carboxylic acids.	
	a) Important methods of preparation, physical and chemical properties of acetaldehyde, acetone and applications in textiles.	
	b) Methods of preparation, physical and chemical properties of acetic acid, acidity of carboxylic acids and applications in textiles.	
<b>Unit 5.</b>	<b>Amines</b>	6
	Introduction, nomenclature, classification, orbital structure, important methods of preparation, properties of ethyl amine and their applications in textiles.	
<b>Unit 6.</b>	<b>Stereochemistry</b>	6
	Introduction, stereoisomerism, optical isomerism, enantiomers, distereoisomers, meso form, racemic mixture. Fischer projection formula, relative configuration(d & l), absolute configuration(R&S). Geometrical isomerism, E & Z nomenclature, conformations of ethane, butane and cyclohexane and applications in textiles.	

### Reference Books

1. Organic Chemistry by Morrison & Boyd.
2. Organic Chemistry - Vol. I, The Fundamental Principles by I.L. Finar.
3. A text book of Organic Chemistry by P.L. Soni.
4. A text book of Organic Chemistry by B.S. Bahl and ArunBahl.
5. Reaction Mechanism & Reagents in Organic Chemistry by Gurdeep R. Chatwal.
6. Advanced Organic Chemistry by Jerry March.

**First Year B. Tech. Textile Chemistry – Semester I**

**TCL135: PHYSICAL CHEMISTRY**

<b>Teaching Scheme</b>	
Lectures	3 Hrs. /Week
Total Credits	3

<b>Evaluation Scheme</b>	
SE-I	25
SE-II	25
SEE	50
<b>Total</b>	<b>100</b>

**Course Objectives**

1. To explain concept of acid-base, colligative properties and application of phase rule
2. To describe chemical kinetics and photochemistry.
3. To explain laws of thermodynamics, thermochemistry and their applications.
4. To explain catalyst, adsorption and their types.

**Course Outcomes**

At the end of the course students will be able to

1. Explain concept of acid-base, colligative properties and application of phase rule.
2. Describe chemical kinetics and photochemistry.
3. Apply the laws of thermodynamics and thermochemistry.
4. Describe significance of catalysis and adsorption.

**Course Contents**

	<b>Hrs.</b>
<b>Unit 1. Solutions and Ionic Equilibrium</b> Introduction, types, solutions of solid in liquid, expressing concentration of solutions. Vapour pressure of liquid solutions, lowering of vapour pressure, elevation in boiling point, depression in freezing point and determination of molar mass. Concepts of acids and bases, common ion effect, ionic product of water, pH, buffers, indicators, choice of indicators for acid-base titrations, solubility product, numerical problems.	<b>8</b>
<b>Unit 2. Chemical Kinetics</b> Introduction, rate of chemical reactions, rate equations, order of reaction, zero, first, second and third order reactions with their examples, pseudo first order reactions, rate constant and its units, integrated rate equation, half-life of reaction: (zero order and first order reactions), numerical problems, factors affecting rate of chemical reactions.	<b>8</b>
<b>Unit 3. Photochemistry</b> Introduction, comparison between thermal and photochemical reactions, photo excitation of organic molecules, Jablonski diagram, fluorescence,	<b>6</b>

	phosphorescence.	
<b>Unit 4.</b>	<b>Phase Rule</b> Introduction, Gibb's phase rule, advantages and limitations, phase diagram, application of phase rule to one component, two component and three component system, efflorescence and deliquescence.	<b>5</b>
<b>Unit 5.</b>	<b>Thermodynamics and Thermo Chemistry</b> Introduction, zeroth, first, second and third law of thermodynamics, internal energy, work and heat changes, heat changes at constant pressure and constant volume, maximum work in isothermal expansion of gases, internal energy of an ideal gas, heat capacities at constant pressure and constant volume, adiabatic changes, entropy. heat changes in chemical reaction, heat of reaction at constant pressure and constant volume, heat of formation, heat of combustion, heat of neutralization, heat of dilution, effect of temperature on heat of reaction, Kirchhoff's equation, numerical problems.	<b>7</b>
<b>Unit 6.</b>	<b>Adsorption and Catalysis</b> Introduction, types of adsorption, Freundlich adsorption isotherm, BET equation, isosteres, General characteristics of catalyzed reactions, types, catalyst poisoning, theories of catalysis, criteria for choosing catalyst for industrial processes, applications of catalysts for industrially important processes.	<b>5</b>

#### Reference Books

1. A Text book of Physical Chemistry by Samuel Glasstone.
2. Principles of Physical Chemistry by Maron & Prutton.
3. Essentials of Physical Chemistry by Bahl and Tuli.
4. A Text book of Physical Chemistry by L.K. Sharma.
5. Physical Chemistry by P.C. Rakshit.
6. Physical Chemistry by G.M. Barrow.

**First Year B. Tech. Textile Chemistry – Semester I**

**TCL136: INORGANIC CHEMISTRY**

<b>Teaching Scheme</b>	
Lectures	3 Hrs. /Week
Total Credits	3

<b>Evaluation Scheme</b>	
SE-I	25
SE-II	25
SEE	50
<b>Total</b>	<b>100</b>

**Course Objectives**

1. To explain types of chemical bonds, redox reactions and their applications.
2. To explain properties and applications of important inorganic compounds and detergents in textiles.
3. To describe chromatographic techniques, theories of co-ordinate compounds and their applications.
4. To solve problems based on stoichiometry.

**Course Outcomes**

At the end of the course students will be able to

1. Explain types of chemical bonds, redox reactions and their applications.
2. Explain properties and applications of important inorganic compounds and detergents in textiles.
3. Describe chromatographic techniques, theories of co-ordinate compounds and their applications.
4. Solve problems based on stoichiometry.

**Course Contents**

**Unit 1. Theory of Bonding and Stoichiometry**

Introduction, chemical bond, types of bond: covalent bond, ionic bond, co-ordinate bond, primary and secondary bonds such as Van der Waals forces, hydrogen bonds: intermolecular and intramolecular H-bonds, characteristics of ionic, covalent and co-ordinate compounds, polar and non-polar bonds, electronegativity and nature of bonds, dipole moment, bond length, bond angle, bond energy, atomic weights, molecular weight, equivalent weight of acids & bases, equivalent weight of oxidising and reducing agents, problems based on weight – weight relationship, weight-volume relations and their applications in textiles.

**Hrs.**

**9**

<b>Unit 2.</b>	<b>Compounds used in Textiles</b> Properties and textile applications of ammonium sulphate, ferrous sulphate, zinc oxide, zinc sulphoxylate formaldehyde, sodium carbonate, sodium hydroxide, Glauber's salt, vacuum salt, sodium perborate, sodium hydrosulphite, hydrogen peroxide, peracetic acid, sodium silicate, potassium permanganate.	7
<b>Unit 3.</b>	<b>Chromatography</b> Introduction, classification of chromatography, underlying principles of chromatographic techniques, paper chromatography, TLC, HPTLC: a brief introduction, ion exchange chromatography, high performance liquid chromatography, gas chromatography, applications in textiles.	7
<b>Unit 4.</b>	<b>Soaps and Detergents</b> Introduction, definition of soap, detergency and detergents, detergency mechanism, classification: anionic, cationic, non-ionic and amphoteric detergents, synthesis of detergents, formulations and applications of detergents, concept of microemulsions, use of microemulsions, applications in textiles.	6
<b>Unit 5.</b>	<b>Complex Ions and Co-ordination Compounds</b> Introduction, Werner's theory of co-ordination compound, electronic interpretation of co-ordination. The nature of the linkage in complex ions and co-ordination compounds, complexes resulting from electrostatic forces between constituents and co-ordination bonds, factors affecting the stabilities co-ordination compounds, chelates: classification and importance in textiles.	6
<b>Unit 6.</b>	<b>Redox reaction</b> Introduction, oxidation and reduction, electron transfer concepts, oxidizing and reducing agents, redox reactions in aqueous solutions, oxidation number and rules for assigning oxidation number and applications in textiles.	4

#### Reference Books

1. Fundamental concepts of Inorganic Chemistry by E.S. Gilreath.
2. A New Concise Inorganic Chemistry by J.D. Lee.
3. Inorganic Chemistry by Cotton & Wilkinson.
4. A text book of Quantitative Inorganic Chemistry by A.I. Vogel.
5. Fundamental Inorganic Chemistry by P.L. Soni.
6. Modern Approach Elementary Inorganic Chemistry by Bahl & Sharma.
7. Modern Inorganic Chemistry by Mellor and Parkes.
8. Synthetic Detergents by A. Davidshon and B. M. Milwidsky

**First Year B. Tech. Textile Chemistry – Semester I****TCP137: ELECTRICAL TECHNOLOGY LAB**

<b>Teaching Scheme</b>	
Practical	2 Hrs. /Week
Total Credits	1

<b>Evaluation Scheme</b>	
CIE	50
<b>Total</b>	<b>50</b>

**List of Experiments**

1. Introduction to Electrical Engineering Lab.
2. Verification of Ohm's Law.
3. Verification of Kirchhoff's Current Law.
4. Verification of Kirchhoff's Voltage Law.
5. Determination of power factor of R L series circuit.
6. Determination of R & L of a choke coil.
7. Study of Phasor Relationship in R-L-C series circuit.
8. Direct load test on Single Phase Transformer.
9. Reversal of Rotation of Three Phase Induction Motor.
10. Speed control of Three Phase Induction Motor.
11. Direct load test on Three Phase Induction Motor.
12. Study of starters.

**Submission**

1. Completed Journal.

**First Year B. Tech. Textile Chemistry – Semester I**

**TCP138: ORGANIC CHEMISTRY-I LAB**

<b>Teaching Scheme</b>	
Practical	2 Hrs. /Week
Total Credits	1

<b>Evaluation Scheme</b>	
CIE	50
SEE	
<b>Total</b>	<b>50</b>

**List of Experiments**

**Purification Techniques**

1. To purify given organic compound by sublimation
2. To purify given organic compound by filtration
3. To purify given organic compound by crystallization
4. To purify given organic compound by a simple distillation
5. To study the extraction of solvent soluble matter in cotton fabric using Soxhlet extraction
6. To separate the given mixture of two Immiscible liquids using separatory funnel.

**Estimations**

7. Estimation of Glucose
8. Estimation of Sulphanilic Acid

**Preparation of Some Simple Organic Compounds**

9. Preparation of phthalic anhydride from phthalic acid
10. Preparation phthalimide from phthalic anhydride.
11. Preparation of acetanilide from aniline
12. Preparation of urea-formaldehyde resin

**Submission**

Completed Journal



**First Year B. Tech. Textile Chemistry – Semester I**

**TCP139: PHYSICAL CHEMISTRY LAB**

<b>Teaching Scheme</b>	
Practical	2 Hrs. /Week
Total Credits	1

<b>Evaluation Scheme</b>	
CIE	50
SEE	
<b>Total</b>	<b>50</b>

**List of Experiments**

1. Standardization of NaOH using primary standard.
2. Standardization of H<sub>2</sub>SO<sub>4</sub> using primary standard.
3. Estimation of Na<sub>2</sub>CO<sub>3</sub> and NaOH from the given mixture.
4. Determination of heat of neutralization.
5. Determination of Heat of reaction between CuSO<sub>4</sub> and Zinc dust.
6. Determination of rate constant for the hydrolysis of ethyl acetate in the presence of 0.5N hydrochloric acid.
7. Study of the chemical kinetics of hydrogen peroxide decomposition.
8. Study of the effect of change in temperature on the rate of reaction between sodium thiosulphate & hydrochloric acid.
9. Determination of rate constant of (second order) reaction between potassium persulphate and potassium iodide. (equal concentration)
10. Determination of normality of given weak acid solution using weak base conductometrically.
11. Determination of normality of given acid solution potentiometrically.
12. Determination of Viscosity of liquids by using Ostwald's viscometer.

**Submission**

Completed Journal

**First Year B. Tech. Textile Chemistry – Semester I**

**TCP140: INORGANIC CHEMISTRY LAB**

<b>Teaching Scheme</b>	
Practical	2 Hrs. /Week
Total Credits	1

<b>Evaluation Scheme</b>	
CIE	50
SEE	
<b>Total</b>	<b>50</b>

**List of Experiments**

1. Separation and detection of cations by using Paper Chromatography.
2. Determination of Strength of Hydrogen Peroxide.
3. Determination of Percentage Purity of Hydrose Powder.
4. Determination of Percentage Purity of NaOH.
5. Determination of Percentage Purity of Na<sub>2</sub>CO<sub>3</sub>
6. Determination of Percentage Purity of NaOCl
7. Preparation hexamine nickel (II) chloride.
8. Preparation of chloropenta-amine cobalt (III) chloride.
9. Gravimetric Estimation of Barium as Barium Sulphate.
10. Gravimetric Estimation of Chloride as Sliver Chloride.
11. Qualitative Analysis of Sample Containing One Acidic and One Basic Radical.
12. Qualitative Analysis of Sample Containing Two Acidic and Two Basic Radicals.

**Submission**

Completed Journal

**First Year B. Tech. Textile Chemistry – Semester I**

**TCP141 - PROFESSIONAL COMMUNICATION LAB**

<b>Teaching Scheme</b>	
Lectures	1 Hrs./Week
Practical	2 Hrs. /Week
Total Credits	2

<b>Evaluation Scheme</b>	
SEE	00
CIE	50
<b>Total</b>	<b>50</b>

**Course Objectives**

1. To explain the concept of communication
2. To give information about Organizational structure of communication
3. To develop grammatical ability
4. To explain the importance of business correspondence
5. To discuss the importance of verbal and non-verbal Communication
6. To develop oratorical skills like debate, elocution, meetings, extempore

**Course Outcomes**

At the end of the course students will be able to

1. Understand and apply the importance of communication
2. Understand the structure of organizational communication
3. Understand and apply basic grammar while communicating
4. Design, compose and create different types of business letters.
5. Recognize the importance of verbal and non-verbal communication
6. Prepare themselves for debate, elocution, extempore and meeting.

**Course Contents**

<b>Unit 1.</b>	<b>Understanding Communication</b> Etymological perspective and definition of communication Nature and Importance of Communication, Process of communication – idea or source, sender, encoding process, message, medium or channel, noise, receiver, decoding process, feedback Barriers to Communication, Physical barriers, mechanical barriers, sociocultural, psychological barriers, linguistic and semantics barriers.	<b>2 Hrs.</b>
<b>Unit 2.</b>	<b>Organizational communication</b> Objectives of communication, Forms of Communication, Formal and informal communication, methods of communication oral and written communication, networks of communication in the organization upward, downward, horizontal, grapevine communication.	<b>2Hrs</b>
<b>Unit 3.</b>	<b>Development of grammatical ability</b> Parts of speech, articles, kinds of sentences, punctuation marks	<b>2 Hrs.</b>
<b>Unit 4.</b>	<b>Professional Correspondence</b> Importance, language and style, formats (British & American), Letter Writing, Simple application letter (seeking permission regarding absence etc.), Inquiry and its reply, placing an order, complaint and its adjustment and email etc	<b>3 Hrs.</b>
<b>Unit 5.</b>	<b>Techniques of Communication</b> Techniques of communication, Verbal Communication Non Verbal Communication, appearance, gestures, facial expressions,	<b>3 Hrs.</b>

postures, kinesics, eye contact, silence, haptic, proxemics, paralinguistic, colours

**Unit 6. Developing Oral Skills**

**2 Hrs.**

Importance and techniques to improve oral communication: Techniques of formal speech, meetings, Elocution, Extempore, Debate etc

**Reference Books**

1. Handbook for Technical Writing by David A. McMurrey, Joanne Buckley, Cengage.
2. A Course in English by J.D. O'Connor.
3. Better English Pronunciation by J.D. O'Connor.
4. Communication Skills Handbook: How to succeed in written and oral communication by Jane Summers, Brette Smith, Wiley India Pvt.Ltd.
5. Personal Development for Life and Work by Masters, Wallace, Cengage.
6. Soft Skills for Managers by Dr. T. KalyanaChakravarthi, Dr. T. LathaChakravarthi, Biztantra.
7. Soft Skills for every one by Jeff Butterfield, Cengage.
8. Behavioural Science by Dr. Abha Singh, Wiley India Pvt.Ltd.
9. An Introduction to Professional English and Soft Skills by Bikram K. Das, KalyaniSamantray, Cambridge University Press New Delhi.
10. Speaking Accurately by K.C. Nambiar, Cambridge University Press New Delhi.
11. Speaking Effectively by Jeremy Comfort, Pamela Rogerson, and Cambridge University Press New Delhi.
12. Cambridge English for Job Hunting by ColmDownes, Cambridge University Press New Delhi.
13. Body Language by Allen Pease.
14. The Ace of Soft Skills by Gopalswami Ramesh, Mahadevan Ramesh, Pearson Publication, Delhi.

**LIST OF TUTORIALS**

1. Understanding Self
2. Grammar and vocabulary activities
3. Simple application letter (seeking permission regarding absence)
4. Letter of enquiry and order
5. Letter of complaint and E mail writing
6. Meetings
7. Extempore
8. Vocabulary building & grammar
9. Teamwork- story making
10. Elocution
11. Debate
12. Effective reading (newspaper articles)

**Submission**

1. Completed Tutorial and assignment books

## First Year UG Program in Textile Chemistry

## Semester-II

Sr. No.	Course Code	Name of the Course	Group	Teaching Scheme				Credits
				Theory Hrs/Week	Tutorial/Drawing Hrs/Week	Practical Hrs/Week	Total	
1	TCL142	APPLIED MECHANICS	B	3			3	3
2	TCL143	TEXTILE MATHEMATICS - II	A	3			3	3
3	TCL144	INDUSTRIAL CHEMISTRY	A	3			3	3
4	TCL145	ENGINEERING GRAPHICS	B	2			2	2
5	TCL146	ORGANIC CHEMISTRY - II	D	3			3	3
6	TCL147	CHEMISTRY OF FIBRES - I	D	3			3	3
7	TCP148	INDUSTRIAL CHEMISTRY LAB	A			2	2	1
8	TCP149	ENGINEERING GRAPHICS LAB	B			3	2	1.5
9	TCP150	ORGANIC CHEMISTRY – II LAB	D			2	2	1
10	TCP151	CHEMISTRY OF FIBRES – I LAB	D			2	2	1
11	TCP152	FUNDAMENTALS OF COMPUTER AND PROGRAMMING LAB	B			3	2	1.5
		Total		17	0	12	29	23

**Group Details**

- A: Basic Science  
 B: Engineering Science  
 C: Humanities Social Science & Management  
 D: Professional Core Courses & Professional Elective  
 E: Free Elective  
 F: Seminar/Training/ Project

## First Year B. Tech. Textile Chemistry – Semester II

### TCL142: APPLIED MECHANICS

Teaching Scheme	
Lectures	3 Hrs. /Week
Total Credits	3

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
<b>Total</b>	<b>100</b>

#### Course Objectives

1. To understand the concept of forces and various laws related to force with basic principles, theorems and concepts of mechanics.
2. To understand the concepts like equilibrium, support reactions, friction, moment of inertia and use of simple machines.
3. To study and analyse the effect of various types of forces on the bodies in static and dynamic conditions.
4. To interpret the concept of transmission of motion and power in various machines by using various drives and bearings used in textile machines.

#### Course Outcomes:

1. Understand the concept of forces and various laws related to force with basic principles, theorems and concepts of mechanics.
2. Understand the concepts like equilibrium, support reactions, friction, moment of inertia and use of simple machines.
3. Analyse the effect of various types of forces on the bodies in static and dynamic conditions.
4. Interpret the concept of transmission of motion and power in various machines by using various drives and bearings used in textile machines

Unit	Course Contents	Hrs.
<b>Unit 1</b>	<b>Fundamentals of statics</b> Statics, dynamics, Fundamental units of measurements, Metric system of units, SI. System, Scalar and Vector quantities. Force, system of forces, Resultant force and equilibrant, principle of transmissibility of force, moment of force. Couple, Law of parallelogram of forces, Varignon's theorem, Composition and resolution of Coplanar concurrent and nonconcurrent forces.	7
<b>Unit 2</b>	<b>Equilibrium</b> Equilibrium of Coplanar forces, Conditions of equilibrium, free body diagram, Lami's theorem. <b>Friction:</b> Introduction to friction, types of friction, Laws of friction. (No numerical examples on friction). <b>Beams:</b> Types of beams, Types of Loads, Types of supports, Analysis of	7

Simply supported beams.

<b>Unit 3</b>	<b>Moment of Inertia</b>	<b>7</b>
	Centroid and Centre of gravity, Centroid of composite areas, Radius of gyration, parallel axis theorem, perpendicular axis theorem, Moment of inertia of composite sections.	
<b>Unit 4</b>	<b>Lifting Machines</b>	<b>6</b>
	Mechanical advantage, velocity ratio, efficiency, law of machine, effort lost in friction, load lost in friction, Study and numerical examples on simple machines- Simple screw jack, Simple axle and wheel, differential axle and wheel, worm and worm wheel.	
<b>Unit 5</b>	<b>Kinematics and Kinetics</b>	<b>7</b>
	<b>Kinematics of Linear motion:</b> Equations of linear motion with constant and variable acceleration, motion under gravity.	
	<b>Kinematics of Angular motion:</b> Relation between angular motion & linear motion, Equations of angular motion, Centrifugal & centripetal forces, Motion along a curved path, Banking of roads.	
	<b>Kinetics:</b> Newton's laws of motion, Mass moment of inertia, D'Alemberts principle, work, power, energy, impulse, Work- Energy Principle, Impulse-Momentum Principle, Principle of conservation of energy.	
<b>Unit 6</b>	<b>Transmission of motion and power</b>	<b>5</b>
	Belt, rope, chain and gear drives, P.I.V. drives, Type of gears and gear drives, Gear trains, velocity ratio, advantages of gear drives, uses in textile machines, Concept of epicyclic gearing. Types of bearing and their applications (Only theory, no numerical examples on this topic)	

**Reference Books:**

1. Engineering Mechanics by R. K. Bansal and Sanjay Bansal, Laxmi Publications.
2. Applied Mechanics by R.S. Khurmi, S. Chand Publications.
3. Engineering Mechanics by S. S. Bhavikatti, New Age International Pvt. Ltd.
4. Engineering Mechanics by S. Ramamrutham, DhanpatRai and Sons.
5. Fundamentals of Engineering Mechanics by S. Rajasekaran, Sankarasubramanian, Vikas Publishing House.
6. Applied Mechanics by S.N. Saluja, SatyaPrakashan, New Delhi
7. Engineering Mechanics by S. B. Junnarkar, Charotar Publishing House Pvt. Ltd.
8. Vector Mechanics for Engineers Vol. I & II, by Beer &Jonhstan, Tata Mc-Graw Hill Publication

**First Year B. Tech. Textile Chemistry – Semester II**

**TCL143: TEXTILE MATHEMATICS – II**

Teaching Scheme	
Lectures	3 Hrs. /Week
Total Credits	3

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
<b>Total</b>	<b>100</b>

**Course Objectives**

1. Introduce students with the formulae, methods related to reduction formulae, special functions, multiple integrals and its applications.
2. Introduce students to mathematical methods which suits to numerical differentiation and curve fitting.
3. Prepare students with mathematical knowledge so that they can understand bivariate data distribution, correlation and regression.
4. Develop ability to identify, formulate & solve textile engineering problems of probability distribution.

**Course Outcomes**

At the end of the course students will be able to

1. Solve problems related to reduction formulae, special functions, multiple integrals and its applications.
2. Solve problems related to numerical differentiation and curve fitting.
3. Collect textile testing data & find the correlation and regression.
4. Evaluate and interpret probability distribution.

**Course Contents**

<b>Unit 1. Integral Calculus:</b>	<b>7Hrs.</b>
$\int_0^{\pi/2} \sin x dx$ , $\int_0^{\pi/2} \cos x dx$ , Gamma function, Beta Function, Multiple integrals: Introduction, solution, change of order & Change of variables method.	
<b>Unit 2. Applications of integration:</b>	<b>6Hrs.</b>
Area, Mass of lamina using double integrals only. Volume using triple integral only.	
<b>Unit 3. Numerical Differentiation &amp; curve fitting:</b>	<b>7 Hrs.</b>



Newton's forward & backward formulae, Sterling's formula. Newton's divided difference formula. Fitting of curves  $y=a+bx$ ,  $y=a+bx+cx^2$ ,  $y=abx$  by least square method.

- Unit 4. Bivariate data:** **7Hrs.**
- Correlation: types, coefficient of correlation, properties. Rank correlation coefficient & computation. Regression: lines of X on Y & Y on X, regression coefficients, properties & computation.
- Unit 5. Probability distribution:** **7Hrs.**
- Random variable: types, introduction laws of probability distribution, types of probability distribution, pmf & pdf, expectation of random variable. MGF of random variable. Standard discrete probability distributions: Binomial probability distribution: Definition, properties, fitting & examples. Poisson probability distribution: Definition, properties, fitting & examples
- Unit 6. Standard continuous probability distributions:** **5Hrs.**
- Normal probability distribution: Definition, properties, standard normal distribution & examples. Chi-square probability distribution ( $\chi^2$ ): Definition & properties only. t-probability distribution: Definition & properties only. F-probability distribution: Definition & properties only. Examples of t,  $\chi^2$ , & F are not expected.

#### Reference Books

1. A textbook of applied mathematics Vol.-I & II by P.N. & J.N. Wartikar.
2. Higher engineering mathematics by B.S. Grewal
3. A textbook of applied mathematics by Bali, Saxena & Iyengar.
4. Mathematical Statistics by J.E. Freund.
5. Probability & Statistics for engineers by Johnson.
6. Statistical methods by Kumbhojkar

**First Year B. Tech. Textile Chemistry – Semester II**

**TCL144: INDUSTRIAL CHEMISTRY**

Teaching Scheme	
Lectures	4 Hrs. /Week
Total Credits	3

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
<b>Total</b>	<b>100</b>

**Course Objectives**

1. To explain water quality parameters and treatment methods.
2. To describe the chemistry of carbohydrate and proteins.
3. To explain the metallic materials, corrosion and its prevention.
4. To describe characteristics of fuels and determine calorific value of fuels.

**Course Outcomes**

At the end of the course students will be able to

1. Explain water quality parameters and select proper water treatment method.
2. Describe the chemistry of carbohydrates and proteins.
3. Describe the metallic material and prevent corrosion.
4. Evaluate the quality of fuels.

**Course Contents**

**Hrs.**

**Unit 1. Water**

Introduction, impurities in natural water, water quality parameters: - pH, acidity, alkalinity, total solids, BOD, COD, oils and greases, hardness: definition, types, units and numerical problems, ill effects of hard water in textile industry, boiler feed water, causes & disadvantages of scale and sludge formation, priming, foaming and caustic embrittlement, treatment of water by Zeolite process, ion exchange process, reverse osmosis.

**8 Hrs.**

**Unit 2. Carbohydrates**

Introduction, classification, structure of glucose, **starch**: sources, constitution, properties; **properties of starch paste**: soluble starch and dextrin, action of enzymes, manufacture of starch from maize, cellulose: sources, constitution, chemical and physical properties, methods of pulp making.

**7 Hrs.**

**Unit 3. Proteins**

Introduction, nature of amino acids, classification, chemical properties, nature and classification of proteins, chemical properties, denaturing of

**6 Hrs.**

proteins, isoelectric point, composition and chemical structure of protein fibres like wool and silk.

**Unit 4. Metallic Materials**

Introduction, alloys: definition, classification, purposes of making alloys, composition, properties and applications of ferrous alloys: plain carbon steels, stainless steel, non-ferrous alloys: brass and bronze, nichrome, duralumin.

**6 Hrs.**

**Unit 5. Corrosion**

Introduction, definition, causes, classification, atmospheric corrosion, electrochemical corrosion and mechanisms, factors affecting the rate of corrosion, prevention of corrosion by proper selection of material and proper design, cathodic protection, metallic coatings: hot dipping, metal spraying and electroplating.

**6 Hrs.**

**Unit 6. Fuels**

Introduction, classification, properties, characteristics of good fuel, comparison between solid, liquid and gaseous fuels, coal and coal formation, determination of calorific value by Bomb and Boy's calorimeter, numerical problems. Fuel cells: definition, classification, advantages, limitations and applications.

**6 Hrs.**

**Reference Books**

1. Engineering Chemistry by Jain and Jain.
2. Chemistry of Organic Textile Chemicals by Dr. V.A. Shenai.
3. Text Book of Engineering Chemistry by Shashi Chawla.
4. A Text Book of Engineering Chemistry by S. S. Dara
5. Surfactants and Polymers in Aqueous Solutions by Jonsson, Lindman, Holmberg, Kronberg.

**First Year B. Tech. Textile Chemistry – Semester II**

**TCL145: ENGINEERING GRAPHICS**

<b>Teaching Scheme</b>	
Lectures	2 Hrs. /Week
Total Credits	2

<b>Evaluation Scheme</b>	
SE-I	25
SE-II	25
SEE	50
<b>Total</b>	<b>100</b>

**Course Objectives**

1. To understand procedure for converting a pictorial view into orthographic view.
2. To understand procedure for converting an orthographic view in to isometric view.
3. To understand procedure for drawing Development and anti-development of solids such as cone, cylinder, prism and pyramid.
4. To study IS convections for various materials and mechanical elements, free hand sketches of various mechanisms used in textile machines. To know the use of Auto-CAD Commands.

**Course Outcomes**

At the end of the course students will be able to,

1. Draw orthographic views from a given pictorial view.
2. Draw isometric view from given orthographic views.
3. Draw Development and anti-development of solids such as cone, cylinder, prism and pyramid.
4. Draw IS convections for various materials and mechanical elements, free hand sketches of various mechanisms used in textile machines. To write Commands for various entities in Auto-CAD.

	<b>Course Contents</b>	<b>Hrs.</b>
<b>Unit 1.</b>	<b>Introduction &amp; use of instruments:</b> Line, Lettering, Conventions of section lines, I.S. conventions of machine parts like knurling, square end of shaft, bearing, springs, external & internal thread.	2
<b>Unit 2.</b>	<b>Orthographic Projections:</b> General principles, First angle method, Third angle method, Dimensioning.	4

<b>Unit 3.</b>	<b>Sectional Orthographic views:</b>	
	Cutting plane, Types of sections, drawing sectional views of machine components.	4
<b>Unit 4.</b>	<b>Isometric Projections:</b>	
	Principle, Isometric scale, Isometric views, Making Isometric drawings of simple objects from orthographic views.	5
<b>Unit 5.</b>	<b>Development of Surfaces:</b>	
	Introduction to solids (Types of solids only), Development of lateral surfaces of cubes, prisms, pyramids, cylinders & cones.	8
<b>Unit 6.</b>	<b>Free hand sketches &amp; Introduction to Auto- CAD</b>	
	Making free hand sketches of various textile machine parts & mechanisms used in spinning, weaving, processing, garments & Commands for drawing lines, circles, polygons, ellipse etc.	3

**Reference Books**

1. Engineering Drawing by N. D. Bhatt & V. M. Panchal.
2. Engineering Drawing by Venugopal.
3. Machine Drawing by N. D. Bhatt & V. M. Panchal.
4. Machine Drawing by K. L. Narayana, Kannaiah P., K. Venkata Reddy.
5. Principles of Weaving by Marks & Robinson.
6. Engineering Graphics by H. G. Phakatkar

**First Year B. Tech. Textile Chemistry – Semester II**

**TCL146: ORGANIC CHEMISTRY-II**

Teaching Scheme	
Lectures	3 Hrs. /Week
Total Credits	3

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
<b>Total</b>	<b>100</b>

**Course Objectives**

1. To describe chemistry of benzene, aromatic halogen compounds and aromatic sulphonic acids.
2. To explain the chemistry of aromatic nitro, amino compounds and aryl diazonium salts.
3. To explain the chemistry of aromatic hydroxy compounds and aromatic acids.
4. To describe chemistry of polynuclear hydrocarbons and dye intermediates.

**Course Outcomes**

At the end of the course students will be able to

1. Explain chemistry of benzene, aromatic halogen compounds and aromatic sulphonic acids.
2. Illustrate the chemistry of aromatic nitro, amino compounds and aryl diazonium salts.
3. Differentiate the chemistry of aromatic hydroxy compounds and aromatic acids.
4. Describe chemistry of polynuclear hydrocarbons and dye intermediates.

**Course Contents**

**Hrs.**

**Unit 1. Aromatic Compounds**

Introduction, distinguishing properties of aliphatic and aromatic compounds, coal tar distillation, nomenclature of aromatic hydrocarbons, isomerism. Structure of benzene, resonance, aromaticity: Huckel's  $(4n+2)$  rule, preparation and properties of benzene and toluene, reactivity and orientation aromatic electrophilic substitution reactions like: i) Nitration, ii) Sulphonation, iv) Halogenation, v) Friedel-Crafts reactions vi) Amination.

**8**

**Unit 2. Aromatic Halogen Compounds**

Introduction, nomenclature, methods of preparation of chlorobenzene, physical and chemical properties, aromatic nucleophilic substitution and uses of chlorobenzene.

**6**

- Unit 3. Aromatic Sulphonic Acids**  
Introduction, nomenclature, preparation of benzene sulphonic acid, physical, chemical properties & uses of benzenesulphonic acid, acidity of sulphonic acids, isolation of aromatic sulphonic acid from mother liquor, applications in textiles. **6**
- Unit 4. Aromatic Nitro, Amino Compounds and Aryl Diazonium Salts**  
Introduction and Nomenclature of nitro, amino and aryl diazonium salts.  
a) Preparation of nitrobenzene, physical, chemical properties of nitrobenzene: reduction of nitrobenzene under acidic, neutral, alkaline conditions and electrolytic reduction, applications in textiles. **8**  
b) Preparation, physical, chemical properties and applications in textiles of aniline and toluidines.  
c) Diazotization, mechanism, role of mineral acids, preparation of benzene diazonium chloride, physical, chemical properties and applications of diazonium salts.
- Unit 5. Aromatic Hydroxy Compounds and Aromatic Acids**  
Introduction and Nomenclature of aromatic hydroxyl compounds and aromatic acids.  
a) Preparation of phenol, physical, chemical properties and uses of phenol, preparation & properties of alpha & beta-naphthol, applications in textiles. **5**  
b) Preparation, Physical and Chemical properties and Uses of benzoic acid and phthalic acid.
- Unit 6. Polynuclear Aromatic Hydrocarbons and Synthesis of Dye Intermediates**  
a) Introduction, preparation, properties & uses of naphthalene, anthracene, anthraquinone. **6**  
b) Introduction to dye intermediates, preparation of H-acid, J-acid, G-acid, Naphthionic acid, Gamma acid, Schaffer's acid, N-W acid and Cleve acid and their applications in textiles.

#### Reference Books

1. Organic Chemistry by Morrison & Boyd.
2. Organic Chemistry - Vol. I, The Fundamental Principles by I. L. Finar.
3. A text book of Organic Chemistry by P.L. Soni.
4. A text book of Organic Chemistry by B.S. Bahl and Arun Bahl.
5. Reaction Mechanism & Reagents in Organic Chemistry by Gurdeep R. Chatwal.
6. Advanced Organic Chemistry by Jerry March.

**First Year B. Tech. Textile Chemistry – Semester II**

**TCL147:CHEMISTRY OF FIBRES-I**

<b>Teaching Scheme</b>	
Lectures	3 Hrs. /Week
Total Credits	3

<b>Evaluation Scheme</b>	
SE-I	25
SE-II	25
SEE	50
<b>Total</b>	<b>100</b>

**Course Objectives**

1. To describe concepts of textiles and chemistry and morphology of fibres.
2. To impart knowledge about the physical and chemical properties of fibres
3. To give details about the effect of fibre properties in chemical wet processing of textiles and predict various applications of fibres.
4. To describe the concept of spinning technologies and fibre manufacturing process

**Course Outcomes**

At the end of the course students will be able to

1. Describe basic concepts of textiles and chemistry and morphology of fibres.
2. Enunciate the physical and chemical properties of fibres
3. Explain knowledge of fibre properties in chemical wet processing of textiles and predict various applications of fibres.
4. Demonstrate the concept of various spinning technologies and fibre manufacturing process.

**Course Contents**

**Hrs.**

**Unit 1. Introduction to Textiles:**

Definition of Fibre, Filament, Degree of Polymerization, and Cohesive Energy Density. Classification of fibres according to their chemical nature and origin. Essential and desirable properties of fibres. Concept of crystalline, mesomorphous and amorphous regions and their importance.

**4**

**Unit 2. Natural Cellulosic Fibre: Cotton**

Introduction to Cultivation of cotton and varieties of cotton. Morphological structure of cotton. Chemistry of cellulose, Concept of chemical bonding in cotton, Supra-molecular structure of cotton, structure of cellulose-I & cellulose-II, Physical ,chemical properties and uses of cotton.

**6**

**Unit 3. Unconventional Natural Fibres:**

**6**



Morphological structure and chemical constitution of Jute and Flax. Concept of hemicellulose, lignin and their chemistry. Retting and extraction, physical and chemical properties and uses of Jute and Flax.

**Unit 4. Regenerated Cellulose Fibres:**

Concept and essential requirements of wet spinning. Concept of extrusion and spinning. Raw material, manufacturing process, physical and chemical properties, and uses of viscose rayon, polynosic rayon and Tencel.

9

**Unit 5. Modified Cellulose Fibres:**

Concept and essential requirements of dry spinning, Raw materials, manufacturing process, physical and chemical properties and uses of cellulose acetate

7

**Unit 6. Animal Protein Fibres:**

Source and grading of wool, Varieties of silk, production of raw silk, Physical , chemical properties and uses of wool and silk

7

**Reference Books**

1. Chemical Technology of Fibrous materials by F. Sadov.
2. Textile Fibres Vol -I by Dr. V. A. Shenai.
3. Man Made Fibres by R.W. Moncrieff.
4. Handbook of Textile Fibres by Jordon Cook.
5. Introduction to Textile Fibres by Dr. H.V. Sreenivas Murthy.
6. Silk Production, Processing and Marketing by Mahesh Nanavaty.
7. Wool, Science and Technology by W S Simpson and G H Crawshaw, Woodhead Publication Ltd, England
8. Handbook of Fibre chemistry – Lewin
9. Textbook of Fibre science and technology by Dr. S. P. Mishra

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**First Year B. Tech. Textile Chemistry – Semester II**
**TCP148: INDUSTRIAL CHEMISTRY LAB**

Teaching Scheme	
Practical	2 Hrs. /Week
Total Credits	1

Evaluation Scheme	
CIE	50
SEE	
<b>Total</b>	<b>50</b>

**List of Experiments**

1. Determination of total hardness of water.
2. Determination of alkalinity of water.
3. Determination of chlorides in water.
4. Determination of dissolved oxygen of water.
5. Determination of COD of water.
6. Determination of total solids & suspended solids of water.
7. Determination of rate of corrosion of metal.
8. Estimation of copper in bronze.
9. Analysis of starch.
10. Qualitative analysis of carbohydrates.
11. Qualitative analysis of proteins.
12. Proximate analysis of solid fuel.

**Submission**

Completed Journal

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**First Year B. Tech. Textile Chemistry – Semester II**
**TCP149: ENGINEERING GRAPHICS LAB**

Teaching Scheme		Evaluation Scheme	
Tutorials	2 Hrs. /Week	CIE	50
Total Credits	2	<b>Total</b>	<b>50</b>

**List of Experiments**

1. Lines, Letterings & Dimensioning.
2. Conventions of section lines & I.S. conventions of machine parts.
3. Conversion of pictorial view into orthographic views.
4. Conversion of pictorial view into sectional orthographic views.
5. Free hand sketches of textile machine parts & mechanisms.
6. Isometric Projections.
7. Development of Surfaces

**Submission**

Submission of 8 drawing sheets of half imperial size on the above topics.

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**First Year B. Tech. Textile Chemistry – Semester II**
**TCP150: ORGANIC CHEMISTRY-II LAB**

Teaching Scheme	
Practical	2 Hrs. /Week
Total Credits	1

Evaluation Scheme	
CIE	50
SEE	
<b>Total</b>	<b>50</b>

**List of Experiments**
**Organic Qualitative Analysis**

1. Acid
2. Phenol
3. Base
4. Neutral

**Binary Organic Mixture Separation**

5. Acid + Phenol
6. Acid + Base
7. Acid + Neutral
8. Phenol + Base
9. Phenol + Neutral
10. Base + Neutral

**Preparation**

11. Preparation of p-nitroacetanilide from acetanilide.
12. Preparation of benzene azo- $\beta$ -naphthol from aniline and  $\beta$ -naphthol.

**Submission**

Completed Journal

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**First Year B. Tech. Textile Chemistry – Semester II**
**TCP151: CHEMISTRY OF FIBRES – I LAB**

Teaching Scheme	
Practical	2 Hrs. /Week
Total Credits	1

Evaluation Scheme	
CIE	50
SEE	
<b>Total</b>	<b>50</b>

**List of Experiments**

1. Identification of fibres by chemical method. – I
2. Identification of fibres by chemical method. - II
3. Identification of fibres by Microscope Method.
4. Identification of fibres by density gradient column.
5. Determination of moisture regain of fibre.
6. Detection of Honey dew of cotton.
7. Determination of fibre fineness by cut weight method.
8. Determination of cotton fibre length by using the Grease plate method.
9. Measurement of maturity of cotton by caustic soda method.
10. Detection of cellulosic fibre damage.
11. Detection of animal protein fibre damage.
12. Determination of accessible region of cotton.

**Submission**

Completed Journal

**First Year B. Tech. Textile Chemistry – Semester II**

**TCP152:FUNDAMENTALS OF COMPUTER AND PROGRAMMING LAB**

<b>Teaching Scheme</b>	
Practical	2 Hrs. /Week
Total Credits	1

<b>Evaluation Scheme</b>	
CIE	50
<b>Total</b>	<b>50</b>

**Course Objectives**

1. To describe basic Computer architecture and Generation of computers.
2. To explain operating system concept with its structure and features
3. To illustrate scripting language and programming
4. To explain basic structure of 'C' programming and formation, implementation

**Course Outcomes**

At the end of the course students will be able to

1. Understand basic of computer architecture and generation of computer.
2. Understand basic of operating system and programming language
3. Design and implement web pages using scripting language.
4. Understand programming concept and develop simple application programs in 'C' language

**Experiments will be based on following topics**

**Unit 1. Introduction to Computers**

**Introduction:** Characteristics of Computers, Block diagram of computer. Types of computers and features, Mini Computers, Micro Computers, Mainframe Computers, Super Computers. Types of Programming Languages (Machine Languages, Assembly Languages, High Level Languages). Data Organization, Drives, Files, Directories. Types of Memory (Primary And Secondary) RAM, ROM, PROM, and EPROM. Secondary Storage Devices (FD, CD, HD, Pen drive) I/O Devices (Scanners, Plotters, LCD, Plasma Display) Number Systems Introduction to Binary, Octal, Hexadecimal number system Conversion, Simple Addition, Subtraction, Multiplication

**Unit 2. Computer Software**

**Operating System:** Types of operating system, Functions, Unix/Linux, Windows 7/Windows 8-structures & features, Unix/Linux commands: Listing, changing, copying and moving files & directories (LS, CD, CAT, MKDIR, RMDIR, and other commands), any editor in Linux. Application Software's: Word processor, spreadsheets, presentation, application, DBMS, etc.

**Unit 3. Dynamic Web Page Design**

**HTML:** use of commenting, headers, text styling, images, formatting text with<FONT>, special characters, horizontal rules, line breaks, table, forms, image maps,<META> tags, <FRAMESET> tags, file formats including image formats. Introduction to VBscript, basics of VB scripting, Java script.

**Unit 4. Programming with ‘C’ Language**

**Introduction to ‘C’ Programming:** Algorithm & flowchart, keywords, statements, Loops, Array representation, one dimensional array, structure, define structure variable, accessing structure member, pointer, pointer arithmetic, pointer & array

**Reference Books**

1. Fundamentals of Computers by V. Rajaram, PHI Publications.
2. Introduction to Information Technology, IITL Education Solutions LTD. Pearson Education
3. Let us C by Y.P. Kanetkar, BPB Publication
4. Beginning Java Script ,4Ed by Jeremy Mcpeak Paul Wilton

**List of Experiments**

1. Study of basic structure of computer system – Internal Components & peripherals.
2. Study of windows/Linux commands & create a file using any editor in Linux.
3. Create a document using any word processor (In Linux (open office) /Windows (Microsoft office)).
4. Use any spreadsheet application to manipulate numbers, formulae and graphs (In Linux/Windows).
5. Use any power point presentation application and create a professional power point Presentation using text, image, animation etc. (In Linux/Windows).
6. Create a simple web page using HTML/VB Script
7. Create a simple web page using Java Script.
8. Five programs of ‘C’ Language on Linux/Windows platform.

**Submission :**Completed Journal