



REVISED SYLLABUS W.E.F.01ST JULY, 2010											
F.Y. B.TEXT. (TC) SEMESTER-I											
SR. NO.	COMMITTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
			L	T	DR	PR	TP	TW	OE	PE	SUB. TOTAL
1.1	TT/MMTT/TPE/TC/FT	APPLIED PHYSICS	4	---	---	---	100	---	---	---	100
1.2	TT/MMTT/TPE/TC/FT	TEXTILE MATHEMATICS-I	3	---	---	---	100	---	---	---	100
1.3	TT/MMTT/TPE/TC/FT	ELECTRICAL SCIENCE	3	---	---	2	100	50	---	---	150
1.4	TC	ORGANIC CHEMISTRY-I	4	---	---	2	100	50	---	---	150
1.5	TC	PHYSICAL CHEMISTRY	3	---	---	2	100	25	---	---	125
1.6	TC	INORGANIC CHEMISTRY	3	---	---	2	100	25	---	---	125
1.7	TPE/TC	LANGUAGE LABORATORY	---	---	---	2	---	50	---	---	50
			20	---	---	10	600	200	---	---	800
L =LECTURES			TP=THEORY PAPER								
T =TUTORIALS			TW=TERM WORK								
DR=DRAWING			OE=ORAL EXAMINATION								
PR=PRACTICALS			PE=PRACTICAL EXAMINATION								

REVISED SYLLABUS W.E.F.01ST JULY, 2010											
F.Y.B.TEXT. (TC) SEMESTER-II											
SR. NO.	COMMITTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
			L	T	DR	PR	TP	TW	OE	PE	SUB. TOTAL
2.1	TT/MMTT/TPE/TC/FT	APPLIED MECHANICS	3	---	---	---	100	---	---	---	100
2.2	TT/MMTT/TPE/TC/FT	TEXTILE MATHEMATICS-II	3	---	---	---	100	---	---	---	100
2.3	TT/MMTT/TC	INDUSTRIAL CHEMISTRY FOR TEXTILES	4	---	---	2	100	25	---	---	125
2.4	TT/MMTT/TPE/TC/FT	ENGINEERING GRAPHICS	2	---	2	---	100	25	---	---	125
2.5	TC	ORGANIC CHEMISTRY-II	4	---	---	2	100	50	---	---	150
2.6	TC	CHEMISTRY OF TEXTILE FIBRES-I	4	---	---	2	100	50	---	---	150
2.7	TPE/TC	COMPUTER LABORATORY	---	---	---	2	---	50	---	---	50
			20	---	2	8	600	200	---	---	800
L =LECTURES			TP=THEORY PAPER								
T =TUTORIALS			TW=TERM WORK								
DR=DRAWING			OE=ORAL EXAMINATION								
PR=PRACTICALS			PE=PRACTICAL EXAMINATION								

**FIRST YEAR B. TEXT. – SEMESTER - I****1.1 APPLIED PHYSICS (TT/MMTT/TPE/TC/FT)**

Lectures	:	4 Hours / Week.
Theory Paper	:	100 Marks, 3 Hours.
Subject Total	:	100 Marks.

- 1. Elasticity:** Load, stress, strain, Hooke's Law of elasticity. Elastic behaviour of solids in general - some peculiar traits, working stress and factor of safety. Factors affecting elasticity. Types of elasticity, work done per unit volume in a strain. Relation between  $Y$ ,  $\eta$  and  $K$ . Poission's ratio, relation between  $Y$ ,  $k$  and Poission's ratio and the relation between  $Y$ ,  $\eta$  and Poission's ratio  $he$  . Twisting couple on a cylinder, Torsional pendulum
- 2. Viscosity:** Newton's Law of viscosity, streamline & turbulent flow, critical velocity, significance of Reynold's number, Poiseuille's equation for flow of liquid through a tube. Experimental determination of  $\eta$  for a liquid - Poiseuille's method, Motion in a viscous medium, terminal velocity, Stoke's law, Stokes method. Ostwald's viscometer, variation of viscosity with temperature. Applications of viscosity in textiles.
- 3. Surface Tension:** Molecular theory of surface tension. Free energy of a surface & surface tension. Excess pressure inside a liquid drop & soap bubble. Relation between radii of curvature, pressure & surface tension. Shape of liquid meniscus in a capillary. Energy required to raise a liquid in a capillary tube. Measurement of surface tension. Factors affecting surface tension. Applications of surface tension in textiles.
- 4. Friction:** Laws of friction, Angle of friction, Sliding & Rolling friction. Necessity of friction. Derivation of relation  $T_2/T_1 = e^{\mu \theta}$  (where  $T_1$  &  $T_2$  are incoming & outgoing tensions respectively,  $\theta$  (Theta) is the angle of friction,  $\mu$  is the co-efficient of friction). Mechanism of friction. Applications of friction in textiles.
- 5. Optics:** Introduction to reflection, refraction, Laws of refraction, refractive index, total internal reflection, interference & diffraction. Review of simple & compound microscope, expression for magnifying & resolving power. Electron Microscope: Principle, Construction & working. Scanning & transmission electron microscope, its applications in textiles.

- 6. Polarisation:** Polarisation, Brewsters law. Double refraction, Nicol prism, production of plane, circularly & elliptically polarised light. The colour of crystal plates in polarized light, Quarter & half wave plate. Birefringence and Polarising microscope.
- 7. X-ray:** Origin of continuous & characteristic x-ray spectrum, properties, production of x-rays and its applications. X-ray diffraction - Bragg's law of X-ray diffraction, Bragg's x-ray spectrometer spectrometer, Miller indices. Determination of crystal structure by X-ray diffraction technique.
- 8. Photoelectric Effect:** Concept, Einstein's equation of photoelectric effect. Factors influencing the photoelectric effect. Study of various photocells. Use of photosensors in the textile field.

**Reference Books:-**

1. Elements of Properties of Matter by D.S. Mathur
2. Engineering Physics by B.L. Theraja
3. Modern Physics by B.L. Theraja
4. Engineering Physics by R.K. Gour & Gupta
5. Basic Applied Physics by R.K. Gour.
6. Physics for Engineers by M.R. Srinivasan.
7. Text Book of Optics by Brijlal & Subramanyam
8. Optics by A.K. Ghatak
9. College Physics by Bueche Fredrick J
10. Fundamentals of Physics by Halliday Resnick
11. Perspectives of Modern Physics by Arthur Beiser
12. The general properties of Matter by F. H. Newman
13. University Physics by Hugh D. Loung

**FIRST YEAR B. TEXT. – SEMESTER - I**

**1.2 TEXTILE MATHEMATICS-I (TT/MMTT/TPE/TC/FT)**

Lectures	:	3 Hours / Week.
Theory Paper	:	100 Marks, 3 Hours.
Subject Total	:	100 Marks.

**1. Matrix:**

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

**2. Successive Differentiation:**

Introduction, standard results, Leibnitz rule.

**3. Partial Differentiation:**

Introduction, total differentiation, Euler's theorem on homogeneous function.  
Jacobean ( $J.J'=1$ ) only, Errors & approximation.

**4. Curve Tracing:**

Rules & examples of curve tracing in Cartesian and Polar Equations only.

**5. Introduction of Statistics:**

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.

**6. Measures of central tendency:**

Arithmetic Mean (A.M.), Median, Mode, Combined Mean & Computation  
Partition values : Quartiles deciles and percentiles & Computation

**7. Measures of dispersion:**

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

**8. Measures of Skewness & kurtosis:**

Skewness, types, Karl Pearson's & Bowley's coefficient of skewness & Computation. Kurtosis definition and types only. (No Examples of Kurtosis)

**9. Probability:**

Random experiment, sample space, event, types of events, Venn diagram Definition, laws of probability & examples.

**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. TEXT. – SEMESTER - I****1.3 ELECTRICAL SCIENCE (TT/MMTT/TPE/TC/FT)**

Lectures	:	3 Hours / week.
Practical	:	2 Hours / Week.
Theory Paper	:	100 Marks, 3 Hours.
Term Work	:	50 Marks.
Subject Total	:	150 Marks.

**1. D.C. Circuits:** Units-6

Basic electrical quantities, voltage, current, power energy, co-relation between electrical, mechanical & thermal quantities, ohm's law with its limitation, Kirchoff's current and voltage law, current division rule. Resistance temperature coefficient (Numerical Problems on with two variables).

**2. Magnetic Circuits:** Units-4

Concepts of magnetic circuits, MMF, Reluctance, Magnetic flux density, magnetic field strength, definitions and units, comparison of electrical and magnetic circuits, leakage and fringing, Self and mutual inductance, eddy current & hysteresis loss, material used for core of electrical machines. (Numerical on series magnetic circuits)

**3. A.C. Fundamentals:** Units-4

Faraday's law of electromagnetic induction, Generation of single and three phase quantity, phasor representation, Concept of R.M.S. and Average value, peak value, constructional diagram of three phase alternator. (Simple Numerical).

**4. A.C. Circuits:** Units-5

Concept of inductive reactance, capacitive reactance, phasor representation of pure R, L, C, & series RL, RC, RLC Circuits, impedance, only concept of parallel resonance, (Numerical problems of series RL, RC, RLC Circuits)

**5. Transformer:** Units-5

Operating principle of a transformer types of transformers E.M.F. equation of transformer, concept of K, ideal transformer phasor diagram of ideal transformer on no load, phasor diagram of actual single phase transformer on no load, loaded condition with Resistive load, Efficiency and regulation of transformer by direct loading of transformer, condition of max efficiency. Concept of auto-transformer, On

Load Tap Changing Transformer (OLTC). (Simple Numerical on transformer).  
Testing of transformer, No load test, short circuit test. Concept of percentage impedance.

**6. Electrical Machines:**

Units-6

Principle, construction, operation and characteristics of three phase induction motor, motors used in textile industries, inverter driven motors (VFD), Speed control of three phase induction motor, necessity of starters, Application of three phase induction motor. Power triangle, effect of reactive power on power system, power factor, its significance, causes of low power factor, factors affecting it and methods to improve the power factor, in concern with Energy saving, Introduction to APFC panel & its advantages. (only theoretical treatment), introduction to stepper motors and servo motor.

**7. Luminaries:**

Units-3

Working of sodium vapour lamp, fluorescent lamp, CFL lamps, Calculation of elimination scheme for different purpose, mercury vapour lamp, concept of Energy Efficient lighting system.

**8. Power Quality:**

Units-3

Concept of power quality, advantages of good quality power, harmonics & its effects, method of harmonic elimination., Introduction to electrical tariffs, simple examples on energy calculations.

**9. Introduction to switch gear and protection, instruments:**

Concept of ACB, VCB, MCCB, TOD meter

Constraints in electrical control panel

**List of Experiments (Any Eight)**

1. Introduction to Electrical Engg. Lab.
2. Determination of power factor of R L series circuit.
3. Determination of R & L of a choke coil.
4. Study of Phasor Relationship of RLC circuit.
5. Ratio test on single phase transformer.
6. Direct load test on Single Phase Transformer.
7. Reversal of Rotation of Three Phase Induction Motor.
8. Speed control of Three Phase Induction Motor.

9. Direct load test on Three Phase Induction Motor.
10. Study of starters (Any two).
11. Study of Wiring Circuits.
12. Study of lamps (Any two).

**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

**FIRST YEAR B. TEXT. – SEMESTER - I**

**1.7 LANGUAGE LABORATORY (TPE/TC)**

Practicals	:	2 Hours/week
Term Work	:	50 Marks

**I) Communication**

Nature and Importance of Communication

Process and Barriers to Communication

Forms of Communication

**II) Techniques of Communication.**

Techniques of Formal Speech.

Verbal Communication

Non Verbal Communication – Body Language.

**III) Issues in English**

Getting started – questions – Cloze – Spelling – Diction – Listening – Word – Sentences – Vocabulary – Pictures & Words – Opposite Meaning – Word order- Grammar – Simple present – Simple Past – Present continuous – Future Tense – Personal Pronouns – Pronunciation – words sentences – writing – punctuation – questions – opinions – different genres.

**IV) Pronunciation**

The phonemic alphabet in English

Similar sounds

Word and phrasal stress

Stress and Rhythm

Rhythms from Rainland

**V) Study skills success**

Listening – Speaking – Reading – Writing – Vocabulary – Visuals.

**VI) Tense Buster**

Articles – Reported speech – Passives – Phrasal verbs – How to learn faster.

**VII) Business English**

A formula for clear writing – Formal or Informal – Which words – written communication

**Reference Books:-**

- 1) Communication Skills for Engineers – Sunita Mishra – Pearson Education
- 2) Language Software's (1 to 22 Software's)

**List of Software's**

1. Ease one
2. Click info English
3. Tense Buster
4. Study Skills Success
5. Author Plus with result Manager
6. Sky Pronunciation Suite
7. Pronunciation Power
8. Test Preparation for TOEFL
9. Let's do Business Presentation
10. Let's Do Business Meetings
11. Let's Do Business Negotiations
12. Let's do Business Telephoning
13. Report Writes – Technical Report
14. Report Writers Business Report
15. Report Writers – Letters Faxes, E-Mails
16. Connected Speech
17. Vocabulary Builder
18. Business Territory
19. Error & Terror
20. A Taste for English
21. Issues in English
22. Voice Books

**FIRST YEAR B. TEXT. – SEMESTER - I**

**1.4 ORGANIC CHEMISTRY- I (TC)**

Lectures	:	4 Hours / week
Practicals	:	2 Hours / week
Theory Paper	:	100 Marks, 3 Hours.
Term Work	:	50 Marks.
Subject Total	:	150 Marks

**1) Aliphatic Hydrocarbons:** Scope of the topic,

a) Alkanes: Nomenclature, classification, sources, Important methods of preparation properties & uses of alkanes, Conformations of ethane and n-butane, Applications in textiles.

b) Alkenes: Nomenclature, classification, sources, Methods of preparation, properties and applications of alkenes in textiles.

c) Acetylenes: Nomenclature, Occurrence, preparation, properties and uses of acetylene. Applications of alkynes in textiles.

**2) Halogen derivatives of aliphatic hydrocarbons:** Scope of the topic.

Nomenclature, classification, sources, important methods of preparation, properties & applications in textiles of methyl chloride & ethyl chloride.  $SN^1$ ,  $SN^2$  &  $SNi$  mechanism. Preparation, properties of chloroform, carbon tetrachloride & vinyl chloride & their applications in textiles.

**3) Aliphatic hydroxyl compounds and their derivatives:** Scope of the topic.

Nomenclature, classification, sources, important methods of preparation, properties of methanol, ethanol, ethylene glycol, glycerin, diethanol amine, triethanol amine & their applications in textiles.

**4) Aldehydes and Ketones:** Scope of the topic. Nomenclature, classification,

sources, important methods of preparation, properties of Formaldehyde, glyoxal, acetone & their applications in textiles.

**5) Acids and their derivatives:** Scope of the topic. Nomenclature, classification,

sources, Composition of natural oils, important methods of preparation, important properties & applications of acetic acid, citric acid, formic acid, tartaric acid, acryl amide, urea. Role of fatty acids in manufacturing of textile auxiliaries.

**6) Amines** : Scope of the topic. Nomenclature, classification, sources, important methods of preparation, properties of ethyl amine, quaternary ammonium salts & their applications in textiles.

**7) Ethers & epoxies:** Nomenclature, classification, sources, important methods of preparation, properties of ether, epoxide & crown ethers & their applications in textiles.

**8) Stereochemistry:** Scope of the topic definition, Optical isomerism of compounds containing one asymmetric carbon atom, Enantiomers, Distereoisomers, Meso form, racemic mixture. Fischer projection formula, Relative configuration(D&L), Absolute configuration(R&S). Geometrical isomerism: Necessary conditions for a compound to exhibit geometric isomerism, E & Z nomenclature.

**9) Reaction mechanism:**

Aldol condensation, Claisen ester condensation, Benzidine rearrangement, Michael addition, Reimer-Tiemann reaction, Reformatsky reaction, Skraup Synthesis.

**List of Experiments:-**

**Qualitative analysis:**

1. Detection of elements : sodium fusion test ( Lassaigne test)
2. Detection of functional group like, -COOH, Ar- OH(phenolic), -CHO, >C=O, -COOR, Aromatic-NH<sub>2</sub>-NO<sub>2</sub>, C=C, -CONH<sub>2</sub>, -NHCOCH<sub>3</sub>, -SO<sub>3</sub>H.

**Study of some purification techniques:**

3. Sublimation.
4. Filtration.
5. Crystallization.
6. Distillation.
7. Soxhlet extraction.

**Estimations:**

8. Estimation of glucose.
9. Estimation of ester.
10. Estimation of Aniline.

**Preparations of some simple organic compounds:**

11. Preparation of phthalic anhydride.
12. Preparation of benzoic acid.
13. Preparation of phthalimide.

**Reference Books:**

1. Organic Chemistry by Morrison & Boyd.
2. Organic Chemistry - Vol. I , The Fundamental Principles by I.L. Finar.
3. Organic Chemistry by N.L. Allinger, M.P.Cava, Donc DE Jongh, C.R. Johnson, N.A. Lebel, C.L. Stevens.
4. Mechanism in Organic Chemistry by Peter Sykes.
5. A text book of Organic Chemistry by P.L. Soni.
6. A text book of Organic Chemistry by B.S. Bahl and Arun Bahl.
7. Reaction Mechanism & Reagents in Organic Chemistry by Gurdeep R.Chatwal.
8. Advanced Organic Chemistry Vol. I, by V.S.Kulkarni, L.P.Ghalsasi, A.S.Arora.
9. Advanced Organic Chemistry by Jerry March.

**FIRST YEAR B. TEXT. – SEMESTER - I****1.5 PHYSICAL CHEMISTRY (TC)**

Lectures	:	3 Hours / Week.
Practicals	:	2 Hours / Week.
Theory Paper	:	100 Marks, 3 Hours.
Term Work	:	25 Marks.
Subject Total	:	125 Marks.

**1. Solutions:-** Scope of the topic. Concentration units (Normality, Molarity, Molality, mole fraction), Solutions of solids in liquids, Factors influencing solubility, Lowering of vapour pressure of solutions, Elevation of boiling point, Depression of freezing point of solution, Numerical Problems. Concept of Osmosis and Reverse Osmosis, Concept of Oil in water and water in Oil Emulsions, Applications in Textiles.

**2. Chemical Kinetics :** - Scope of the topic, Order of reaction and methods to determine the same. Zero, first, second and third order reactions with their examples. Rate equations for simple reactions. Numericals. Homogeneous and Heterogeneous reactions. Application in Textiles.

**3. Electrolytic Conductance and Transference :-** Scope of the topic. Strong and weak electrolytes, Electrolytic conductance, Equivalent conductance and concentration cell, Kohlraush law of independent migration of ions, Ionic mobilities. Application in Textiles.

**4. Phase Rule :-** Scope of the topic The phase rule, phase diagram. Application of phase rule to one component, two component and three component system. Efflorescence and deliquescence. Application in Textiles.

**5. Thermochemistry :-** Scope of the topic, 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. Application in Textiles.

**6. Thermodynamics:-** Scope of the topic, Zeroth law of thermodynamics, First law of thermodynamics, Internal energy, work and heat changes, Heat changes at constant pressure and constant volume, Maximum work in isothermal expansion of a

gas, Internal energy of an ideal gas, Heat capacities at constant pressure and constant volume, adiabatic changes. Second Law of Thermodynamics, Entropy, The Physical significance of entropy, Entropy change in chemical reaction, Third law of thermodynamics. Application in Textiles.

**7. Catalysis:-** Scope of the topic Introduction to Catalysis, General Characteristics of catalyzed reactions, Types, Enzyme catalysis, Theories of catalysis, Catalyst poisoning, Autocatalysis.

**8. Adsorption:** Scope of the topic Introduction to Adsorption, Types of adsorption. Freundlich adsorption isotherm, BET equation, Isosteres, Application in Textiles.

**9. Ionic Equilibrium:-** Scope of the topic Acids and Bases - Concepts of acids and bases, Common ion effect, Ionic product of water, pH, Buffers and indicators, Choice of indicators, Solubility product. Application in Textiles.

**List of Experiments:-**

1. Preparation of standard solutions of NaOH & H<sub>2</sub>SO<sub>4</sub>. and standardization using primary standards.
2. Estimation of Na<sub>2</sub>CO<sub>3</sub> and NaOH from the mixture solution of Na<sub>2</sub>CO<sub>3</sub> and NaOH.
3. Determination of heat of neutralization for the reaction between strong acid & strong base.
4. Determination of the value of rate constant for the hydrolysis of ethyl acetate catalysed by hydrochloric acid.
5. Study of the chemical kinetics of hydrogen peroxide decomposition.
6. Determination of pH by using pH paper, Litmus paper, Universal Indicator and pH meter.
7. Determination of normality of given acid solution potentiometrically.
8. Study of the effect of change in temperature on the rate of reaction between sodium thiosulphate & hydrochloric acid.
9. Determination of normality of given weak acid solution using weak base conductometrically.
10. Determination of energy of activation by titration method.
11. Determination of Viscosity of liquids by using Ostwald's viscometer.

12. Determination of unknown concentration of cobalt chloride solution spectrophotometrically.

**Reference Books:-**

1. A Text book of Physical Chemistry by Samuel Glasstone.
2. Principles of Physical Chemistry by Maron & Prutton.
3. Colloid Chemistry by S. Voyutsky.
4. Essentials of Physical Chemistry by Bahl and Tuli.
5. A Text book of Physical Chemistry by L.K. Sharma.
6. Physical Chemistry by P.C. Rakshit.
7. Problems and Exercises in Physical Chemistry by Karetnikov & Kudryashov.
8. Physical Chemistry by G.M. Barrow.
9. Thermodynamics by P.K. Nag.

**FIRST YEAR B. TEXT. – SEMESTER - I****1.6 INORGANIC CHEMISTRY (TC)**

Lectures	:	3 Hours / Week.
Practicals	:	2 Hours / Week.
Theory Paper	:	100 Marks, 3 Hours.
Term Work	:	25 Marks.
Subject Total	:	125 Marks.

**1.Theory of Bonding** : Scope of the topic, Valency, Chemical bond, Types of bonds-Primary and secondary bonds such as Van der Waals forces, Hydrogen bonds-intermolecular and intramolecular H-bonds, Characteristics of ionic, covalent & co-ordinate compounds, Polar and non-polar bonds, Electronegativity and nature of bonds, Dipole moment, Bond length, Bond angle, Bond energy.

**2. Compounds used in Textiles** : 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.

**3. Stoichiometry** : Scope of the topic, Atomic weights, Dulong and Petits rule, Molecular weight, Equivalent weight of an acids & bases, Equivalent weight of oxidising and reducing agents, Problems based on weight – weight relationship, weight-volume relations. Their applications in textiles.

**4. Chromatography** : Scope of the topic, Classification, Paper chromatography, Thin layer chromatography, Ion exchange chromatography-cation and anion exchangers, Gas-liquid chromatography. Their applications in textiles.

**5. Inorganic components of detergents, builders and other additives :**

Introduction, Scope of the topic – Phosphates, Silicates, Zeolites, Carbonates, Oxygen Releasing Compounds, Sundry Inorganic Builders.

**6. Complex Ions and Co-ordination Compounds** : Introduction to co-ordination chemistry, Scope of the topic, Werner's theory of co-ordination compounds. Electronic interpretation of co-ordination. The nature of the linkage in complex ions and co-ordination compounds, complexes resulting from electrostatic forces between

constituents, Complexes resulting from the formation of co-ordination bonds, Factors affecting the stabilities of complex ions and co-ordination compounds, Sequestering agents, Classification of Sequestering agents, The importance of Sequestering agents in textiles.

**7. Redox reactions** : Introduction, Scope of the topic, Oxidation and reduction, electron transfer concepts, oxidizing and reducing agents, redox reactions in aqueous solutions, oxidation number and rules for assigning oxidation number. Applications in textiles.

**List of Experiments:-**

1. Paper Chromatography.
2. Estimation 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  $\text{Na}_2\text{CO}_3$
6. Determination of Percentage purity of  $\text{Na}_2\text{S}$
7. Determination of Percentage purity of NaOCl
8. Determination of Percentage purity of ammonium sulphate.
9. Gravimetric estimation of Barium as barium sulphate.
10. Gravimetric estimation of chloride as silver chloride.
11. Qualitative Analysis of mixture containing two acidic and two basic radicals.
12. Qualitative Analysis of mixture containing three acidic and three basic radicals.

**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. Inorganic Chemistry by P.K. Dutta.

**FIRST YEAR B. TEXT. – SEMESTER - II**

**2.1 APPLIED MECHANICS (TT/MMTT/TPE/TC/FT)**

Lectures	:	3 Hours / Week.
Theory Paper	:	100 Marks, 3 Hours.
Subject Total	:	100 Marks.

1. Statics, dynamics, Fundamental units of measurements, Metric system of units, SI. System, Scalar quantities, Vector quantities.  
Force, system of forces, principle of transmissibility of force, moment of force. Couple, resultant, parallelogram of forces, triangle of forces, polygon of forces, Varignons theorem, Composition and resolution of Coplanar concurrent and non-concurrent forces. Analytical and graphical method.
2. Equilibrium of Coplanar forces. Conditions of equilibrium, Free body diagram, Lami's theorem, Support reactions of for simply supported beams.
3. Centre of gravity, Centroid of a uniform lamina, Centroid of composite areas, Moment of inertia of sections, parallel axis theorem, perpendicular axis theorem.
4. Lifting Machines : Mechanical advantage, velocity ratio, efficiency, law of machine, effort lost in friction, load lost in friction, Simple machines such as smooth inclined plane, screw jack, simple and differential axle and wheel, worm and worm wheel, single and double purchase crab.
5. Friction: Static friction, dynamics friction, laws of friction, coefficient of friction, angle of friction, angle of repose. Friction of a body lying on an inclined plane.
6. Motion: Equations of linear motion with constant acceleration, variable acceleration, motion under gravity.  
Angular motion, relation between angular motion and linear motion, equations of angular motion.
7. Force and motion of translation: Mass, momentum, inertia, Newton's laws of motion, impulse, principle of conservation of momentum, work, power, energy. Principle of conservation of energy.
8. Couples and Motion of rotation: Angular momentum, mass moment of inertia, radius of gyration, kinetic energy of rotatory flywheels.
9. Transmission of motion and power by belt, rope, chain, gears. Type of gears.  
Types of gear drive: Gear trains, velocity ratio, advantages of gear drives, uses in textile machines. Concept of epicyclic gearing.

**Reference Books:-**

1. Engineering Mechanics by S. Ramamrutham.
2. Engineering Mechanics by Junnarkar.
3. Applied Mechanics Satya Prakashan, New Delhi by S.N. Saluja.
4. Vector Mechanics for Engineers Vol – I & II, Tata Mc-Graw Hill Publication by Beer & Jonhstan.
5. Engineering Mechanics by R. K. Bansal and Sanjay Bansal
6. Applied Mechanics by R.S. Khurmi.
7. Engineering Mechanics, New Age International Pvt. Ltd. By S. S. Bhavikattis,

**FIRST YEAR B. TEXT. – SEMESTER - II****2.2 TEXTILE MATHEMATICS-II (TT/MMTT/TPE/TC/FT)**

Lectures	:	3 Hours / Week.
Theory Paper	:	100 Marks, 3 Hours.
Subject Total	:	100 Marks.

**1. Integral Calculus:**

Reduction formulae for  $\int_0^{\pi/2} \sin^n x \, dx$ ,  $\int_0^{\pi/2} \cos^n x \, dx$ , Gamma function, Beta function

**2. Multiple integrals:**

Introduction, solution, change of order & change of variables method.

**3. Applications of integration:**

Area, Mass of lamina using double integrals only. Volume using triple integral only.

**4. Numerical Differentiation & curve fitting:**

Newton's forward & backward formulae, Sterling's formula. Newton's divided difference formula.

Fitting of curves  $y=a+bx$ ,  $y=a+bx+cx^2$ ,  $y=ax^b$  by least square method.

**5. Bivariate data:**

Correlation: types, coefficient of correlation, properties. Rank correlation coefficient & computation.

Regression: lines of X on Y & Y on X, regression coefficients, properties & computation.

**6. Probability distribution:**

Random variable: types, introduction & types of probability distribution, pmf & pdf, expectation of random variable. MGF of random variable.

**7. Standard discrete probability distributions:**

Binomial probability distribution: Definition, properties, fitting & examples.

Poisson probability distribution: Definition, properties, fitting & examples.

**8. Standard continuous probability distributions:**

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. TEXT. – SEMESTER - II****2.3 INDUSTRIAL CHEMISTRY FOR TEXTILES (TT/MMTT/TC)**

Lectures	:	4 Hours / week.
Practicals	:	2 Hours / week.
Theory Paper	:	100 Marks, 3 Hours.
Term Work	:	25 Marks.
Subject Total	:	125 Marks.

**1. Water:-**

Scope of topic in textiles Introduction, sources of water, impurities in natural water, quality parameters like pH, hardness, total solids, alkalinity, BOD & COD, oil & grease. Types of hardness (temporary/permanent), Calcium carbonate equivalents of hardness, units of hardness and numerical based on hardness, ill effects of hard water in textile industry, industrial treatment of water by lime-soda process, zeolite process and ion exchange process, domestic treatment of water. disinfection of water. Boiler feed water: Norms for boiler feed water. Definition causes & disadvantages of priming, foaming, scale, sludge and caustic embrittlement.

**2. Surface Active Agents:**

Scope of topic in textiles, concept of HLB & wetting Preparation, properties and applications in textiles of

- a) Ionic - Anionic surfactants and cationic surfactants.
- b) Non-ionics
- c) Amphoteric surfactants.

**3. Carbohydrates:**

Scope of topic in textiles Introduction, Classification of carbohydrates, Manufacture of starch, Constitution of starch, Properties of starch paste, Chemical & physical properties of starch, Soluble starch and dextrin, Action of enzymes on starch, Cellulose – sources, methods of pulp making, Constitution of cellulose, Chemical & physical properties of cellulose

**4. Amino Acids and Proteins:**

Scope of topic in textiles Introduction, Nature of amino acids, Classification of amino acids, Chemical properties of amino acids Nature and classification of proteins, Chemical properties of proteins, Denaturing of proteins, isoelectric point, Composition & chemical structure of protein fibres like wool & silk.

**5. Corrosion:**

Scope of topic in textiles Electrochemistry, electrode potential, electrochemical series,, causes of corrosion, classification, atmospheric corrosion (oxygen & other gases), factors influencing dry corrosion, electrochemical corrosion (hydrogen evolution and oxygen absorption mechanism), factors influencing wet corrosion, Testing and measurement of corrosion by weight loss method & electrical resistance method. Prevention of Corrosion – Introduction, metallic coatings (anodic and cathodic), methods of application of metal coatings such as hot dipping, metal spraying, organic coatings, paints, varishes. Protection from corrosion by proper design, material selection, Cathodic protection, modifying the environment, use of inhibitors.

**6. Fuels:**

Scope of topic in textiles, Definitions and units, Classification of fuels, characteristic of good fuel

Solid fuels : Properties and analysis of fuels, wood, Coals : classification of coal by ranking, Calorific value of fuel.

Liquid fuels: petroleum, cracking, synthetic petrol, reforming, Gasoline, knocking, Gaseous fuels from petroleum & coal.

**7. Alloys:**

Scope of topic in textiles, Necessity of making alloys, classification, composition, properties and application of brass, bronze, duralumin, stainless steel.

**8. Colloids:**

Scope of topic, applications in textiles, true solutions, colloidal solutions ,suspensions, classifications of colloidal, lyophilic and lyophobic colloids, preparations of sols, properties of colloidal solution, Tyndall effect and its applications, electrical properties of colloids, spontaneous aging of colloids, coagulation, factors affecting on coagulation

**List of Experiments:-**

- 1) Determination of total hardness of given sample of water.
- 2) Determination of total solids & suspended solids of given sample of water.
- 3) Determination of dissolved oxygen of given sample of water.
- 4) Determination of chemical oxygen demand of given sample of water.
- 5) Determination of alkalinity of given sample of water.

- 6) Determination of chlorides in given water sample.
- 7) Determination of pH by using pH paper, Litmus paper, Universal Indicator and pH meter.
- 8) Determination of oil & grease in given sample of water.
- 9) Estimation of copper in given sample of bronze.
- 10) Analysis of starch.
- 11) Determination of rate of corrosion of metal.
- 12) Determination of ash content & moisture content of given solid fuel.

**Reference Books:-**

1. Industrial Chemistry by Reigel.
2. Engineering Chemistry by Jain and Jain.
3. Industrial Chemistry Lecture Notes by Prof.V.R. Wadekar.
4. Chemistry of Organic Textile Chemicals by Dr. V.A. Shenai.
5. Text Book of Engg. Chemistry by Shashi Chawla.
6. Profiles in chemical analysis by N.F. Desai.

**FIRST YEAR B. TEXT. – SEMESTER - II**

**2.4 ENGINEERING GRAPHICS (TT/MMTT/TPE/TC/FT)**

Lectures	:	2 Hour / Week.
Drawing Practical	:	2 Hours / Week.
Theory Paper	:	100 Marks, 3 Hours
Term Work	:	25 Marks.
Subject Total	:	125 Marks.

1. Introduction and use of instruments - Line - Lettering - I.S. conventions for External and Internal Threads, Bearing, Gears, Knurling, end of shaft. I.S. conventions for various materials.
2. Orthographic Projections - General Principles - First angle method - Third Angle method - Dimensioning.
3. Sectional Orthographic Views: Cutting plane - Types of sections. Making sectional drawings of machine components.
4. Isometric Projections: Principle, Isometric scale, Isometric views, Making Isometric drawings of simple objects from orthographic views.
5. Development of Surfaces : A) Introduction to solids (Types of solids only) B) Development of lateral surfaces of cubes, prisms, cylinders, pyramids.
6. Free hand sketches: Making free hand sketches of -
  - i. Mechanisms in textile machines – Picking motion mechanism, Let-off motion mechanism, Take-up motion mechanism, Three blade beater, Immersion roller drive in sizing plaiting mechanism, Sewing needle, Throat plate, Sewing machine table, Cutting machine parts
7. Introduction to 'Auto-Cad' - Commands for drawing lines, circles, polygons.

**TERM WORK:-** Submission of 08 drawing sheets of half imperial size, on the following topics:

- a) Conversion of pictorial view into orthographic projects.
- b) Conversion of pictorial view into sectional orthographic projections.
- c) Isometric projections.
- d) Development of surfaces.
- e) Free hand sketches of I.S. conventions for threaded parts, khurling, materials etc.
- f) Free hand sketches of Textile machines mechanisms.

**Reference Books:-**

1. Engineering Drawing by N.D. Bhat.
2. The Fundamental of Engineering Drawing & Graphic Technology by French & Virek
3. I.S.: 696 (1972) Code of Practice for General Engineering Drawing by I.S.I, New Delhi.
4. Machine Drawing by N.D. Bhat.
5. Engineering Graphics by Narayana K.L. & Kannaiah P.
6. Principles of Weaving by Marks & Robinson.
7. Engineering Drawing by Venugopal.

**FIRST YEAR B. TEXT. – SEMESTER - II**

**2.7 COMPUTER LABORATORY (TPE/TC)**

Practical	:	2 Hours/week
Term Work	:	50 Marks
Subject Total	:	50 Marks

**1. Computer Fundamental :-**

Basic organization of computer & its functional unit, Memories, System Software, Application Software.

**2. 'C' Programming:-**

Introduction, Algorithm & flowchart, keywords, statements, Loops.

**3. Array:-**

Introduction, Array representation, one dimensional array, two dimensional arrays.

**4. Structure:-**

Introduction, define structure, define structure variable, accessing structure member, array of structure, union.

**5. Pointer:-**

Introduction, application of pointer, pointer arithmetic, pointer & array.

**6. Introduction of 'C++' programming:-**

Basic concept of OOP, Application of OOP & C++, characteristic of OOP language.

**7. Classe & Object:-**

Class type, Data member, Member function, Constructor, Destructor.

**8. Function in 'C++':-**

Function prototype, inline function, friend function.

**9. Inheritance:-**

Basic Concept of inheritance, types of inheritance, Virtual function.

**Term Work (Minimum 12 Program)**

**List of Experiments:-**

1. One programs each on Loops, Array, Structure, Pointer, Union.
2. Class & Object
3. Constuctor & Destrucure
4. Function
5. Inheritance & virtual function.

**Reference Books:-**

1. C++ Programming- Robert Lafore
2. Let us C – Yashwant Kanitkar.
3. Let C++ - Yashwant Kanitkar
4. Fundamental of computer- Rajaraman

**FIRST YEAR B. TEXT. – SEMESTER - II**

**2.5 ORGANIC CHEMISTRY-II (TC)**

Lectures	:	4 Hours / week
Practicals	:	2 Hours / week
Theory Paper	:	100 Marks, 3 Hours.
Term Work	:	50 Marks.
Subject Total	:	150 Marks

**1) Aromatic Compounds:**

Scope of topic, Reasons for separate classification of Aromatic compounds.

Coal tar distillation, Nomenclature of Aromatic hydrocarbons

Study of Benzene:

- a) Orbital picture of benzene
- b) Resonance structure of benzene.
- c) Isomerism of benzene derivatives
- d) Reactivity and orientation.
- e) Preparation, properties & uses of benzene & Toluene.

Electrophilic substitution in aromatic compounds:

Study of some important reactions like : i) Nitration, ii) Sulphonation, iii) Sulphation iv) Halogenation, v) Friedel-Crafts reaction vi) Amination vii) Oxidation

**2) Aromatic Halogen Compounds:**

Scope of topic, Nomenclature, Methods of preparation of halobenzene by i) direct halogenations, ii) Action of  $\text{PCl}_5$  on nuclear hydroxyl compounds iii) Sandmeyer's Reaction. Physical, chemical properties and uses of chlorobenzene.

**3) Benzene Sulphonic Acid:**

Scope of topic, Nomenclature, preparation of benzene sulphonic acid. Physical, Chemical properties & uses of benzoic sulphonic acid. Compare acidity of carboxylic acid & sulphonic acids. Applications in Textiles.

**4) Aromatic Nitro Compounds:**

Scope of topic, Nomenclature, preparation of nitrobenzene. Physical, Chemical properties of nitrobenzene. Applications in Textiles.

**5) Aromatic Amino Compounds:**

Scope of topic, Nomenclature, Compare basicity of aliphatic & aromatic amines. Preparation, physical & chemical properties of Aniline. Uses of i) Aniline ii) o-, m- & p- Toluidines iii) Phenylene diamines iv) Diphenyl amine v) Triphenyl amine in textiles.

**6) Diazonium Salts:**

Nomenclature, Diazotization, Preparation of benzene diazonium chloride. Physical, Chemical properties & uses of benzene diazonium chloride. Role of excess of mineral acid in diazotization.

Reactions of diazonium salts in which the nitrogen atoms are replaced :

i) by halogen ii) by -CN iii) by -OH iv) by -H.

Coupling reactions of diazonium salts with amines & phenols.

**7) Aromatic Hydroxy Compounds:**

Scope of topic, Nomenclature, preparation of phenol. Physical, Chemical properties & uses of phenol. Preparation & properties of Naphthols. Applications in Textiles.

**8) Aromatic Acids:**

Scope of topic, Nomenclature, preparation of benzoic acid. Physical & Chemical properties of benzoic acid. Uses of benzoic acid, phthalic acid, Anthranilic acid & Terephthalic acid in textiles.

**9) Polynuclear Aromatic Hydrocarbons:**

Preparation, properties & uses of

a) Polynuclear aromatic hydrocarbons with isolated benzene rings :

Biphenyl, Benzidine, Diphenylmethane, Triphenylmethane.

b) Polynuclear aromatic hydrocarbons with condensed benzene rings :

Naphthalene, Anthracene, Anthraquinone.

**10) Synthesis of Some Dye intermediates:**

Scope of topic, Preparation of following dye intermediates. H-acid, J-acid, Naphthionic acid, Gamma acid.

**List of Experiments:-**

Organic Binary Mixture Separation :-

- 1) Acid + Phenol
- 2) Acid + Base
- 3) Acid + Neutral
- 4) Phenol + Base
- 5) Phenol + Neutral
- 6) Base + Neutral

Study of Important Reactions :-

- 7) Nitration
- 8) Sulphonation
- 9) Halogenation
- 10) Coupling Reaction (Preparation of azo dye)

Study of Some Estimations :-

- 11) Estimation of Resist salt
- 12) Estimation of Acetone
- 13) Estimation of Ethylene glycol
- 14) Estimation of urea

**Reference Books:-**

1. Organic Chemistry by Morrison & Boyd.
2. Organic Chemistry - Vol. I , The Fundamental Principles by I.L. Finar.
3. Organic Chemistry by N.L. Allinger, M.P.Cava, Donc DE Jongh, C.R. Johnson,N.A. Lebel, C.L. Stevens.
4. Mechanism in Organic Chemistry by Peter Sykes.
5. A text book of Organic Chemistry by P.L. Soni.
6. A text book of Organic Chemistry by B.S. Bahl and Arun Bahl.
7. Reaction Mechanism & Reagents in Organic Chemistry by Gurdeep R.Chatwal.
8. Advanced Organic Chemistry Vol. I, by V.S.Kulkarni, L.P.Ghalsasi, A.S.Arora.
9. Advanced Organic Chemistry by Jerry March.

**FIRST YEAR B. TEXT. – SEMESTER - II****2.6 CHEMISTRY OF TEXTILE FIBRES-I (TC)**

Lecture	:	4 Hours / Week.
Practical	:	2 Hours / Week
Theory Paper	:	100 Marks.
Term Work	:	50 Marks
Subject Total	:	150 Marks

**1. INTRODUCTION :**

Concept of fibre, yarn, rope, fabrics; Sequence of operations for conversion of natural and manmade fibres into finished fabrics. Concept of weaving, knitting & production of non-woven, Importance of fabric design in weaving. General production sequence of fabric to garment manufacturing, concept of processing and finishing of fabrics and garments.

Introduction to Textile Fibres: Definition of fibre, filament, degree of polymerization and Cohesive Energy Density (CED). 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.

**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., influence of structure of cotton cellulose on its properties. Physical and chemical properties of cotton, Chemistry of damage of cellulose. Chemical methods of detection of oxycellulose and hydrocellulose.

**3. BAST FIBRES :**

Classification of Bast fibres, Introduction to cultivation and varieties of Jute. Morphological structure and chemical constitution of Jute and Ramie. Concept of hemicellulose, lignin and such other cementing components and their chemistry. Retting of Jute and Ramie. Physical and chemical properties of Jute and Ramie.

#### **4. REGENERATED CELLULOSE :**

Concept of wet, dry and melt spinning with fibre example, Essential requirements of wet spinning. Concept of extrusion and spinning. Manufacturing process of viscose rayon. The functions of various additives used in the manufacture of viscose rayon. Concept of press weight ratio and its significance. Chemical crimp in viscose rayon. Physical and chemical properties of viscose rayon. Raw materials, brief manufacturing process, physical and chemical properties and uses of polynosic rayon, H.W.M.F., Cuprammonium Rayon, Tencel.

#### **5. MODIFIED CELLULOSE :**

Concept of Dry spinning. Essential requirements of dry spinning. Concept of heterogeneous and homogeneous acetylations. Raw materials, manufacturing process, physical and chemical properties of cellulose acetate and triacetate.

#### **6. ANIMAL PROTEIN FIBRES :**

**Wool :** - Source and grading of wool, Impurities present in raw wool, morphological structure of wool, Chemical composition of wool, types of forces present in wool fibres, Physical and chemical properties of wool.

**Silk:** - Varieties of silk, production of raw silk - sericulture and reeling, Morphological structure of silk, Chemical composition of silk, Physical and chemical properties of silk, degumming of silk.

#### **List of Experiments:-**

1. Identification of Fibres by Microscope Method.
2. Determination of moisture regain of fibre.
3. Detection of Honey dew content of cotton.
4. Determination of Fibre fineness by cut weight method.
5. Determination of fibre length by using Grease plate method.
6. Identification of fibres by density gradient column.
7. Identification of fibres by chemical method.
8. Identification of fibres by chemical method.
9. Identification of fibres by chemical method.
10. Testing of fibre properties by High Volume Instrument
11. Measurement of maturity of cotton by caustic soda method.
12. Detection of fibre damage.

**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. Textiles Fibre to Fabric by Corbmann, New York Mc Garw Hill Book Co.1983.
7. Cotton Spinning 'ATIRA' Publication, Ahmedabad.
8. Plain Weaving Motions by Aswani K.T., Mahajan Book Publishers, 1996.
9. Fundamental Principles of Textile Processing by V.A. Shenai, Sevak Publisher
10. Silk Production, Processing and Marketing by Mahesh Nanavaty.
11. Wool, Science and Technology, W S Simpson and G H Crawshaw, Woodhead Publication Ltd, England
12. Handbook of fibre chemistry - Lewin