

**ANNA UNIVERSITY TIRUCHIRAPPALLI****Tiruchirappalli – 620 024****Regulations 2007****Curriculum****B.TECH. TEXTILE TECHNOLOGY****SEMESTER III**

S.No.	Subject Code	Subject	L	T	P	Max. Marks
<b>Theory</b>						
1	<b>MA1201</b>	Mathematics III	3	1	0	100
2	<b>HS1202</b>	Organic Chemistry	3	1	0	100
3	<b>CE1214</b>	Mechanics of Solids	3	1	0	100
4	<b>TT1201</b>	Fibre Science and Technology	3	1	0	100
5	<b>EE1208</b>	Electrical Machines and Drives	3	1	0	100
6	<b>CS1201</b>	Data Structures	3	1	0	100
<b>Practical</b>						
7	<b>HS1205</b>	Organic Chemistry Laboratory	0	0	3	100
8	<b>EE1209</b>	Electrical Machines Laboratory	0	0	3	100
9	<b>CS1204</b>	Data Structures Laboratory	0	0	3	100

**SEMESTER IV**

S.No.	Subject Code	Subject	L	T	P	Max. Marks
<b>Theory</b>						
1	<b>MA1251</b>	Numerical Methods	3	1	0	100
2	<b>CH1251</b>	Physical Chemistry	3	1	0	100
3	<b>HS1201</b>	Environmental Science and Engineering	4	0	0	100
4	<b>TT1251</b>	Polymer Chemistry	3	1	0	100
5	<b>TT1252</b>	Man-Made Fibre Production	3	1	0	100
6	<b>TT1253</b>	Spun Yarn Technology	3	1	0	100
<b>Practical</b>						
7	<b>CH1253</b>	Physical Chemistry Laboratory	0	0	3	100
8	<b>HS1251</b>	Environmental Engineering Laboratory	0	0	3	100
9	<b>TT1254</b>	Polymer Testing and Analysis Laboratory	0	0	3	100

## SEMESTER V

S.No.	Subject Code	Subject	L	T	P	Max. Marks
<b>Theory</b>						
1	<b>MA1302</b>	Special Functions	3	1	0	100
2	<b>ME1309</b>	Engineering Thermodynamics	4	0	0	100
3	<b>TT1301</b>	Preparatory Process of Chemical Processing	4	0	0	100
4	<b>TT1302</b>	Physical Structure and Properties of Fibres	4	0	0	100
5	<b>TT1303</b>	Preparatory Process of Weaving Operations	4	0	0	100
6	<b>TT1304</b>	Process and Quality Control in Spinning	4	0	0	100
<b>Practical</b>						
7	<b>TT1305</b>	Preparatory Process of Chemical Processing Laboratory	0	0	3	100
8	<b>TT1306</b>	Process and Quality Control in Spinning Laboratory	0	0	3	100
9	<b>HS1301</b>	Communication and Soft Skills Laboratory	0	0	3	100

## SEMESTER VI

S.No.	Subject Code	Subject	L	T	P	Max. Marks
<b>Theory</b>						
1	<b>MA1351</b>	Statistics and Linear Programming	3	1	0	100
2	<b>TT1351</b>	Chemical Processing of Textile Materials	3	1	0	100
3	<b>TT1352</b>	Quality Assessment of Textiles	3	1	0	100
4	<b>TT1353</b>	New Spinning Technologies	4	0	0	100
5	<b>TT1354</b>	Fabric Structure	3	1	0	100
6	<b>TT1355</b>	Fabric Manufacturing Technology	4	0	0	100
<b>Practical</b>						
7	<b>TT1356</b>	Chemical Processing of Textile Materials Laboratory	0	0	3	100
8	<b>TT1357</b>	Cloth Analysis Laboratory	0	0	3	100
9	<b>TT1358</b>	Textile Testing Laboratory	0	0	3	100

## SEMESTER VII

S.No.	Subject Code	Subject	L	T	P	Max. Marks
<b>Theory</b>						
1	<b>GE1351</b>	Professional Ethics and Human Values	3	1	0	100
2	<b>TT1401</b>	Garment Technology	4	0	0	100
3	<b>TT1402</b>	Knitting Technology	4	0	0	100
4	<b>TT1403</b>	Computer Applications in Textile Technology	4	0	0	100
5	<b>E1****</b>	Elective I	4	0	0	100
6	<b>E2****</b>	Elective II	4	0	0	100
<b>Practical</b>						
7	<b>TT1404</b>	Knitting and Garment Laboratory	0	0	3	100
8	<b>TT1405</b>	Fabric Manufacturing Laboratory	0	0	3	100
9	<b>TT1406</b>	Yarn Manufacturing Laboratory	0	0	3	100

## SEMESTER VIII

S.No.	Subject Code	Subject	L	T	P	Max. Marks
<b>Theory</b>						
1	<b>MG1352</b>	Total Quality Management	4	0	0	100
2	<b>MG1453</b>	Safety and Risk	4	0	0	100
3	<b>E3****</b>	Elective III	4	0	0	100
4	<b>E4****</b>	Elective IV	4	0	0	100
<b>Practical</b>						
5	<b>TT1455</b>	Project Work	0	0	12	100

## LIST OF ELECTIVES

S.No.	Subject Code	Subject	L	T	P	Max. Marks
<b>Elective I</b>						
1	<b>TT1001</b>	Technical Textiles	4	0	0	100
2	<b>TT1002</b>	Textured Yarn Technology	4	0	0	100
3	<b>TT1003</b>	Silk Yarn Technology	4	0	0	100
4	<b>TT1004</b>	Theory of Staple-Fibre Opening	4	0	0	100
<b>Elective II</b>						
5	<b>TT1005</b>	Mechanics of Staple-Fibre Drafting	4	0	0	100
6	<b>TT1006</b>	Apparel Production Control	4	0	0	100
7	<b>TT1007</b>	Long-Staple Spinning Process	4	0	0	100
8	<b>TT1008</b>	Mechanics of Textile Structures	4	0	0	100
<b>Elective III</b>						
9	<b>TT1009</b>	Apparel Marketing and Merchandising	4	0	0	100
10	<b>TT1010</b>	Energy Management in Textile Industry	4	0	0	100
11	<b>MG1003</b>	Process Engineering Economics	4	0	0	100
12	<b>TT1011</b>	Textile Mill Planning and Management	4	0	0	100
<b>Elective IV</b>						
13	<b>GE1001</b>	Intellectual Property Rights	4	0	0	100
14	<b>TT1012</b>	Mechanics of Textile Machinery	4	0	0	100
15	<b>TT1013</b>	Technology of Staple-Fibre Yarn Twisting	4	0	0	100
16	<b>TT1014</b>	Textile Machinery Maintenance	4	0	0	100

# ANNA UNIVERSITY TIRUCHIRAPPALLI

Tiruchirappalli – 620 024

Regulations 2007

Syllabus

**B.TECH. TEXTILE TECHNOLOGY**

**SEMESTER III**

**MA1201 – MATHEMATICS III**

L	T	P
3	1	0

**UNIT I PARTIAL DIFFERENTIAL EQUATIONS 9**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients.

**UNIT II FOURIER SERIES 9**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of fourier series – Parseval's identity – Harmonic analysis.

**UNIT III BOUNDARY VALUE PROBLEMS 9**

Classification of second order Quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

**UNIT IV FOURIER TRANSFORM 9**

Fourier integral theorem (without proof) – Fourier transform pair – Sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

**UNIT V Z-TRANSFORM AND DIFFERENCE EQUATIONS 9**

Z-Transform – Elementary properties – Inverse Z-transform – Convolution theorem – Formation of difference equations – Solution of difference equations using Z-transform.

**L: 45 T: 15 Total: 60**

## TEXT BOOK

1. Grewal B.S., "Higher Engineering Mathematics", 40th Edition, Khanna Publishers, 2007.

## REFERENCES

1. Churchill R.V. and Brown J.W., "Fourier Series and Boundary Value Problems", 4th Edition, McGraw-Hill, 1987.
2. Veerarajan T., "Engineering Mathematics III", 3rd Edition, Tata McGraw-Hill Education, 2007.
3. Kandasamy P., Thilagavathy K. and Gunavathy K., "Engineering Mathematics", Vol-III, S. Chand & Company Ltd., 2007.

## HS1202 – ORGANIC CHEMISTRY

L T P  
3 1 0

### UNIT I ALIPHATIC HYDROCARBONS AND ALCOHOLS 9

Alkanes – General methods of preparation – Physical and chemical properties – Alkenes – General methods of preparation – Physical and chemical properties – Markovnikov's rule – Peroxide effect – Bayer's test – Alkynes – General methods of preparation and properties monohydric alcohols – Saytzeff rule – Methods of distinguishing the three classes of alcohols – Lucas test – Dichromate test.

### UNIT II ALDEHYDES, KETONES AND ACIDS 9

General methods of preparation – Physical and chemical properties – Aldol condensation – Clemmensen reduction – Wolf-Kishner reduction – Haloform reaction – Cannizzaro reaction – Reformatsky reaction – Wittig reaction – Saturated monocarboxylic acids – Methods of preparation – Physical and chemical properties – Hell-Volhard-Zelinsky reaction – Amino acids – Methods of preparation – Physical and chemical properties.

### UNIT III CARBOHYDRATES 9

Classification of carbohydrates – Monosaccharides – Reactions of glucose and fructose – Open chain and cyclic structures of glucose and fructose – Mutarotation – Epimerization – Killiani-Fisher synthesis – Ruff degradation – Conversion of aldoses to ketoses and ketoses to aldoses – Disaccharides – Properties and structure of sucrose – Polysaccharides – Properties and structure of starch and cellulose – Derivatives of cellulose – Carboxy methyl cellulose and gun cotton.

### UNIT IV AROMATIC HYDROCARBON, AMINE AND DIAZONIUM SALT 9

Benzene – Aromaticity – Huckel rule – General methods of preparation of benzene – Electrophilic substitution reactions – Directive effects of substituents – Aromatic amino compounds – General methods of preparation – Physical and chemical properties – Carbylamines reaction – Aryldiazonium salts – Preparation and synthetic applications.

### UNIT V DYES AND DYEING 9

Colour and constitution – Synthesis – Azodyes – Methyl orange – Methyl red and Congo red – Triphenylmethane dyes – Malachite green – Para-rosaniline – Alizarin – Eosin – Introduction to natural and reactive dyes.

**L: 45 T: 15 Total: 60**

### TEXT BOOKS

1. Morrison, R.T. and Boyd, R.N., "Organic chemistry", 6th Edition, Prentice Hall of India (P) Ltd., 2003.
2. Arun Bahl and Bahl, B.S., "Advanced Organic Chemistry", 16th Edition, S.Chand & Company Ltd., 2002.

### REFERENCES

1. March J., "March's Advanced Organic Chemistry: Reactions, Mechanisms, and Structure", 5th Edition, John Wiley, 2001.
2. Finar I.L., "Organic chemistry" Vol-I, 6th Edition, Pearson Education, 2002.
3. Sharma B.K., "Industrial Chemistry", 12th Edition, Goel Publishing house, 2001.

## CE1214 – MECHANICS OF SOLIDS

**L T P**  
**3 1 0**

### **UNIT I STRESS, STRAIN AND DEFORMATIONS OF SOLIDS 9**

Rigid bodies and deformable solids – Forces on solids and supports – Equilibrium and stability – Strength and stiffness – Tension, compression and shear stresses – Hooke's law and simple problems – compound bars – Thermal stresses – Elastic constants and poisson's ratio.

### **UNIT II TRANSVERSE LOADING ON BEAMS 9**

Beams – Support conditions – Types of beams – Transverse loading on beams – Shear force and bending moment in beams – Analysis of cantilevers – Simple supported beams and over hanging beams – Relationships between loading, S.F. and B.M. in beams and their applications – S.F. and B.M. diagrams.

### **UNIT III SLOPE, DEFLECTIONS OF BEAMS 9**

Fourth order differential equations – Relationship – Intensity of loading, Shear, B.M, Slope and deflection – Double integration method – Macaulay's method – Area – Moment theorems for computation of slopes and deflections in beams – Conjugate beam method.

### **UNIT IV STRESSES IN BEAMS 9**

Theory of simple bending – Assumptions and derivation of bending equation ( $M/I = F/Y = E/R$ ) – Analysis of stresses in beams – Loads carrying capacity of beams – Proportioning beam sections – Leaf springs – Flitched beams – Shear stress distribution in beams – Distribution of shear stress in flanged beams.

### **UNIT V TORSION AND COLUMNS 9**

Torsion of circular shafts – Derivation of torsion equation ( $T/J = C/R = Gq/L$ ) – Stresses, deformation of circular and hollow shafts – Stepped shafts – Shafts fixed at both ends – Stresses in helical springs – Deflection of springs – Spring constant – Axially loaded short columns – Columns of unsymmetrical sections – Euler's theory of long columns – Critical loads for prismatic columns with different end conditions – Effect of eccentricity – Rankine-Gordon formula.

**L: 45 T: 15 Total: 60**

### **TEXT BOOKS**

1. Prakash Rao, D.S., "Strength of Materials: A Practical Approach", Vol-I, Universities Press, 2004.
2. Junarkar, S.B., "Mechanics of Structures ", Vol-I, Twenty 1st Edition, Charotar Publishing House, 1995.

### **REFERENCES**

1. William A. Nash., "Theory and Problems of Strength of Materials ", 3rd Edition, McGraw Hill, 1994.
2. Popov, "Engineering Mechanics of solids", 2nd Edition, Prentice Hall of India (P) Ltd.,1998.
3. Khurmi, R.S., "Applied Mechanics and Strength of Materials", 13th Edition, S.Chand and Company Ltd., 2005.

## TT1201 – FIBRE SCIENCE AND TECHNOLOGY

**L T P**  
**3 1 0**

### **UNIT I TEXTILE FIBRES AND THEIR CLASSIFICATION**

**9**

Textile fibres and their classification – General physical properties and microscopic appearance of various fibres – Identification of fibres by simple tests.

### **UNIT II STUDY OF NATURAL FIBRES**

**9**

Cotton cultivation – Geographical position of cotton fields in the world – Physical conditions necessary for its growth and their influence on the character of the fibre with special reference to Indian conditions – General methods of cultivating and harvesting cotton – Periods of sowing and picking cotton and damage to crops – Cotton acreage and yield per acre – Cotton varieties and their characteristics – Grading of cotton – General methods of production of silk – Wool – Flax and jute.

### **UNIT III STUDY OF MAN-MADE FIBRES**

**9**

Outline of manufacturing processes of viscose – Cuprammonium and acetate rayons – Nylon 6 – Nylon 66 and Polyester – Introduction to other synthetic fibres like polypropylene – Vinyon – Acrylic and glass fibres – High performance fibres like Kevlar – Nomex and carbon fibres.

### **UNIT IV NUMBERING SYSTEMS**

**9**

Systems of numbering cotton – Worsted – Woollen – Silk – Spunsilk – Man-made fibres and fancy yarns and their conversions – Average and resultant counts.

### **UNIT V MANUFACTURING PROCESSES OF YARNS AND FIBRICS**

**9**

Outline of the processes used in the manufacture of yarns and fabrics from cotton – Silk – Woollen – Worsted – Flax – Jute – Man-made fibres and waste cotton.

**L: 45 T: 15 Total: 60**

### **TEXT BOOKS**

1. Moncrieff, R.W., “Man-made fibres”, 6th Edition, Wiley-Interscience, 1975.
2. Carolina, S., “Textile processing”, Vol. I, State Department of Education, 1968.

### **REFERENCES**

1. Morton, W.E. and Wray, G.R., “An Introduction to the Study of Spinning”, Longman, 1966.
2. Anonymous, “Characteristics of Raw Cotton”, Manual of Cotton Spinning, Vol. II, Part-I, Textile Institute, Manchester, 1961.
3. Srinivasamurthy, H.V., “Textile Fibres”, Textile Association, 1988.

## EE1208 – ELECTRICAL MACHINES AND DRIVES

**L T P**  
**3 1 0**

### **UNIT I D.C. CIRCUITS 9**

Basics of electricity – Electric energy and power – Circuit elements and sources – Kirchhoff's laws – Series and parallel combination of resistances – Mesh analysis – Nodal analysis – Superposition theorem – Thevenin's theorem – Norton's theorem – Maximum power transfer theorem.

### **UNIT II STEADY STATE ANALYSIS OF SINUSOIDAL EXCITATION 9**

Sinusoidal excitation – RMS, average and peak values – Phasor representation – RC, RL and RLC circuits – Complex power – Resonance – Three phase circuits – Line and phase values.

### **UNIT III D.C. MACHINES AND TRANSFORMER 9**

D.C. Machines – Constructional features – EMF and torque – Characteristics of D.C. motors – Speed control – Transformers – Constructional features – Transformer operation – Voltage regulation – Efficiency.

### **UNIT IV A.C. MACHINES 9**

Alternators – Principles of operations – Synchronous machines – Circuit model – Armature leakage reactance – Synchronous reactance – Voltage regulation – Induction machines – Construction – Circuit model – Power across air gap, torque and power output – Torque-slip characteristics – Starting arrangements – Speed control of induction motor – Single phase induction motors – A.C. series motor.

### **UNIT V ELECTRIC DRIVES 9**

Concept of electric drives – D.C. motors starters – Induction motor starters – Industrial applications – Rolling mill drives – Cement mill – Electric traction – Coalmines – Paper mill – Machine tool drives – Textile mills.

**L: 45 T: 15 Total: 60**

### **TEXT BOOKS**

1. Kothari, D.P. and Nagrath, I.J., 'Basic Electrical Engineering', 2nd Edition, Tata McGraw-Hill, 2002.
2. Nisit K.De. and Sen P.K., 'Electric Drives', 10th Edition, Prentice Hall of India, 2007.

### **REFERENCES**

1. Theraja B.L. and Theraja A.K., 'A Textbook of Electrical Technology', Vol-I & II, S.Chand & Company Ltd., 2005.
2. Tewari J.P., 'Basic Electrical Engineering', New Age International Publishers, 2003.

## CS1201 – DATA STRUCTURES

**L T P**

**3 1 0**

### **UNIT I PROBLEM SOLVING**

**9**

Problem solving – Top-down Design – Implementation – Verification – Efficiency – Analysis – Sample algorithms.

### **UNIT II LISTS, STACKS AND QUEUES**

**9**

Abstract Data Type (ADT) – The List ADT – The Stack ADT – The Queue ADT.

### **UNIT III TREES**

**9**

Binary Trees – The Search Tree ADT – Binary Search Trees – AVL Trees – Tree Traversals – Hashing – General Idea – Hash Function – Separate Chaining – Open Addressing – Linear Probing – Priority Queues (Heaps) – Model – Simple implementations – Binary Heap.

### **UNIT IV SORTING**

**9**

Insertion Sort–Shell Sort – Heap Sort – Merge Sort – Quick Sort – External Sorting.

### **UNIT V GRAPHS**

**9**

Topological Sort – Shortest Path Algorithms – Unweighted Shortest Paths – Dijkstra’s Algorithm – Minimum Spanning Tree – Prim’s Algorithm – Applications of Depth-First Search – Undirected Graphs – Biconnectivity – Introduction to NP Completeness.

**L: 45 T: 15 Total: 60**

### **TEXT BOOKS**

1. Dromey, R. G., “How to Solve it by Computer” (Chapters 1 -2), Prentice-Hall of India, 2002.
2. Weiss, M.A., “Data Structures and Algorithm Analysis in C”, 2nd Edition, Pearson Education, 2002.

### **REFERENCES**

1. Langsam Y. Augenstein M. J. and Tenenbaum A. M., “Data Structures using C”, Pearson Education, 2004
2. Gilberg R.F. and Forouzan B.A., “Data Structures - A Pseudocode Approach with C”, Thomson Brooks / COLE, 1998.
3. Aho J. E. Hopcroft and J. D. Ullman, “Data Structures and Algorithms”, Pearson education, 1983.
4. Harowitz, Sahani, Anderson-Freed, “Fundamentals of DataStructures in C”, 2nd Edition, Universities Press, 2007.

## HS1205 – ORGANIC CHEMISTRY LABORATORY

L	T	P
0	0	3

1. Ore/alloy analysis
2. Pigment Analysis
3. Industrial Waste Water Analysis
4. Estimation of Phenol
5. Analysis of fertilizers
6. Sugar Analysis
7. Polymer Analysis
8. Determination of the number of Amino acids
9. Diazotization
  - a. Preparation of Phenyl azo –  $\beta$  – naphthal
  - b. Preparation of Methyl red
10. Preparation of 5, 10, 15, 20 Tatrakis Phenyl Porphyrin
11. Determination of saponification value of an oil.
12. Qualitative analysis of simple Organic compounds.

**Total: 45**

## EE1209 – ELECTRICAL MACHINES LABORATORY

L	T	P
0	0	3

1. Open circuit and load characteristics of separately excited and self excited D.C. generator
2. Load test on D.C. shunt motor
3. Load test on D.C. series motor
4. Speed control of D.C. shunt motor
5. Load test on single phase transformer and open circuit and short circuit test on single phase transformer
6. Regulation of three phase alternator by E.M.F. and M.M.F. methods
7. Load test on three phase induction motor
8. No load and blocked rotor tests on three phase induction motor (Determination of equivalent circuit parameters)
9. Load test on single- phase induction motor
10. Study of D.C. motor and induction motor starters

**Total: 45**

**Implement the following exercises using C**

1. Array implementation of List ADT
2. Linked list implementation of List ADT
3. Cursor implementation of List ADT
4. Array implementation of Stack ADT
5. Linked list implementation of Stack ADT
  
6. The following three exercises are to be done by implementing the following source files
  - a. Program for ‘Balanced Paranthesis’
  - b. Array implementation of Stack ADT
  - c. Linked list implementation of Stack ADT
  - d. Program for ‘Evaluating Postfix Expressions’

An appropriate header file for the Stack ADT should be included in (a) and (d)

- I. Implement the application for checking ‘Balanced Paranthesis’ using array implementation of Stack ADT (by implementing files (a) and (b) given above)
  
- II. Implement the application for checking ‘Balanced Paranthesis’ using linked list implementation of Stack ADT (by using file (a) from experiment 1 and implementing file (c))
  
- III. Implement the application for ‘Evaluating Postfix Expressions’ using array and linked list implementations of Stack ADT (by implementing file (d) and using file (b) - and then by using files (d) and (c))
  
7. Queue ADT
8. Search Tree ADT – Binary Search Tree
9. Heap Sort
10. Quick Sort

**Total: 45**

## SEMESTER IV

### MA1251 – NUMERICAL METHODS

**L T P**  
**3 1 0**

#### **UNIT I SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS 9**

Linear interpolation methods (method of false position) – Newton’s method – Solution of linear system by Gaussian elimination and Gauss-Jordan methods – Iterative methods – Gauss Jacobi and Gauss-Seidel methods – Inverse of a matrix by Gauss-Jordan method – Eigen value of a matrix by power method

#### **UNIT II INTERPOLATION AND APPROXIMATION 9**

Lagrangian Polynomials – Divided differences – Interpolating with a cubic spline – Newton's forward and backward difference formulae.

#### **UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 9**

Derivatives from difference tables – Divided differences and finite differences – Numerical integration by Trapezoidal and Simpson's 1/3 and 3/8 rules – Romberg's method – Double integrals using Trapezoidal and Simpson's rules.

#### **UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 9**

Single step Methods – Taylor Series method – Euler’s method – Modified and Improved Euler’s method – Fourth order Runge-Kutta method for solving first and second order equations – Multi-step methods – Milne’s and Adam’s predictor and corrector methods.

#### **UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 9**

Finite difference solution of second order ordinary differential equation – Finite difference solution of one dimensional heat equation by implicit and explicit methods – One dimensional wave equation and two dimensional Laplace and Poisson equations.

**L: 45 T: 15 Total: 60**

#### **TEXT BOOK**

1. Gerald C.F. and Wheatley P.O., “Applied Numerical Analysis”, 6th Edition, Pearson Education, 2005.

#### **REFERENCES**

1. Jain M.K., Iyengar S.R.K. and Jain R.K., “Numerical Methods for Scientific and Engineering Computation” 4th Edition, New Age International Publishers, 2003.42  
Venkatraman M.K., ‘Numerical Methods’, National Publication Company, 1991.
3. Kandasamy P., Thilakavathy K. and Gunavathy K., “Numerical Methods”, 2nd Edition, S.Chand & Co., 2003.

## CH1251 – PHYSICAL CHEMISTRY

**L T P**  
**3 1 0**

### **UNIT I ELECTROCHEMISTRY 9**

Electrical Conductance – Specific conductance – Equivalent conductance – Variation with dilution – Kohlrausch's law – Transport Number – Galvanic cells – EMF and its measurement – Reference electrode – Standard Hydrogen Electrode – Nernst equation – Electrochemical series – Applications of EMF measurements.

### **UNIT II CHEMICAL REACTION EQUILIBRIA 9**

Law of Mass Action – Van't Hoff reaction isotherm – Standard free energy change – Le Chatelier's principle – Application to selected systems – Biological activity – Thermodynamics of ATP.

### **UNIT III CHEMICAL KINETICS 9**

Rate of reaction – Order – Molecularity – Integrated rate law – Kinetics of parallel and opposing reactions – Concept of activation energy – Arrhenius equation – Theory of absolute reaction rates – Kinetics of Enzyme catalyzed reactions.

### **UNIT IV PHASE RULE 9**

Derivation – Application of phase rule to water system – Thermal Analysis – Cooling curves – Two Component system – Eutectic and compound formation.

### **UNIT V ADSORPTION AND CATALYSIS 9**

Physical and Chemical adsorption – Types of adsorption isotherm – BET method – Gibbs equation – Homogeneous catalysis – Heterogeneous catalysis – Acid–base catalysis – Enzyme catalysis – Applications of catalysts in industries.

**L: 45 T: 15 Total: 60**

### **TEXT BOOKS**

1. Atkins P., "Physical Chemistry", 6th Edition, W.H. Freeman and Company, 1997.
2. Puri B.H. and Sharma L.R., "Principles of Physical Chemistry ", S.Nagin Chand & Company, 1994.

### **REFERENCES**

1. Mortimer R.G., "Physical Chemistry", 2nd Edition, Academic press, 2000.
2. Bahl B.S., Tuli.G.D. and Arun Bahl., "Essentials of Physical Chemistry", S.Chand & Company Ltd., 1998.

## HS1201 – ENVIRONMENTAL SCIENCE AND ENGINEERING

**L T P**  
**4 0 0**

### **UNIT I IMPORTANCE OF ENVIRONMENTAL STUDIES 12**

Scope and Importance – Need for Public Awareness – Forest resources – Water resources – Mineral resources – Land resources – Energy resources – Food resources – Equitable use of resources for sustainable lifestyles.

### **UNIT II ECOSYSTEMS AND BIODIVERSITY 12**

Concept of ecosystem – Structure and function of an ecosystem – Energy flow in the ecosystem – Food chains – Food webs – Ecological Pyramids – Definition of Biodiversity – Biogeographical classification in India – Value of biodiversity – Biodiversity at Global – National and local levels – India as a mega diversity nation – Hot spots of biodiversity – Threats to biodiversity – Conservation of biodiversity.

### **UNIT III ENVIRONMENTAL POLLUTION 12**

Causes and effects of environmental pollution – Air pollution – Water pollution – Soil pollution – Marine pollution – Noise pollution – Thermal pollution – Nuclear hazards – Solid waste management – Societal role in pollution prevention – Environmental disasters and management.

### **UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 12**

Unsustainable to sustainable development – Concept of conservation – Water and energy conservation – Rain water harvesting – Climate change – Global warming – Acid rain – Ozone layer depletion – Nuclear accidents and holocaust – Environmental protection Act – Issues involved in Enforcement of Environmental legislation – Public awareness.

### **UNIT V HUMAN POPULATION AND THE ENVIRONMENT 12**

Population growth – Population explosion – Family welfare programme – Environment and human health – Human rights – Value education – HIV / AIDS – Women and child welfare – Role of IT in Environment and human health.

**L: 60 Total: 60**

### **TEXT BOOKS**

1. Venugopala Rao P., “Principles of Environmental Science and Engineering”, Prentice Hall of India (P) Ltd., 2006.
2. Masters G.M., “Introduction to Environmental Engineering and Science”, 3rd Edition, Prentice Inc., 2007.

### **REFERENCES**

1. Davis M.L. and Masten S.J., “Principles of Environmental Engineering and Science”, McGraw-Hill, 2004.
2. Bharucha E., “Text book of Environmental Studies”, Universities Press, 2005.
3. Trivedi R.K., “Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards”, Vol-I & II, Enviro Media, 1996.

## TT1251 – POLYMER CHEMISTRY

**L T P**  
**3 1 0**

### **UNIT I BASIC CONCEPTS OF POLYMER SCIENCE 9**

Monomer – Nomenclature – Functionality – Tacticity – Degree of polymerization – Polymer classification based on source and applications – Raw materials – Source and their derivatives.

### **UNIT II SYNTHESIS OF POLYMERS 9**

Types of polymerization – Mechanism – Addition – Condensation and coordination polymerization – Methods of polymerisation – Bulk, solution – Emulsion and suspension.

### **UNIT III CHARACTERIZATION OF POLYMERS 9**

Average molecular weight – Property of polymers – Structure of polymers – Effect of molecular structure on properties – Crystallinity – Orientation – Glass transition temperature and melting behavior – Solubility of polymers – Mechanical – Optical – Thermal – Electrical – Chemical and weather resistant characteristics of polymers.

### **UNIT IV POLYMERIC MATERIALS 9**

Plastics – Classification – Moulding constitutes – Thermoplastic resins – Polyethylene – Polypropylene – Polystyrene – Polycarbonate – PVC – Teflon – Nylon – Polyacrylonitrile – Polyurethanes – Polyester – Polyamide – Conducting polymer – Biomaterials.

### **UNIT V RUBBERS 9**

Natural rubber – Vulcanization – Synthetic rubbers – Types of synthetic rubbers – Compounding – reclaimed – Reinforced rubber.

**L: 45 T: 15 Total: 60**

### **TEXT BOOKS**

1. Billmeyer F.W., "Text Book of Polymer Science", 3rd Edition, John Wiley & Sons, 1984.
2. Joel R.Fried., "Polymer Science and Technology", 2nd Edition, Prentice Hall, 2003.

### **REFERENCES**

1. Seymour, R.B., "Engineering Polymer Source Book", McGraw-Hill, 1990.
2. Blackly D.C., "High Polymer Lattices: Their Science and Technology", Vol-I, Applied Science Publishers Ltd., 1966.
3. Skothen., "Handbook of Conducting Polymers", Vol-I&II, 2nd Edition, Marcel Dekker Inc., 1998.

## TT1252 – MAN-MADE FIBRE PRODUCTION

**L T P**  
**3 1 0**

### **UNIT I INTRODUCTION 9**

An introduction on man-made fibres and its manufacture – Global production trends – Application of man-made fibres.

### **UNIT II POLYMER MANUFACTURE 9**

Introduction on fundamentals of polymer chemistry – Production of viscose – Polyester – Nylon 6 – Nylon 6.6 – Polyacrylonitrile and polypropylene polymers.

### **UNIT III PRODUCTION OF MELT SPUN FILAMENT YARNS 9**

Fluid flow and melt spinning – Manufacture of PET – Polyester – Nylon 6 and polypropylene filament yarns.

### **UNIT IV PRODUCTION OF WET AND DRY SPUN FILAMENT YARNS 9**

Manufacture of viscose Rayon – Wet and dry spinning of polyacrylonitrile filament yarns.

### **UNIT V POST SPINNING PROCESS 9**

Spin finishes – Drawing and heat setting – Texturisation – False twist texturing – Staple fibre production – Tow to top converters.

**L: 45 T: 15 Total: 60**

### **TEXT BOOKS**

1. Vaidya, A. A., "Production of Synthetic Fibres", Prentice Hall of India (P) Ltd., 1988.
2. Gupta V.B. and Kothari K.K., "Man-Made Fibres Production, Processing, structure, properties and applications", Vol-I&II, Department of Textile Technology, IIT, 1988.

### **REFERENCES**

1. Gupta V.B. and Kothari V.K., "Manufacture of Fibre Technology", Chapman and Hall, 1997.
2. Lewin M. and Pearce E.M., "Handbook of Fibre Science and Technology, Vol-IV Fibres Chemistry", Marcel Dekker Inc., 1985.
3. Mark, H.F., Atlas S.M. and Certia. E.D., "Man-Made Fibres-Science and Technology", Vol-I to III, Inter science Publishers, 1987.

## TT1253 – SPUN YARN TECHNOLOGY

**L T P**  
**3 1 0**

### **UNIT I GINNING & BLOWROOM MACHINES 9**

Description and working of different types of gins – Selection of right type of gins – Ginning performance on yarn quality – Objects – Principle and description of opening – Cleaning and blending machines used in blowroom – Chute feed.

### **UNIT II CARD 9**

Objects and principle of carding – Detailed study of flat card – Card clothing – Drives and production calculation.

### **UNIT III DRAWFRAME AND COMBER 9**

Tasks of draw frame – Drafting systems used in modern draw frames – Draft and production calculation – Comber preparation – Objects and principles of combing – Sequence of combing operation – Combing efficiency and production calculation.

### **UNIT IV SPEEDFRAME 9**

Objects of speed frame – Working of speedframe – Bobbin builder mechanism – Draft – Twist and production calculations.

### **UNIT V YARN SPINNING AND YARN TWO-FOLDING 9**

Principle of yarn production in ring – Rotor – Friction and air-jet spinning machines – Working of ringframe – Cop building – Design features of important elements used in ring spinning – Draft – Twist and production calculations in ringframe – Merits of two-folding of yarns – Methods followed for two-folding – Selection of twist level for two-folding – Calculation of resultant count of two-folded yarns.

**L: 45 T: 15 Total: 60**

### **TEXT BOOKS**

1. Oxtoby E., "Spun Yarn Technology", Butterworth-Heinmann, 1987.
2. Doraiswamy.I., Chellamani.P. and Pavendhan. A., "Cotton Ginning, Textile Progress", The Textile Institute, Manchester, 1993.

### **REFERENCES**

1. Lord P.R., "Handbook of Yarn production: Science, Technology and Economics", The Textile Institute, Woodhead Publishing Ltd., 2003.
2. Klein W., "New Spinning Systems", The Textile Institute, Manchester, 1993.
3. Iredale J., "Yarn Preparation: A Handbook", Intermediate Technology, 1992.

## CH1253 – PHYSICAL CHEMISTRY LABORATORY

**L T P**  
**0 0 3**

1. Molecular weight determination of Polymer by using
  - a. Rast's Method
  - b. Viscometer
2. Partition Coefficient Studies
3. For Benzene – Water system
4. Phase rule Studies
5. Simple Eutectic system
6. Conductivity Studies
  - a. Precipitation Titration
  - b. Mixtures of acid – Strong Base Titration
7. EMF Studies
8. Estimation of Fe<sup>2+</sup> by Potentiometric Titration
9. Kinetic Studies
  - a. Kinetic studies of Persulphate – Iodide reaction
  - b. Kinetic studies of Iodination of Acetone.
  - c. Determination of Rate constant of Acid catalyst hydrolysis of an Ester.
10. Polarimetry Studies
11. Kinetic study of Inversion of Cane Sugar.
12. Adsorption Studies - Freundlich Adsorption Isotherm
13. Determination of Transition Temperature.
14. Determination of Critical solution temperature for the Phenol Water system.

**Total: 45**

## HS1251 – ENVIRONMENTAL ENGINEERING LABORATORY

**L T P**  
**0 0 3**

1. Sampling and preservation methods and significance of characterization of Water and Wastewater.
2. Determination of
  - a. P<sup>H</sup> and Turbidity
  - b. Hardness
3. Determination of Iron & Fluoride
4. Determination of residual Chlorine
5. Determination of Chlorides
6. Determination of Ammonia / Nitrogen
7. Determination of Sulphate
8. Determination of Optimum Coagulant Dosage
9. Determination of available Chlorine in Bleaching powder
10. Determination of dissolved Oxygen
11. Determination of suspended, volatile and fixed Solids
12. B.O.D test
13. C.O.D test
14. Introduction to Bacteriological Analysis (Demonstration only)

**Total: 45**

## TT1254 – POLYMER TESTING AND ANALYSIS LABORATORY

L	T	P
0	0	3

1. Synthesis of simple fibre forming polymers.
2. Determination of density of textile fibres.
3. Estimation of molecular weight.
4. Thermal characteristics.
5. Solubility.
6. Morphological structure.
7. Evaluation of Spin finishes on commercial fibres.
8. Determination of chemical constitution of fibres.
9. Demonstrations of X-ray crystallography, scanning electron microscope, tunneling electron microscope, infrared analysis, nuclear magnetic resonance.

**Total: 45**

## SEMESTER V

### MA1302 – SPECIAL FUNCTIONS

L	T	P
3	1	0

#### UNIT I IMPROPER INTEGRALS AND SERIES SOLUTIONS 9

Improper integrals-Gamma and Beta functions, Series solutions-Ordinary point, regular singular point of second order linear ordinary differential equation, series solution to a second order linear ordinary differential equation about an ordinary point and a regular singular point.

#### UNIT II BESSEL FUNCTIONS 9

Bessel's equation, Bessel functions, Recurrence relations, Orthogonality property, Generating function, Equations reducible to Bessel's equation, Modified Bessel functions.

#### UNIT III LEGENDRE POLYNOMIALS 9

Legendre's equation, Legendre Polynomials, Rodrigue's formula generating function, recurrence relations, orthogonality property,

#### UNIT IV HERMITE AND LAGUERRE POLYNOMIALS 9

Hermite and Laguerre equations and their solutions-Polynomials, Rodrigue's formula, generating functions, recurrence relations, orthogonality property.

#### UNIT V BOUNDARY VALUE PROBLEMS. 9

Solution of Boundary Value Problems involving Bessel functions & Legendre polynomials

**L: 45 T: 15 Total: 60**

#### TEXT BOOKS

1. Andrews, L.A., "Special Function for Scientist and Engineers", McGraw-Hill, 1992.
2. Narayanan, S. Manicavachagam Pillay and Ramanaiah.G, "Advanced Mathematics for Engineering Students", Vol. II, S.Viswanathan Printers Private Limited, 1985.

#### REFERENCES

1. Grewal, B.S., "Higher Engineering Mathematics", Khanna Publishers, 2005.
2. Jain, R.K. and Iyengar, S.R.K. Advanced Engineering Mathematics, Narosa Publishing House, 2002.

## ME1309 – ENGINEERING THERMODYNAMICS

L T P  
4 0 0

### UNIT I FUNDAMENTAL CONCEPTS AND FIRST LAW OF THERMODYNAMICS 12

Scope of thermodynamics – Basic concepts – Thermodynamic System – State and equilibrium – Process and cycles – Temperature and Zeroth law of Thermodynamics – Properties of pure substances – First law of Thermodynamics – First Law Analysis of Closed systems and control volumes and its application.

### UNIT II ENTROPY AND THE SECOND LAW OF THERMODYNAMICS 12

The Clausius inequality – Entropy – Causes of entropy change – Entropy change of pure substances – Thermal Energy reservoirs – Heat Engines – Perpetual Motion Machines – Reversible and irreversible processes – The Carnot cycle and principles – The Carnot Heat engine – The Second law Efficiency – Second law analysis of open and closed systems.

### UNIT III REFRIGERATION, VAPOR & COMBINED POWER CYCLES 12

Refrigerators and Heat pumps – The Carnot refrigerator and heat pumps – The reversed Carnot cycle – Ideal and Actual vapor compression Refrigeration cycle – Selection of right refrigerants – Heat pumps – Absorption refrigerator system – The Carnot vapor cycle – Rankine cycle – Cogeneration – Second law analysis of vapor power cycles.

### UNIT IV PVT RELATIONS AND THERMODYNAMIC RELATIONS 12

PVT relations for gases and liquids – equations of state, Cubic equations of state-Thermodynamic properties from equations of state, Compressibility factor, Generalised properties of fluids-Law of corresponding state, acentric factor, gas mixtures.

Thermodynamic relations – Maxwell's relations – Estimation of thermodynamic properties– Thermodynamic properties of homogeneous mixtures – Partial molar properties, Fugacity and fugacity coefficients – Lewis and Randall rule – Property changes of mixing, activity – Excess properties, activity coefficients.

### UNIT V PHASE EQUILIBRIA AND CHEMICAL REACTION EQUILIBRIA 12

Phase equilibria – Pure component and mixtures – Van Laar, Margules equation, Group contribution method – Gibb's Duhem equation – Consistency tests – Partially miscible and immiscible systems – Azeotropes – Retrograde condensation – Thermodynamic diagrams.

Chemical equilibria – Heat effects, industrial reactions – Free energy calculations – Homogeneous and heterogeneous reactions – Equilibrium composition.

**Total: 60**

### TEXT BOOKS

1. Smith, J.M. and Van Ness, "Introduction to Engineering Thermodynamics", Edition 5, McGraw Hill, 1996.
2. Narayanan, K.V., "A Text Book of Chemical Engineering Thermodynamics", Prentice Hall of India, 2002.
3. Rao, Y.V.C., "Chemical Engineering Thermodynamics", Universities Press, 1997.

### REFERENCES

1. Hougen and Watson, "Chemical Process Principles" Vol. II, CBS Publishers, 2002.
2. Kyle, "Chemical and Process Thermodynamics", Edition 2, Prentice Hall of India, 2000.

## TT1301 – PREPARATORY PROCESS OF CHEMICAL PROCESSING

L	T	P
4	0	0

### UNIT I SINGEING AND DESIZING 12

Wet process sequences for cotton, wool, silk, blended fabrics: Singeing -Yarn singeing machines. Gas singeing machine for woven and tubular knits - Classification of desizing methods-Hydrolytic methods and oxidative methods - Enzymatic desizing - Scouring – Kier boiling - Saponification, Emulsification. Detergency-Lime boil Vs soda boil –Types of Kier-Wool carbonizing- Degumming of silk.

### UNIT II BLEACHING AND MERCERISATION 12

Bleaching of cotton: Hypochlorite-Hydrogen Peroxide-Sodium chlorite. Batchwise, Semi-continuous and Continuous processes. continuous scouring and bleaching machines, washing ranges, hydro extractors. Bleaching of viscose/linen, cotton/viscose, and polyester/cotton blends. Mercerisation: Theory of Processes – Methods-Chemicals-Effects. Yarn mercerizer, Chain and Chainless Mercerisers, Circular mercerizing machine. Liquid ammonia treatment-Equipments-Kier-J box-Pad roll, Mangles, Jigger, Winch, Jet and Softflow machines, Dryers, Stenter and Stretching devices.

### UNIT III DYEING 12

Dyeing: Introduction to dyeing of natural and synthetic fibres, fabrics and blends with various dye classes. Recent developments in dyeing of natural fibres, synthetic fibres and their blends. Problems in dyeing and their solutions. Eco-friendly chemicals and banned dyes.

### UNIT IV PROCESSING MACHINES 12

Mechanical and economic aspects of fibre, yarn, and fabric Scouring, bleaching and dyeing machines for woven and knits. Loose stock, bale, hank, package, Jigger, Winch, HT beam, Jet, Padding mangles and garment dyeing machines.

### UNIT V TESTING 12

Colour Measurement: Application of Computer Colour Matching system to evaluate strength of dye, shade matching, whiteness / yellowness index. Fastness properties of dyed products.

**Total: 60**

### TEXT BOOKS

1. Trotman, E.R., “Dyeing and Chemical Technology of Textile Fibres”, Charles Griffin and Co. Ltd., London. 1990.
2. Shenai, V.A., “Technology of Bleaching and Mercerizing - Vol. III”, Sevak Publications Chennai, 1991.

### REFERENCES

1. Shenai, V.A., “Fundamentals of Principles of Textile Wet Processing”,
2. Marsh J.T., “Mercerizing”, Chapman and Hall Ltd., London, 1041.
3. Bhagwat R.S “Handbook of Textile Processing”, Colour Publication, Mumbai, 1999
4. Shenai, V.A., “Principle and Practice of Dyeing”, Sevak Publisher, Bombay.
5. T.L.Vigo, “Textile Processing and Properties”, Elsevier, New York, 1994.



## **UNIT V      ELECTRICAL AND THERMAL PROPERTIES**

**12**

Definition of electrical resistance, electrical resistance of fibres, measurement of resistance in fibres, factors influencing electrical resistance. Dielectric properties, factors influencing dielectricity. Static electricity – generation of static charge and measurement, problems encountered during processing, elimination techniques. Thermal properties – specific heat, thermal conductivity, thermal expansion and contraction, structural changes in fibres on heating, thermal transitions – glass transition and melting, heat setting. Flammability characteristics of fibres.

**Total: 60**

### **TEXT BOOKS**

1. Morton W.E and Hearle, J.W.S., “Physical Properties of Textile Fibres”, The Textile Institute, Manchester, U.K., 1993.
2. Meredith. R and Hearle, J.W.S., “Physical Methods of Investigation of Textiles”, Wiley Publication, New York, 1989.

### **REFERENCES**

1. Gupta V.B. Textile Fibres: Developments and Innovations. Vol. 2, Progress in Textiles: Science & Technology. Edited by V.K. Kothari, IAFL Publications, 2000.
2. Meredith R., “Mechanical Properties of Textile Fibres”, North Holland, Amsterdam 1986.
3. Murthy, H.V. S., Introduction to Textile Fibres, The Textile Association, India, 1987.
4. Mishra, S.P., Fibre Science & Technology, New Age International Publishers, 2000.

## TT1303 – PREPARATORY PROCESS OF WEAVING OPERATIONS

L	T	P
4	0	0

### UNIT I BASICS OF WINDING 12

Classification of winders – Characteristics of parallel winding cross winding and precision winding. Types and working principles of yarn clearers, knotters and splicers – Classification of yarn faults - Types of tensioners, guides- cop unwinding characteristics – stop motions – cone defects, causes and rectification.

### UNIT II WINDING 12

Features of automatic cheese and cone winders – winding of synthetic yarns, blended yarns and sewing threads – package quality for dyeing – productivity calculations of winding machine. Types and working principle of pirn winding machines – bunching, stop motions – features of automatic pirn winding machine – production and efficiency calculation – process control in pirn winding – pirn defects – causes and remedies.

### UNIT III WARPING 12

Beam warping machines – types – creels – stop motion – brakes – length measuring motion – features of modern warping machines - sectional warping machine – creel – lease reed-stop motion – end breaks in warping – quality control – beam defects – causes – remedies.

### UNIT IV SIZING 12

Types and selection of ingredients for sizing. Size preparation and storage equipments – sizing machines – multi-cylinder & hot air – marking and measuring motion – control systems in sizing machines – mechanism of cylinder drying, beam pressing devices – mechanical, pneumatic, hydraulic.

### UNIT V DEVELOPMENTS IN SIZING & DRAWING-IN 12

Single end sizing machines –sizing of blended & filament yarns – process control in sizing – sizing faults – causes & remedies – modern development in sizing, Efficiency and production calculations. Need for drawing-in operation, working principles of manual, semiautomatic and automatic drawing in machines – knotting, pinning machines.

**Total: 60**

### TEXT BOOKS

1. Ajgaonkar D.B., Talukdar M.K. and Wedekar, Sizing: Material Methods and Machineries, Mahajan Publications Ahmedabad, 1999.
2. Lord P.R. and Mohammed M.H., Weaving – Conversion of Yarn to Fabric, Merrow Publication, 1992.

### REFERENCES

1. Modi J.R.D., Sizing Ingredient, Mahajan Publications, Ahmedabad
2. Booth J.E., Textile Mathematics, Vol. II & III, Textile Institute, Manchester, U.K., 1975.
3. Ormerod A., Modern Preparation and Weaving, Merrow Publication Co. U.K. 1988.
4. Sengupta E., Yarn Preparation, Vol. I & II, Popular Prakasam, Bombay, 1970.
5. Talukdar M.K., “An Introduction to Winding and Warping” Testing Trade Press, Mumbai.

## TT1304 – PROCESS AND QUALITY CONTROL IN SPINNING

L	T	P
4	0	0

### UNIT I PROCESS CONTROL CONCEPT AND STATISTICAL APPLICATION 12

Scope of process control in spinning - Identification of process variables and product characteristics to control process in the blow room, card, draw frame, comber, speed frame and yarn spinning - Concepts of developing norms and standards for spinning process. Application of statistical techniques in process and quality control.

### UNIT II CONTROL OF RAW MATERIAL QUALITY 12

Quality control of mixing quality through fibre quality characteristics - Concept of fibre quality index and its application – Prediction of spinnability and yarn quality - Blending irregularity. Causes of nep generation – nep removal in carding and combing machines. Online monitoring and control of neps on modern cards.

### UNIT III CONTROL OF YARN REALIZATION AND WASTE 12

Estimation of yarn realisation – Determination of trash content and cleaning efficiency in blow room and carding – Determination of comber noil and combing efficiency - Control of waste in blowroom, carding and comber - Control of hard waste.

### UNIT IV YARN QUALITY CONTROL 12

Assessment of within and between bobbin count variations, Assessment and control of count variations in preparatory machines and ringframe –Assessment of yarn unevenness and imperfections - causes for unevenness and imperfections - unevenness caused by random fibre arrangement – Drafting waves – Periodic variation. Yarn faults – classification – assessment of faults – causes and methods to reduce faults. Causes for variability in strength, elongation and hairiness and measures for their control.

### UNIT V PRODUCTION CONTROL 12

Factors affecting the productivity in ring spinning. Productivity indices. Methods for maximizing production in spinning machinery – New concepts. Effect of Machinery maintenance and Humidity on production. Causes for end breaks in spinning, Measures to control end breaks, Snap study.

**Total: 60**

### TEXT BOOKS

1. Garde. A. R. & Subramaniam T. A., Process Control in Spinning, ATIRA, Ahmedabad 1989.
2. Ratnam T.V. & Chellamani. K. P., Quality Control in Spinning, SITRA Coimbatore 1999.

### REFERENCES

1. Chattopadhyay R., “Advances in Technology of Yarn Production”, NCUTE Publication, New Delhi, 2002.
2. Van der Sluiji M and Hunter L., “Neps in Cotton Lint”, Textile Progress, The Textile Institute, Manchester, U.K., 1999.
3. Klein W., “Man-made Fibre and their Processing”, The Textile Institute, Manchester, U.K. 1994.
4. Slater K., “Yarn Evenness”, Textile Progress, The Textile Institute, Manchester, U.K., 1986

## TT1305 – PREPARATORY PROCESS OF CHEMICAL PROCESSING LABORATORY

L	T	P
0	0	3

1. Desizing of cotton fabrics
2. Scouring of cotton
3. Scouring of wool
4. Cotton bleaching with bleaching powder
5. Cotton bleaching with hydrogen peroxide
6. Wool bleaching with hydrogen peroxide
7. Cotton mercerization
8. Degumming of silk
9. Identification of class of dyes
10. Wash fastness properties of dyed/ printed samples

**Total: 45**

## TT1306 – PROCESS AND QUALITY CONTROL IN SPINNING LABORATORY

L	T	P
0	0	3

1. Studies on determination of cylinder load and transfer efficiency in carding
2. Studies on influence of process variables on ring-spun yarn quality
3. Studies on productivity improvement in ring spinning
4. Studies on influence of process variables on rotor-spun yarn quality
5. Studies on productivity improvement in rotor spinning
6. Studies on influence of process variables on siro-spun and siro-fil yarns
7. Studies on production of mélange yarns
8. Studies of production of core-spun yarns
9. Studies on influence of process important variables on air-jet-spun yarn quality
10. Studies on influence of important process variables on friction-spun yarn quality

**Total: 45**

## HS1301 – COMMUNICATION AND SOFT SKILLS LABORATORY

L T P  
0 0 3

(Common to All Branches of III Year B.E./ B.Tech students of Anna University Tiruchirappalli and affiliated colleges)

The aim of the course is two-fold: to enable the students to develop communication skills in the language laboratory and to arrange discussions for developing soft skills in the lab and/or the classroom. Each lab session shall last for three periods.

### List of activities that are to be carried out:

15 sessions x 3 periods = 45

Lab session # 1: Listening and speaking practice exercises with communicative functions. Learning material: the ACD of Spoken English: A Foundation Course for Speakers of Indian Languages (Orient Longman, 2008)

Lab session # 2: Practice with more advanced communicative functions. Learning material: the ACD of Spoken English: A Foundation Course for Speakers of Indian Languages (Orient Longman, 2008)

Lab session # 3: Pronunciation exercises with Oxford Advanced Learners' Dictionary of Current English or any other standard Dictionary

Lab session # 4: Making an oral presentation in English. Learning Material: Professional Presentations VCD (Cambridge University Press)

Lab session # 5: Listening to telephone conversations in English and completing the tasks. Learning material: Essential Telephoning in English ACD (Cambridge University Press)

Lab session # 6: Giving an exposure to and practice with model group discussion and interviews. Learning material: How to Prepare for Group Discussion and Interview Audio Cassette (McGraw-Hill)

Lab session # 7: Giving insights into the format and the task types in the IELTS (International English Language Testing System). Learning Material: Objective IELTS, Intermediate Level (CUP)

Lab session # 8: Understanding the format and the task types in the TOEFL (Test of English as a Foreign Language). Learning Material: Understanding the TOEFL (Educational Testing Services, Princeton)

Lab session # 9: Administering the BEC (Business English Certificate) Diagnostic Test. Learning Material: BEC Practice Materials (British Council, Chennai)

Lab session # 10: Completing the steps involved in Career, Life Planning and Change Management. Learning Material: Developing Soft Skills (Pearson Education)

Lab session # 11: Setting goals and objectives exercises. Learning Material: Developing Soft Skills (Pearson Education)

Lab session # 12: Prioritizing and time planning exercises. Learning Material: Managing Time Multimedia Program CD

Lab session # 13: Taking a Personality Typing/ Psychometric Test Learning Material: 200 Psychometric Test prepared by the CUIC, Anna University Chennai

Lab session # 14: Critical and creative thinking exercises.

Lab session # 15: Improving body language and cross-cultural communication with pictures.

Learning material: Body Language (S. Chand and Co.)

For a detailed plan, refer to the topics given below;

## **UNIT I LISTENING AND SPEAKING PRACTICE IN COMMUNICATIVE FUNCTIONS**

Introductions and meetings – Talking about studies and/ or job – Expressing likes and dislikes – Describing daily routines and current activities – Talking about past states and events – Talking about future plans and intentions – Expressing preferences – Giving reasons – Expressing opinions, agreement and disagreement – Seeking and giving advice – Making suggestions

## **UNIT II SPEAKING APPLICATIONS**

Making an oral presentation – Preparing the presentation – Performing the presentation – Beginning – Language – Visual aids and body language – Voice – Ending – Questions – Telephone conversations – Group Discussion and Interview

## **UNIT III UNDERSTANDING AND PREPARING FOR INTERNATIONAL ENGLISH LANGUAGE EXAMINATIONS**

Graded Examinations in Spoken English (GESE) – Spoken English for Work (SEW) – International English Language Testing System (IELTS) – Test of English as a Foreign Language (TOEFL) – Business English Certificate (BEC)

## **UNIT IV SOFT SKILLS (1)**

Preparing for and dealing with change – Motivation, goal-setting and self-esteem – Managing time and stress – Career and life planning – Team work – Leadership traits

## **UNIT V SOFT SKILLS (2)**

Multiple Intelligences – Learning Styles and Personality typing – Critical and creative thinking – People, cultures and self – Intercultural Communication

## **RESOURCES**

1. Kamalesh Sadanand and Susheela Punitha, “**Spoken English: A Foundation Course**” for Speakers of Indian Languages, Part 2 Audio CD, Hyderabad: Orient Longman, 2008
2. Malcome Goodale, “**Professional Presentations**”, (VCD) New Delhi: Cambridge University Press, 2005
3. Barbara Garside and Tony Garside, **Essential Telephoning in English** (Audio CD), Cambridge: Cambridge University Press, 2002
4. Hari Mohan Prasad and Rajnish Mohan, **How to Prepare for Group Discussion and Interview** (Audio Cassette) Tata McGraw-Hill Publishing
5. **Graded Examinations in Spoken English** and **Spoken English for Work** downloadable materials from Trinity College, London
6. **International English Language Testing System** Practice Tests, CUP
7. **Business English Certificate** Materials, Cambridge University Press
8. **Personality Development** (CD-ROM), Times Multimedia, Mumbai
9. Interactive Multimedia Programs on **Managing Time and Stress**
10. Robert M. Sherfield and et al “**Developing Soft Skills**” 4th edition, New Delhi: Pearson Education, 2009.

**Total: 45**



## TT1351 – CHEMICAL PROCESSING OF TEXTILE MATERIALS

**L T P**  
**3 1 0**

### **UNIT I PRINTING 9**

Methods and styles of printing – Direct, discharge, resist, printing machines, essential ingredients of printing paste – Printing with direct, reactive, acid, disperse vat dyes and pigments – Fixation and after-treatment processes – Recent developments in printing.

### **UNIT II FINISHING 9**

Introduction – Finishing-objects-mechanical and chemical finishing, durable and Temporary finishes on cotton fabrics, back filling, starch calendaring, swissing, chasing, friction, schreiner, embossing – Anti shrink finish – Principles of shrinkage, compressive, relaxed shrinkage – Compacting, creping, softening, crease proofing, felting, non-felting – Enzymes in finishing.

### **UNIT III SPECIAL FINISHES 9**

Crease resist finish – Cross linking agents – Nitrogenous and non nitrogenous resins – Properties and uses – Wash-n-wear, durable press finish – Water proof and repellent finishes for cotton and synthetics – Flame resistance finishes for cellulose and blends – Antimicrobial finishes – Insect-resist finishes – Softeners

Finishing of knits – Garment processing – Value added finishing of garments.

### **UNIT IV EFFLUENT TREATMENT 9**

Textile effluent – Textile waste characteristics – Textile waste water problems – Chemicals used in Textile industry – Treatment of textile effluents – Techniques for effluent treatment – Chlorine trioxide treatment, ozone treatments, reverse osmosis, enzymatic decolourisation – Concepts of ISO 14000.

### **UNIT V WASTE CONTROL 9**

Waste minimisation and its opportunities – Need for waste minimisation – Chemical and auxiliaries conservation – Water conservation – Energy conservation – Pollution control – Workers awareness – Export market requirements – Waste minimisation potential.

**L: 45 T: 15 Total: 60**

### **TEXT BOOKS**

1. Shenai, V.A., “Technology of Textile Finishing”, Sevak Publications, 1995
2. Shenai, V.A., “Technology of Printing”, Sevak Publications, 1996.

### **REFERENCES**

1. Miles, L.W.C., “Textile Printing”, Dyers Company of Publications Trust, 1981.
2. Marsh, J.T., “An Introduction to Textile Finishing”, Chapman and Hall Ltd., 1979.
3. Padmavankar, “Textile Effluent”, NCUTE, IIT Delhi Publication, 2002.
4. Anonymous, “From waste to Profits - Technical Manual Series III”, National Productivity Council, 1998.

## TT1352 – QUALITY ASSESSMENT OF TEXTILES

**L T P**  
**3 1 0**

### **UNIT I INTRODUCTION 9**

Definition of quality – Product based, user based, manufacturing based, value based – Types of quality – Quality of design, quality of conformance, quality of performance – Quality control and quality assurance – Factors influencing quality – Reasons for quality evaluation – Terms used in sampling – Fibre sampling from bulk, combed slivers, rovings and yarn – Yarn sampling – Fabric sampling.

### **UNIT II STATISTICAL EVALUATION 9**

Measures of central tendency and dispersion – Determination of number of tests – Types of error – Sources of error – Design of experiments – Factorial designs – Response surface designs – Taguchi designs – Repeatability – Reproducibility.

### **UNIT III FIBRE QUALITY EVALUATION 9**

Measurement of fibre fineness and its importance – Measurement of fibre length and its uniformity – Principles of various fibre testing instruments – High volume instrument – Advanced fibre information system – Principles of measurement of single fibre fineness, strength and crimp characteristics of man-made fibres – Lenzing technik's vibroscope, vibrodyn, vibrojet, vibrotex – Principle of fibre strength measurement by stelometer – Determination of moisture content and regain in fibres – Innovations in fibre quality evaluation.

### **UNIT IV YARN QUALITY EVALUATION 9**

Linear density, twist, evenness, hairiness, bulk, friction and abrasion – Tensile properties of yarn – Tensile testing of yarn at high speeds – Uster tensojet, lenzing speedy, texttechno's statimat – Influence of test speed, specimen length, humidity and temperature on yarn tensile characteristics – Classification of yarn imperfections and faults – Yarn appearance assessment – ASTM yarn grades – Electronic Inspection Board – Latest developments in yarn testing instruments.

### **UNIT V FABRIC QUALITY EVALUATION 9**

Tensile strength – Tear strength – Bursting strength – Dimensional stability – Serviceability – Air permeability – Water repellency – Abrasion resistance and pilling – Colour fastness – Comfort – Objective evaluation of fabric handle – Advances in fabric quality evaluation.

**L: 45 T: 15 Total: 60**

### **TEXT BOOKS**

1. Kothari, V. K., "Testing and Quality Management", Vol.1, IAFL Publications, 1999.
2. Saville, B. P. "Physical Testing of Textiles", Woodhead Publishing Ltd., 1999.

### **REFERENCES**

1. Booth, J.E., "Textile Testing", Butterworth Heinemann Ltd., 1996.
2. Basu, "Textile Testing; Fibre, Yarn and Fabric", SITRA, 2001.
3. Box, G.E.P., Hunter, W.G. and Hunter, J.S., "Statistics for Experimenters", John Wiley and Sons, Inc., 1978.

**UNIT I RING SPINNING****12**

Principle of ring spinning – Detailed study of modern ring frame creel – Suspension type of bobbin holder – Drafting system – Angle of roller stand, fluted rollers, types of flutes-cots, aprons and their specifications – Types of top roller loading systems – Spring loading, pneumatic loading – Functions of yarn guide, balloon control ring, separators, rings and travelers, symmetric and asymmetric rings – Ring / traveller interaction and profile matching – Antiwedge ring and elliptical traveller, orbit ring / traveller, zenith ring / traveler – Spindles – Spindle size, spindle drives – Traveller lag – Traveller burning and control – Cop building, ring rail movements, builder motion, doffing procedure – Process parameters – speeds, settings, draft, production particulars for cotton, synthetics and blends. Condensed yarn spinning – Principle of compacting drafted fibre strand – Different methods of condensed yarn manufacture – Condensed yarn properties vis-à-vis conventional ring-spun yarn properties – Benefits and limitations of condensed yarn spinning.

**UNIT II ROTOR SPINNING****12**

Principle of open end rotor spinning – Mechanism of yarn formation – Fibre individualization, fibre assembling, integration of fibres into open end of yarn, twist insertion, yarn withdrawal – Yarn structure – Fibre orientation and extent, fibre migration, twist structure, packing of fibres in yarn – Raw material specification and fibre characteristics for optimum performance and yarn quality – Process parameters influencing spinning performance and yarn quality, opening roller speed and wire profile, rotor diameter, rotor speed, groove design, profile of doffing tube – Yarn characteristics – Strength and extension, unevenness and imperfections, hairiness, flexural rigidity, abrasion resistance – Latest developments in rotor spinning – Economic benefits – Technological and economic limitations for production of finer yarns – End uses of rotor-spun yarns.

**UNIT III FRICTION SPINNING****12**

Introduction – Principle of operation – History of machine developments – PSL Masterspinner, DREF-1 Friction Spinner, DREF-2 friction spinner, DREF-3 Friction Spinner, DREF-5 friction spinner, DREF-2000 Friction Spinner, DREF-3000 Friction Spinner – Yarn formation process – Fibre feed, fibre assembly, twist insertion, yarn withdrawal – Yarn structure – Structure of open end friction spun yarn, structure of core-sheath type (DREF-3) friction spun yarn – Raw material requirement and fibre characteristics for friction spinning – Influence of process parameters – Spinning drums' speed, yarn withdrawal rate, friction ratio, suction air pressure, core-sheath ratio, factors influencing fibre slip and twisting efficiency – Applications fields for open-end and core-sheath type friction-spun yarns – Merits and demerits of friction spinning – Latest developments in friction spinning.

**UNIT IV AIR-JET SPINNING****12**

Introduction to false twisting – Basic principles and methods of fasciated yarn manufacture – Dupont's rotofil process – Toray air-jet spinning process – Murata jet spinning – Murata vortex spinning – Importance of fibre characteristics for optimum spinning performance and yarn quality – Classification of fasciated yarn structure – Yarn properties – Yarn quality in relation to various process parameters – air pressure, draft, delivery rate, ribbon width, feed ratio, developments in air-jet spinning – 5-line high drafting system, murata twin spinning, murata roller jet spinning, murata vortex spinning – MVS 851, MVS 861 – Applications of air-jet spun yarns.

Wrap spinning – Principle of operation – Yarn structure and properties– Spinning limits – Applications of yarns – Double-rove spinning – Operating principle – Process monitor – Effect of strand spacing on spinning performance and yarn quality, process limitation, Introduction to solo-spun technology – difference between siro spinning and solo spinning– End uses of siro-spun and solo-spun yarns – Core yarn spinning – Basic principle and requirements of core yarn spinning– Different methods of core yarn production – Manufacture of core yarn in ring spinning, rotor spinning, friction spinning, air-jet spinning – Raw materials for core yarn spinning – Applications of core-spun yarns – Twistless and self-twist spinning – Basic principles of yarn manufacture – Yarn characteristics and end uses– Latest developments.

**Total: 60**

**TEXT BOOKS**

1. Klein, W., “A Practical Guide to Ring Spinning”, Vol.4 and 5, 1987 and “New Spinning Systems” The Textile Institute, Manchester, 1993.
2. Gowda, R.V.M, “New Spinning Systems”, NCUTE, IIT Delhi Publication, 2003.

**REFERENCES**

1. Chattopadhyay, R., “Advances in Technology of Yarn Production”, NCUTE, IIT Delhi Publication, 2002.
2. Lawrence, C.A. and Chen K.Z, “Rotor Spinning - Textile Progress”, Vol. 13, The Textile Institute, Manchester, 1981.
3. Basu, A., "Progress in Air-jet Spinning", Textile Progress, Vol.29, The Textile Institute, Manchester, 1997
4. Ishtiaque, S.M., Salhotra, K.R. and Gowda, R.V.M, "Friction Spinning - Textile Progress", Vol.33, The Textile Institute, Manchester, 2001.

**UNIT I BASICS & STANDARD WEAVES 9**

Cloth Geometry – Cover factor – Use of Point Paper – Elementary weaves – Plain and its derivatives – Twill and derivatives – Satin – Sateen and derivatives – Ordinary and brighten honey comb – Huck-a-back and modification – Mock leno – Distorted mock leno – Crepe weaves.

**UNIT II ARRANGEMENT OF FIGURES 9**

Bedford cords – Plain and twill faced – Wadded welts and piques – Wadded piques – Loose and fast back welts and piques – Spot figuring – Arrangement of figures – Drop designs half drop bases – Sateen system of distribution.

**UNIT III COLOUR AND WEAVE 9**

Colour theory – Light and pigment theory – Modification of colour – Application of colours – Colour and weave effects – Extra warp and extra weft figuring with two colours.  
Backed fabrics – Warp and weft backed – Reversible and non-reversible.

**UNIT IV SPECIAL WEAVES 9**

Pile fabrics – Warp pile, fast wire pile – Terry weaves – Terry stripe and checks – Weft pile – Plain back, twill back velveteen – Lashed pile corduroy – Weft plush.  
Double cloth – Classification – Types of stitches-wadded double cloth – Warp and weft wadded double cloth – Centre warp and weft stitched double cloth.

**UNIT V PRINCIPLES OF ORNAMENTATION 9**

Gauze and Leno weaves – Russian cord – Net Leno – Madras Muslin structures – Damasks, ply fabrics, brocades, tapestry, swivel, lappet – Designs for ornamentation of fabrics – Application of special jacquards – Self twilling, inverted hook, border jacquards.

**L: 45 T:15 Total: 60****TEXT BOOKS**

1. Grosicki, Z.J, “Textile Design and Colour”, Butterworths, 1950.
2. Grosicki, Z.J, “Advanced Textile Design and Colour” Butterworths, 1952.

**REFERENCES**

1. Goerner, D., “Woven Structure and Design”, Part – I, WIRA, 1986.
2. Goerner, D., “Woven Structure and Design”, Part – II, BTT6, 1989.

## TT1355 – FABRIC MANUFACTURING TECHNOLOGY

L T P  
4 0 0

### UNIT I BASIC CONCEPTS 12

Basic Weaving motions – Warp Let- off, shedding, filling insertion, beat-up, take-up – Auxiliary functions – Classification of looms – Loom timing diagram for different motions – Negative and positive cam shedding – Negative and positive dobby shedding – Cross border dobby – Pick finding device and dobby pegging.

### UNIT II PRIMARY MOTIONS 12

Jacquard shedding – Single Lift, single cylinder, double lift, single cylinder, double lift, double cylinder jacquards, electronic jacquards – Card cutting lasing – Cone overpick, side leverpick, cone underpick, ruti underpick, swell checking, check straps, hydraulic swell checking, check straps, hydraulic checking, 4 bar 6 bar linkage, beat up mechanism, crank arm types.

### UNIT III SECONDARY AND AUXILARY MOTIONS 12

Weaving Accessories – Types and selection of heald wires, heald frames, reeds, shuttles, picking accessories, drop wires, temples.

Negative let off and positive let off, five and seven wheel take up motions, continuous take up motion, loose reed and fast reed mechanisms – Types of warp stop motions – Multiple box motions, pick at will motion.

### UNIT IV SHUTTLELESS WEAVING 12

Weft feelers – Different types – Pirn transfer mechanisms, thread cutters, eye and temple cutters – Yarn quality requirements for shuttleless looms – Principles of weft insertion in shuttleless loom – Weft accumulators – Selvages – Mechanisms of weft insertion by projectile, rapier, airjet and waterjet, technoeconomics of shuttleless weaving.

### UNIT V DEVELOPMENTS IN WEAVING 12

Multiphase looms, quick style changes, weaving of rotor spun yarns, blended yarns, filament yarns – denim – Warp preparation and weaving of terry fabrics– Improving productivity.

**Total: 60**

### TEXT BOOKS

1. Sriramalu, P.K., Ajsaonkar, D.B. and Talukdar, M.K., “Weaving Machines: Mechanisms, Management”, Mahajan Publishers, 1998.
2. Marks, P. and Robinson, A.T.C., “Principles of Weaving”, The Textile Institute Manchester, 1989.

### REFERENCES

1. Lord, P.R. and Mohamed, M.H., “Weaving: Conversion of Yarn to Fabric”, Merrow Publications, 1992.
2. Chakravorthy, B., “Mechanism of Weaving Machines”, Chakravorthy Serampore, 1982.
3. Ormerod, “Modern Preparation and Weaving”, Butterworths and Co. Ltd., 1983.
4. Talavasek, O.and Svaty, V., “Shuttleless Weaving Machines”, Elsevier Scientific Pub. Co., 1981.
5. Adanur, S., “Handbook of Weaving”, Technomic Publishing Co., 2001.

## TT1356 – CHEMICAL PROCESSING OF TEXTILE MATERIALS LABORATORY

L	T	P
0	0	3

1. Dyeing of cotton / viscose yarns using direct dyes
2. Dyeing of cotton yarn using vat dyes
3. Dyeing of cotton yarn using cold brand reactive dyes
4. Dyeing of cotton fabric with hot brand reactive dyes
5. Dyeing of cotton using naphthol dyes
6. Dyeing of polyester using carrier
7. Dyeing of polyester / cotton blends
8. Dyeing of silk, wool with acid, basic dyes
9. Printing of cotton by direct style
10. Printing of cotton by resist style

### LIST OF EQUIPMENTS REQUIRED

1. Stainless vats (500 ml)
2. Water bath, Thermometers
3. Stirrer
4. Steam ager, Pilot padding mangle
5. HTHP Beaker dyeing machine
6. Pilot curing chamber
7. Fastness tester for Washing, Rubbing

**Total: 45**

## TT1357 – CLOTH ANALYSIS LABORATORY

L T P  
0 0 3

(Minimum of Ten Experiments shall be offered)

Construction Details – Design, Draft, Peg Plan, Warp and Weft particulars and Loom requirements and Knitting machine particulars for the following.

1. Plain / Twill / Satin / Sateen Weaves.
2. Honey comb weave.
3. Huck-a-Back weave.
4. Extra Warp / Extra Weft.
5. Pile Fabrics (Warp & Weft)
6. Welts and Pique.
7. Backed Fabrics.
8. Gauze and Leno.
9. Double cloth.
10. Crepe.
11. Tapestry.
12. Mock Leno.
13. Bedford cords.
14. Colour and Weave Effects.
15. Knitted – Single Jersey, Interlock, Rib Structures.

### LIST OF EQUIPMENTS REQUIRED

S.No	Description	Quantity required
1.	Counting glass	Students must bring
2.	Electronic balance (0.01g to 300g)	1
3.	GSM cutter	1
4.	Beesley balance	1

**Total: 45**

(Minimum of 10 experiments shall be offered)

1. Measurement of Fibre Length.
2. Measurement of Fibre Strength.
3. Measurement of Fibre Fineness.
4. Measurement of Fibre Maturity.
5. Measurement of Fibre Trash & Lint.
6. Measurement of Fibre Nep content.
7. Measurement of Fibre Linear density of sliver, roving and yarn.
8. Measurement of single yarn and ply yarn twist.
9. Measurement of single yarn strength and Lea strength.
10. Measurement of Yarn Evenness.
11. Measurement of Yarn Impact Strength.
12. Measurement of Fabric thickness, Stiffness and Crease recovery.
13. Measurement of Fabric Tensile Strength.
14. Measurement of Fabric Bursting strength.
15. Measurement of Abrasion Resistance.
16. Measurement of Fabric Pilling.
17. Crimp study, GSM study in Fabric and Fabric engineering.

**TESTING EQUIPMENTS REQUIRED**

1. Baer Sorter.
2. Fibre Bundle Strength Tester.
3. Fibre Fineness Tester.
4. Trash Analyser.
5. Nep Count Template.
6. Wrap Reel.
7. Electronic Twist Tester.
8. Single Yarn Strength Tester.
9. Ballistic tester.
10. Thickness Tester.
11. Stiffness Tester.
12. Crease Recovery Tester.
13. Bursting Strength Tester.
14. Martindale Abrasion Resistance Tester.
15. Crock meter.

## SEMESTER VII

### GE1351 – PROFESSIONAL ETHICS AND HUMAN VALUES

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#### UNIT I HUMAN VALUES 9

Morals, values and ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – caring – Sharing – Honesty – Courage – Valuing time – Co-operation – Commitment – Empathy – Self-confidence – Character – Spirituality.

#### UNIT II ENGINEERING ETHICS 9

Senses of 'Engineering Ethics' - variety of moral issued – types of inquiry – moral dilemmas – Moral autonomy – Kohlberg's theory – Gilligan's theory – Consensus and controversy – Models of Professional Roles – Theories about right action – Self-interest – Customs and religion – Uses of ethical theories.

#### UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as experimentation – Engineers as responsible experimenters – Codes of ethics – A balanced outlook on law – The challenger case study.

#### UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and risk – Assessment of safety and risk – Risk benefit analysis and reducing risk – The Three Mile Island and chernobyl case studies.

Collegiality and loyalty – Respect for authority – Collective bargaining – Confidentiality – Conflicts of interest – Occupational crime – Professional rights – Employee rights – Intellectual Property Rights (IPR) – Discrimination.

#### UNIT V GLOBAL ISSUES 9

Multinational corporations – Environmental ethics – Computer ethics – Weapons development – engineers as managers – Consulting engineers-engineers as expert witnesses and advisors – Moral leadership – Sample code of ethics (Specific to a particular Engineering Discipline).

**L: 45 T: 15 Total: 60**

## **TEXT BOOKS**

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, 1996.
2. Govindarajan, M., Natarajan. S. and Senthil Kumar, V.S, "Engineering Ethics", Prentice Hall of India, 2004.

## **REFERENCES**

1. Fleddermann, C.D., "Engineering Ethics", Pearson Education/ Prentice Hall, 2004.
2. Harris, C. E., Protchard, M. S. and Rabins, M. J., "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Learning, 2000.
3. Boatright, J. R., "Ethics and the Conduct of Business", Pearson Education, 2003.
4. Seebauer, E.G and Barry, R.L., "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, 2001.

## **TT1401 – GARMENT TECHNOLOGY**

<b>L</b>	<b>T</b>	<b>P</b>
<b>4</b>	<b>0</b>	<b>0</b>

### **UNIT I INTRODUCTION 12**

Apparel industry in India, domestic industry, size of the industry, nature of the industry, its developments in recent years – Definition of merchandising – Functions of merchandising division – Role and responsibilities of a Merchandiser – Awareness of current market trends – Product development – Line planning – Line presentation – Need for sourcing – Sourcing materials – Manufacturing resources planning – Overseas sourcing – Sourcing strategies.

### **UNIT II PRODUCTION SYSTEMS 12**

Evaluation of fabric quality – Receiving and inspecting materials – Types of fabric defects – Fabric grading – Common fabric problem for apparel manufacturers – Apparel production systems – Basic concepts – Flexible Manufacturing – Work flow – Balancing, buffer, plant layout – Product oriented layout, process oriented layout – Progressing Bundle System (PBS) – Unit Production System (UPS) – Modular Production System (MPS) – Team training.

### **UNIT III PRODUCTION OPERATIONS & CUTTING MACHINES 12**

Production control – Work study – Method analysis – Work measurement – Preproduction operations – Cut order planning, marker making, methods for making markers, spreading – spreading equipments – Cutting – Portable, stationary cutters, computer controlled cutting.

### **UNIT IV FUNDAMENTALS OF SEWING & PRESSING 12**

Sewing machine fundamentals, classification – Stitch forming mechanism – Needles – Feeding system – Pressing equipment – Elements of pressing – Types of pressing equipment – Technological advancement in Pressing – Stitches, sews and thread stitches – Stitch properties – Stitch classes – seams – Seam dimensions – Classes – Sewing threads – Functions of sewing thread – Characteristics of threads – Thread size – Ticket number – Types of plackets, cuff, pockets.

### **UNIT V GARMENT TRIMMINGS 12**

Purpose of support materials – Interlinings – Functions of interlinings – Fusible interlinings, linings – Functions and applications of linings – Adhesives – Shoulder pads – Closures – Purposes of closures – Aesthetic, Performance – Zippers – Functions of Buttons and button holes – Snaps – Elastic – Function of Elastic – Hooks – Trims – Types and sources of Trims – Knit Trims, Embroidery – Lace – Labels – Materials styles and application methods.

**Total: 60**

## **TEXT BOOKS**

1. Jacob Solinger., “Apparel Manufacturing Handbook”, VanNostrand Reinhold Company, 1998.
2. Glock, R. E., and.Kunz, G.I., “Apparel Manufacturing Sewn Product Analysis”, Blackwell Scientific Publications, 1983.

## **REFERENCES**

1. Hudson, P. B., “Guide to Apparel Manufacturing” Mediapparel Inc, 1989.
2. Carr, H. and Latham, B., “The Technology of Clothing Manufacture” Blackwell Scientific Publications, 1988.
3. Gerry Cooklin, “Introduction to Clothing Manufacture” Blackwell Science Ltd., 1995.
4. Laing, R., “ Fundamentals of Stitches and Seams”, Textile Institute, Manchester, 1995.
5. Chuter, A.J., “Introduction to Clothing Production Management”, Blackwell Science, 1995.

## TT1402 – KNITTING TECHNOLOGY

L	T	P
4	0	0

### UNIT I INTRODUCTION 12

Properties of woven and knitted fabrics – Terms and definitions used in knitting – Yarn quality requirements for knitting – Comparison of warp and weft knitting – Classification of warp and weft knitting machines – Knitting needles: Spring – Beard – Latch – Compound needles.

### UNIT II WEFT KNITTING 12

Classification of weft knit structure – Technical terms and symbolic representation of weft knit structure – Characteristics of plain, rib, interlock, purl knit structures – Rib, interlock and purl circular knitting machines – Fundamentals of formation of knit, tuck and float stitches – Factors affecting the formation of loop – Effect of loop length and shape on fabric properties – Faults in knitted fabrics, causes and remedies – Production calculation.

### UNIT III FLAT KNITTING 12

Basic principles and elements of flat knitting machines – Different types of flat knitting machines – Manual, mechanical and computer controlled knitting machines – Production of various fabric designs with flat knitting machines – Jacquard knitting – Pattern wheel, pattern drum, tape patterning devices, electronic devices.

### UNIT IV WARP KNITTING 12

Warp knitting fundamentals – Basic warp knitted structures – Closed lap and open lap stitches – Classification of warp knitting machines – Knitting elements of Raschel and Tricot knitting machine – Difference between Raschel and Tricot knitting machine – Representation of warp – Knit structure.

### UNIT V YARN REQUIREMENTS, DEFECTS & CALCULATIONS 12

Basic yarn properties for weft and warp knitting – Defects in weft and warp knitted fabrics, causes and remedies – Test for Weft Knit quality – Knitting Calculations for weft knits and warp knits.

**Total: 60**

### TEXT BOOKS

1. Ajgaonkar, D.B., “Knitting Technology”, Universal Publication Corporation, 1998.
2. Spencer, D.J., “Knitting Technology”, Textile Institute, 1989.

### REFERENCES

1. Chandrasekhar Iyer, Bernd Mammal and Wolfgang Schach., “Circular Knitting”, Meisenbach GmbH, 1995.
2. Samuel Raz., “Flat Knitting; The new generation”, MeisenbachGmbH, Bamberg.
3. Samuel Raz., “Warp Knitting Production”, Melliand TextilberichteGmbH, 1987.

**UNIT I COMPUTERS FUNDAMENTALS 12**

Introduction to computers – Genesis, basic architecture and functions of different components – Input / output devices, memory unit – Classification of computers – Character representation, Number system – Basic of binary numbers, decimal numbers, octal numbers, hexadecimal numbers and their conversions – Introduction to programming – Machine language, assembly language, Different high level languages, compiler/assembler – Computer network – LAN/WAN – Database management system, classification of database – Introduction to system – Study of systems and the development of system requirements

**UNIT II ROLE OF COMPUTER SYSTEMS IN FIBRE AND YARN PRODUCTION 12**

The scope for the application of computers to the process of fibre production – Online monitoring of machine and process performance in man-made fibre production – The scope for the application of computers to the process of yarn production – Application of various sensors, LVDT, and microprocessors for online monitoring of machine and process performance in cotton blending, opening and cleaning – ABC control, short- and long-term regulation of sliver count and online nep monitoring on modern cards – Working of open-loop autoleveller on modern drawframe, principle of operation of ring data system, and ring eye system on ringframe.

**UNIT III ROLE OF COMPUTER SYSTEMS IN FABRIC AND APPAREL PRODUCTION 12**

Basics of online monitoring of machine and process performance at different stages of fabric production – Computerised yarn clearing on modern winding machines – Use of microprocessors to monitor and control key parameters in sizing process – Online monitoring of loom working – Basics of loom eye system – Introduction to computer aided textile design in weaving and knitting – Introduction to computer aided garment design – Basics features of various softwares – Scope for application of computers to the process of textile chemical processing – Introduction to computer colour matching for textiles.

**UNIT IV EXISTING SOFTWARE 12**

Overview of spreadsheets – Word processing programs – Data base management software – Visual basic and SQL software and their application to the field of textile technology – Software for cotton selection and blending – BIAS software – Software for control of cotton mixing cost – Linear programming – Computerised fibre testing – Basics of HVI spectrum and AFIS – Computerised yarn quality evaluation – Basics of UT4, CYROS and OASYS systems for online yarn simulation – Uster Fabriscan for automatic fabric inspection and quality control – Introduction to PERT / CPM with reference to textile industry – Application of image processing technique and artificial neural network – Identification of areas for the application of computers in finance and administration and other business areas.

**UNIT 5 DESIGNING APPLICATIONS 12**

Design and development of programs for various textile applications – Programs to compute CSP of a spun yarn – Yarn tenacity – Fabric cover using empirical relationships and input data set – Designing spin plan – Weave plan using VB – Plotting a given set of data and establish relationships between the dependant and independent variables in the form of regression equation using MExcel or Systat – Working with database systems, etc.

**Total: 60**

## **TEXT BOOKS**

1. Parameswaran, R., "Computer Applications in Business", 2nd Edition, S. Chand and Company Ltd., 1999.
2. Sinha, P.K. and Preethi Sinha, "Computer Fundamental Concepts, Systems and Applications", 1st Indian Edition, BPB Publications, 2003.

## **REFERENCES**

1. Ram, B., "Computer Fundamentals: Architecture and Organisation", 2nd Edition, New Age International (P) Ltd. Publishers, 1998.
2. Jayaraman, S., "Computer Science and Textile Science, Textile Progress, Vol.26, No.3, Textile Institute, Manchester, 1995.
3. Barella, A., "On-line Quality Control in Spinning and Weaving", Textile Progress, Vol.17, No.1, Textile Institute, 1988.
4. Sigmon, D.M., Grady, P.L. and Winchester, S.C., "Computer Integrated Manufacturing and Total Quality Management", Textile Progress, Vol. 27, No.4, Textile Institute, 1995.
5. Phiroz Dastoor, "Application of CAD in the Industrial Fabrics", Journal of the Textile Institute, Part I, Textile Institute, 1993.
6. Aldrich, W., "CAD in Clothing and Textiles: A Collection of Experts Views", 2nd Edition, Blackwell Science, 1994.

## TT1404 – KNITTING AND GARMENT LABORATORY

L	T	P
0	0	3

1. To study the working Principle of Circular Weft Knitting machine
2. To study the features of various types of Knitting needles
3. Effect of Stitch length on Knitted fabric quality
4. Setting of various machine parameters on Circular Knitting machine
5. Preparing samples for different types of basic hand stitches
6. Preparing samples for seams and seam finishes
7. Developing patterns for children's wear
8. Developing pattern for ladies wear.
9. Developing patterns for men's wear.
10. Development of embroidery designs – hand and sewing machine

### LIST OF EQUIPMENTS

1. Single jersey knitting machine
2. Sewing machine
3. Embroidery circular wooden frame
4. Hand sewing needles
5. Steel scales, Brown sheets, Measuring tapes, Scissors
6. Skein threads, Machine embroidery threads, marking chalk

**Total: 45**

## TT1405 – FABRIC MANUFACTURING LABORATORY

<b>L</b>	<b>T</b>	<b>P</b>
<b>0</b>	<b>0</b>	<b>3</b>

(Minimum of 10 experiments shall be offered)

1. Conventional Cone Winder
2. Automatic cone Winder
3. Conventional/Automatic Pirn Winder
4. Sectional/Beam Warping machine
5. Study of Knotters/Splicers
6. Study of yarn unwinding from cop and yarn tensioner
7. Preparation of size paste and measurement of its characteristics
8. Measurement of Adhesive Power of size (Roving method)
9. Hank/Single end sizing of cottong warp
10. Study of cone characteristics, pirn characteristics
11. Mechanisms for regulating pirn dimensions & characteristics
12. Tappet Shedding
13. Dobby and method of pegging.
14. Side Weft Fork Mechanism
15. Loose Reed, Fast Reed
16. Loom Brake and Clutch Mechanism
17. 4x1 Drop Box Mechanism
18. 1x 4 Drop Box Mechanism and Pick at will Motion
19. Positive Let off
20. Warp Stop Motion
21. Automatic Pirn Changing
22. Centre Weft Fork Motion
23. Shuttleless Loom

**Total: 45**

(Minimum of Ten Experiments shall be offered)

1. Study of ginning machine
2. Study of blowroom machinery
3. Settings and production calculations in blowroom
4. Card - Draft and production calculations
5. Card - Settings
6. Construction details of Drawframe
7. Draft calculation in Drawframe
8. Study of comber preparatory machines
9. Construction details of comber
10. Draft calculation in comber
11. Construction details of speedframe
12. Draft calculation in speedframe
13. Twist calculation in speedframe
14. Study of builder motion mechanism in speedframe
15. Study of construction details and technical specifications of different makes/models of ring frames
16. Speed and draft calculations in ring frame
17. Study of various settings on ring frame
18. Twist and production calculations in ring frame
19. Study of builder motion mechanism in ring frame
20. Production and twist calculation of Two-For-One twister (TFO)
21. Studies on influence of TFO process variables on two-fold yarn quality
22. Production and quality characterization of two-fold spun and blended yarns
23. Production of fancy yarns on TFO
24. Production and twist calculation in rotor spinning

**LIST OF MACHINERY REQUIRED**

1. Lab model Ginning machine
2. Miniature Blowroom line
3. Carding machine
4. Drawframe
5. Comber Preparatory machines
6. Comber
7. Speedframe
8. Ring frame (lab model)
9. TFO (lab model - Desirable)
10. Rotor spinning machine (lab model - Desirable)

**Total: 45**

## SEMESTER VIII

### MG1352 – TOTAL QUALITY MANAGEMENT

L	T	P
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#### UNIT I INTRODUCTION 12

Definition of quality – Dimensions of Quality – Quality Planning – Quality costs - Analysis Techniques for quality costs – Basic concepts of total quality management – Historical review – Principles of TQM – Leadership – Concepts – Role of senior management – Quality council – Quality statements – Strategic planning – Deming philosophy – Barriers to TQM implementation.

#### UNIT II TQM PRINCIPLES 12

Customer satisfaction – Customer perception of quality – Customer complaints – Service quality – customer retention – Employee involvement – Motivation-empowerment – Teams-recognition and Reward – Performance appraisal– Benefits – Continuous process improvement – Juran trilogy- PDSA cycle – 5S – Kaizen – Supplier partnership – Partnering – Sourcing – Supplier selection – Supplier rating – Relationship development – Performance measures – Basic concepts – Strategy – Performance measure.

#### UNIT III STATISTICAL PROCESS CONTROL (SPC) 12

The seven tools of quality – Statistical fundamentals – Measures of central tendency and dispersion – Population and sample – Normal curve – Control charts for variables and attributes – Process capability – Concept of six sigma – New seven Management tools.

#### UNIT IV TQM TOOLS 12

Benchmarking – Reasons to Benchmark- Benchmarking Process-Quality Function Deployment (QFD) – House of Quality, QFD Process-Benefits, Taguchi Quality Loss Function- Total Productive Maintenance (TPM) – Concept – Improvement needs – FMEA – Stages of FMEA.

#### UNIT V QUALITY SYSTEMS 12

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, QS 9000, ISO 14000 – Concept, Requirements and Benefits.

**Total: 60**

#### TEXT BOOKS

1. Besterfield, D.H., “Total Quality Management”, Prentice Hall of India Pvt. Ltd., 3rd Edition, 2007.
2. Kanishka Bedi, “Quality Management”, Oxford Press, 2006.

#### REFERENCES

1. Shridhara Bhat, K., “Total Quality Management”, Himalaya Publishing House, 1st Edition, 2002.
2. Lal, H., “Total Quality Management – A practical approach”, New Age Internaional Publishers, 2004.
3. Nagarajan, R.S., “Toatal Quality Management”, New Age International Publishers, 2005.

## MG1453 – SAFETY AND RISK MANAGERMENTS

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### UNIT I INDUSTRIAL SAFETY 15

Concepts of safety – Hazard classification chemical, physical, mechanical, ergonomics, biological and noise hazards – Hazards from utilities like air, water, steam.

### UNIT II HAZARD ANALYSIS 15

Hazard identification and control – HAZOP, job safety analysis – Fault tree analysis – Event tree analysis – Failure modes and effect analysis and relative ranking techniques – Safety audit – Safety Survey – Plant inspection – Past accident analysis.

### UNIT III RISK MANAGEMENT 15

Overall risk analysis – Chapains model, Eand FI model– Generation of meteorological data – Ignition data – Population data – Overall risk contours for different failure scenarios – Disastar management plan – Emergency planning – Onsiteand offsite emergency planning – Risk management – Gas processing complex, refinery – First Aids.

### UNIT IV SAFETY PROCEDURES 7

Safety in plant design and layout – Safety acts and regulations for industries.

### UNIT V SAFETY IN HANDLING and STORAGE OF CHEMICALS 8

Safety measures in handling and storage of chemicals – Fire chemistry and its control – Personal protection.

**Total: 60**

### TEXT BOOKS

1. Raghavan, K.V. and Khan, A.A., “Methodologies in Hazard Identification and Risk Assessment”, Manual by CLRI, 1990.
2. Blake, R.P., “Industrial Safety”, Prentice Hall, 1953.
3. Lees, F.P., “Loss Prevention in Process Industries”, 2nd Edition, Butterworth Heinemann,1996.

### REFERENCES

1. “A Guide to Hazard Operability Studies”, Chemical Industry Safety Council, 1977.
2. Geoff Wells, “Hazard Identification and risk assessment”, I.ChE, UK.

## **TT1455 – PROJECT WORK**

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<b>0</b>	<b>0</b>	<b>12</b>

The project may be considered as the ultimate exercise presented to the final semester student before graduation to measure accumulated engineering knowledge and experience. At the same time, the project itself should provide the students with some new skills, innovation and information, and strengthen the acquired ones.

The project programme consists of different assignment, allotted time, submission of report under internal faculty guidance and evaluation by external member along with internal faculty.

The activities performed during a project may cover one or more of the following;

- Data collection
- Critical literature review
- Laboratory experience and tests
- Mathematical modeling
- Software application
- Industrial visits
- Design and/or assembly
- Process analysis

The major project may be assigned to a group of two students. The project topic allotted may be of theoretical, experimental or industrial projects to be carried out under the supervision of internal guide and external guide (in case of industrial projects).

Major projects are to be executed strictly as per the project schedule prepared during VIII semester. A committee of departmental faculty members comprising the project guide, one more faculty member and the head of department will monitor and review the progress achieved by the student at various stages. The internal assessment will be done by the committee based on the progress achieved on completion of the project work.

On completion of the project work, each student has to prepare a project report and submit the same in triplicate to the department. The project work and the report will be evaluated by the internal assessment committee for a total of 100 marks. The external university examination, which carries a total of 100 marks, will have report evaluation and viva voce examination conducted by a committee of one external examiner and one internal examiner appointed by the university.

**ELECTIVES I**  
**TT1001 – TECHNICAL TEXTILES**

**L T P**  
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**UNIT I TEXTILES AND FIBRES 12**

**Technical Textiles – An Overview:** Definition and scope of technical textiles – Milestones in the development of technical textiles – Textile processes – Applications – Globalization of technical textiles – Future of the technical textiles industry.

**Technical Fibres:** Introduction – High strength and high modulus organic fibres – High chemical and combustion-resistant organic fibres – High performance inorganic fibres – Ultra-fine and novelty fibres – Fibres used in civil and agricultural engineering – Automotive and aeronautics – Medical and hygiene applications – Protection and defence applications.

**UNIT II APPLICATIONS 12**

**Textile-reinforced Composite Materials:** Composite materials – Textile reinforcement – Woven fabric– Reinforced composites – Braided reinforcement – Knitted reinforcement – Stitched fabrics.

**Textiles in Filtration:** Introduction – Dust collection – Fabric construction – Finishing treatments – Yarn types and fabric constructions – Fabric constructions and properties – Production equipment – Finishing treatments – Fabric test procedures.

**UNIT III OTHER FIELDS 12**

**Textiles in Civil Engineering:** Geosynthetics – Geotextiles – Essential properties of geotextiles – Engineering properties of geotextiles – Geotextile structure – Frictional resistance of geotextiles.

**Medical Textiles:** Introduction – Fibres used – Non-implantable materials – Extra-corporeal devices – Implantable materials – Healthcare / hygiene products.

**UNIT IV TEXTILES IN DEFENCE 12**

Introduction – Historical background – Criteria for modern military textile materials – Textiles for environmental protection – Thermal insulation materials – Water vapour permeable and waterproof materials – Military combat clothing systems – Camouflage concealment and deception – Flame-retardant – Heat protective textiles – Ballistic protective materials – Biological and chemical warfare protection.

**UNIT V TEXTILES IN TRANSPORTATION 12**

**Textiles in Transportation:** Introduction – Textiles in road vehicles – Rail applications – Textiles in aircraft – Marine applications – Future prospects for transportation textiles –Belts – Tyre cords. Hoses: Introduction – Construction particulars – Fibres and yarns used.

**Total: 60**

### **TEXT BOOKS**

1. Horrocks, A.R. and Anand , S.C., “Handbook of Technical Textiles”, The Textile Institute, Woodhead Publishing Ltd, 2000.
2. Adanur, S., “Wellington Sears Handbook of Industrial Textiles”, Technomic Publishing Co. Inc., 1995.

### **REFERENCES**

1. John, N.W.M., “Geotextiles”, Blackie, 1987.
2. Mukhopadhyay, S.K. and Partridge, J.F., “Automotive Textiles”, Text. Prog, Vol. 29, No.1/2, 1998.
3. Anand, S., “Medical Textiles”, Textile Institute, 1996.

## TT1002 – TEXTURED YARN TECHNOLOGY

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### UNIT I INTRODUCTION 12

Need for bulking of synthetic fibres – Texturing – Basic definition and classifications – Developments in high speed spinning – POY.

### UNIT II HEAT SETTING 12

Heat setting – Need-factors involved – Types of setting – Effects on fibre morphology and mechanical properties – Fundamentals of thermo – Mechanical texturing – Helanca process.

### UNIT III FALSE-TWIST TEXTURING 12

Basics of false-twist texturing – Texturability of various fibres – Process parameters – Time, temperature, twist, tension suitability of POY and UDY for FT texturing – Draw texturing – simultaneous and sequential draw texturing – Twisting devices – Testing of textured yarns.

### UNIT IV AIR JET TEXTURING 12

Basics of air jet texturing – Types of yarns produced – Feed material structure and properties of air-jet texturing machines – Nozzles, evaluation of air-jet textured yarn vis-à-vis spun and filament false twist textured yarns.

### UNIT V OTHER TEXTURING TECHNIQUES 12

Stuffer box and edge crimping methods – Principles, limitations, and applications – Knit-de-knit and gear crimping methods – Bi-component filament texturing – Texturing of polypropylene and jute fibres – Chemo-mechanical and thermo-mechanical texturing.

**Total: 60**

### TEXTBOOKS

1. Ursiny, P.H.L., “Yarn Texturing Technology”, Eurotex, 1994.
2. Behery, H.M. and Demir, A., “Synthetic Filament Yarn Texturing Technology”, Prentice Hall, 1996.

### REFERENCES

1. Guirajani, M.L., “Annual Symposium of Texturing”, I.I.T Delhi, 1977.
2. Wilson, D.K. and Kollu, T., “Production of Textured Yarns by the False Twist Technique”, Textile Progress, Vol. 21, No.3, Textile Institute, 1991.
3. Gupta V.B., “Winter School on Man-made Fibers – Production, Processing, Structure, Properties and Applications”, Vol. 1, 1988.
4. Wilson, D.K. and Kollu, T., “Production of Textured Yarns by Methods Other than False Twist Technique”, Text. Progress, Vol. 16, No.3. Textile Institute, 1981.
5. Demir and El-Behery, H., “Synthetic Yarn Production”, Prentice Hall Inc., 1996.

## TT1003 – SILK YARN TECHNOLOGY

L T P  
4 0 0

### UNIT I INTRODUCTION 12

Overview of the silk industry and the features of silk – Present day silk industry – Varieties of silk – Mulberry leaf varieties and production – Biology of the silkworm – Silkworm rearing – Harvesting. Characteristics of the cocoon – Physical characteristics – Composition of the cocoon – Properties of silk – Cocoon quality – Factors influencing cocoon quality – Classification of cocoons – Cocoon testing and grading.

### UNIT II REELING 12

Cocoon drying – Storage and Sorting: Objective of cocoon drying – Mechanism of cocoon drying – Various methods of stifling/drying – Degree of drying – Types of drying machines and methods – Effects of drying conditions on reeling results – Cocoon storage – Sorting of cocoons – Cocoon Cooking and Raw Silk Reeling: Introduction – Cocoon cooking methods – Degree of cocoon cooking – Adjustments to cooking conditions – Effects of cocoon cooking conditions on reeling result – Various silk reeling devices – Methods of silk reeling – Quality control during raw silk reeling.

### UNIT III RE-REELING AND FINISHING 12

Re-reeling – Re-reeling machine and apparatus – How to re-reel raw silk – Re-reeling efficiency – Silk end tying and skein lacing – Booking and packing – Storage of silk – Factory Planning: Annual requirement of cocoons – Equipment for installation – Location and space – Quality and quantity of filature water – Selection of proper machinery.

### UNIT IV UTILIZATION OF BY-PRODUCTS 12

Introduction – Dupion silk reeling – Reeling of non-mulberry cocoons – Manufacture of spun silk – Degumming – Opening-up – Finishing – Count of spun silk yarn – Wild silk yarn.

### UNIT V MARKETING OF SILK YARN 12

Silk throwing – Soaking – Hydroextracting – Drying – Winding – Doubling – Primary and secondary twisting – Tram – Organdine – Crepe twist – Warping – Weaving – Handloom, Powerloom – Shuttleless weaving – Degumming and dyeing of yarn and fabrics – Types of silk fabrics.

**Total: 60**

### TEXT BOOKS

1. Sonwalkar, T.N., “Handbook of Silk Technology”, Wiley Eastern Ltd., 1993.
2. Dandin, S.B., Jayaswal, J., and Giridhar (Eds.), K., “Handbook of Sericulture Technologies”, Central Silk Board, Bangalore, 2001.

## TT1004 – THEORY OF STAPLE-FIBRE OPENING

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### UNIT I FIBRE INDIVIDUALIZATION 12

The necessity of fibre individualization in the fibre opening processes – Effect of fibre – Group size on yarn uniformity – Minimum requirements to achieve fibre individualization – Basic approach for fibre individualization in the opening machines.

### UNIT II PRINCIPLE OF FIBRE OPENING IN BLOWROOM 12

The principle of fibre opening in the blowroom machines – Calculation of tuft size reduction in openers based on machine and processing parameters – Limitation of fibre opening in blowroom machinery – Control tuft size variation and fibre rupture during opening.

### UNIT III ROLE OF CARDING MACHINE 12

The function of licker – In-licard – Degree of opening in licker-in – The mechanics of fibre opening in the carding area – Study of effect of fundamental factors like wire point design and density, speeds – Setting and transfer coefficient on fibre individualization – Calculation of useful parameters to assess the carding performance – Card grinding on carding efficiency.

### UNIT IV CARDING PRODUCTIVITY 12

Relationship between carding productivity and degree of fibre individualization – Limiting factors of carding productivity – New concepts to improve carding productivity.

### UNIT V CLEANING 12

Role of fibre opening on fibre cleaning – The factors affecting fibre cleaning in the blowroom and carding machines – Control of air suction for efficient cleaning.

**Total: 60**

### TEXT BOOKS

1. Klein, W., “A Practical Guide to Opening and Carding”, The Textile Institute, 1999.
2. Grosberg, P., and Iype, C., “Yarn Production: Theoretical Aspects”, The Textile Institute, 1999.

### REFERENCES

1. Salhotra, K.R., and Chattopadhyay, R., “Book of Papers on Blowroom and Card”, Indian Institute of Technology, 1998.
2. Lord, P.R., “Yarn Production; Science, Technology and Economics”, The Textile Institute, 1999.

## ELECTIVE II

### TT1005 – MECHANICS OF STAPLE-FIBRE DRAFTING

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#### UNIT I IDEAL DRAFTING 12

Definition of ideal drafting – Conditions required to achieve ideal drafting in a roller drafting system – Deviations from ideal drafting situation duration actual drafting conditions.

#### UNIT II DRAFTING WAVE 12

Definition of drafting wave – Condition for drafting wave formation during roller drafting – Estimation of the magnitude of the irregularity caused by the occurrence of the drafting wave – Forces acting on a fibre during drafting at different positions in a drafting zone – Methods to avoid drafting wave formation – Role of apron in controlling drafting wave formation.

#### UNIT III ROLLER SLIP 12

Definition of roller slip – Conditions for the formation of forward and backward slips in the roller drafting systems – Measures to avoid roller slip occurrence.

#### UNIT IV OTHER DRAFTING IRREGULARITIES 12

The causes for roller nip movement and roller speed variation during drafting and their effect on products irregularity – Control of the irregularity formed from these sources.

#### UNIT V COMPARISON 12

Comparison of roller drafting system with wire point drafting system application of wire point drafting in card and rotor spinning machine – Comparison of roller drafting in drawframe – Comber preparatory – Comber speedframe – Ringframe – Ringcan spinning – Condensed yarn spinning and in air-jet spinning machine – Influence of draft on spinning triangle size – Subsequent effect on machine performance and product quality.

**Total: 60**

#### TEXT BOOKS

1. Foster, G.A.R, “The Principles of Roller Drafting and the Irregularity of Drafted Materials”, The Textile Institute, 1958.
2. Klein, W., “A Practical Guide to Combing”, Drawing and the Roving Frame, The Textile Institute, Manchester, 1999.
3. Lord, P.R., “Roller Drafting, Textile Progress”, The Textile Institute, 1993.

#### REFERENCES

1. Groberg, P. and Iype, C., “Yarn Production: Theoretical Aspects”, The Textile Institute, Manchester, 1999.
2. Lord, P.R., “Yarn Production; Science, Technology and Economics”, The Textile Institute, 1999.

## **TT1006 – APPAREL PRODUCTION CONTROL**

**L T P**  
**4 0 0**

### **UNIT I BASICS 12**

Control parameters – Apparel production parameters – Planning and lead-time – Product development – Steps from prototype to production model – Importance of pre-production activities – Introduction to timetable concepts – Product data management – Understanding and interpretation of specification sheet.

### **UNIT II OPERATION SEQUENCE DEVELOPMENT 12**

Garment breakdown with machine and attachment details – Development of production grid for garment construction – Development of production flowchart.

### **UNIT III BUNDLE TICKETS AND LAY LOT PLANNING 12**

Guidelines for bundle ticket design – Functions of bundle tickets – Bundle ticket control – Different manufacturing systems: Make through and Assembly line manufacturing – Advantages and disadvantages – Numerical exercises on lay lot planning to optimize cutting cost – Bundling– Ticketing and cutting room control formats.

### **UNIT IV PLANNING AND CONTROL 12**

Capacity calculation for cutting – Sewing and finishing – Determination of machine requirements for new factory – Line balancing – Determination and allocation of manpower – Machine for balanced production in existing plant for a given target.

### **UNIT V QUALITY IN PRODUCT DEVELOPMENT 12**

Quality assurance during product development – Methods to avoid problems during pattern making – Garment construction and other areas – Inspection procedures – Work-study in garment industry – methods to control time and cost.

**Total: 60**

### **TEXT BOOKS**

1. Chuter, A.J., “Introduction to Clothing Production Management”, Blackwell Scientific Publications.
2. Tyler, D.J., “Materials Management in Clothing Production”, Blackwell Scientific Publications Professional Books.

## TT1007 – LONG-STAPLE SPINNING PROCESS

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### UNIT I FIBRE CLEANING AND BLENDING 12

Impurities in the long-staple fibre like wool and their removal – Methods adapted to process raw flax and jute – Blending methods followed for long staple fibres.

### UNIT II FIBRE INDIVIDUALISATION 12

Fibre individualisation in the carding machine – Working Principle and details of different type of carding machine-worsted carding – Semi-worsted carding – Wollen carding – Flax carding and jute carding – Card clothing and its maintenance – Carding performance.

### UNIT III COMBING 12

Objective of combing – Basic principles of combing – Details of wool combing preparation and combing operation – Worsted top finishing.

### UNIT IV DRAWING 12

Principle of long-staple drafting – Effect of doubling – Drafting irregularities – Working details of worsted – Semi-worsted – Jute and flax drawing – Operating principle of roving machine.

### UNIT V YARN SPINNING 12

Mule spinning-drafting – Twisting – Backing-off – Winding on – Description of centrifugal spinning – Flyer spinning – Ring spinning twisting – Rings and travelers – Condenser yarn spinning cap spinning – Open end spinning – General features of rotor and friction spinning as applicable to long – Staple fibres – Self twist spinning system.

**Total: 60**

### TEXT BOOKS

1. Oxtoby, E., "Spun Yarn Technology", Butterworths, 1987.
2. Happey, F., "Contemporary Textile Engineering", Academic Press, 1983.
3. Lord P.R., "Yarn Production: Science, Technology and Economics", The Textile Institute, 1999.

### REFERENCES

1. Ross, D.A., Carnaby, G.A. and Lappage, J., "Woollen Yarn Manufacture", Textile Progress, The Textile Institute, 1986.
2. Richards, R.T.D and Sykes, A.B., "Wollen Yarn Manufacture", The Textile Institute, 1994.
3. Henshaw, D.E., "Worsted Spinning", Textile Progress, The Textile Institute, 1981.

**UNIT I YARN GEOMETRY 12**

Basic geometry of twisted yarn – The idealized helical yarn structure – Yarn count and twist factor – Twist contraction and theoretical calculations – Limits of twists – Real and idealized yarns – Packing of fibres in yarn – Idealized packing – Derivations from ideal forms of packing – Packing in actual yarns – Specific volume of yarns – Relation between twist, diameter and twist angle.

**UNIT II FIBRE MIGRATION 12**

Ideal migration – Observation of the paths of individual fibres – Migration in spun yarns – Characterisation of migration behaviour – Tension variation as a mechanism of migration – Criteria for interchange of position – Theory of migration – Conditions for migration and frequency of migration – Forms of yarn twisting – Cylindrical and ribbon twisting.

**UNIT III MECHANICS OF STAPLE FIBRE YARNS 12**

Theoretical analysis of yarn geometry – Stress-strain distribution in yarn – Fibre obliquity and slippage – Influence of fibre length, fineness and friction on fibre slippage and yarn strength – Yarn breakage – Strength of blended yarns – Hamburger's model – Analysis of tensile behaviour – Prediction of breakage – Analysis of yarn mechanics by energy method – Observed extension and breakage of staple fibre yarns.

**UNIT IV MECHANICS OF FILAMENT YARNS 12**

Theory of extension of continuous filament yarns – Analysis of tensile forces – Stress-strain relations of the filaments – Effects of large extensions – Filament behaviour at large extensions – Prediction of breakage – Load-Extension curve near break – Tenacity – Breaking extension – Initial modulus – Work of rupture.

**UNIT V FABRIC GEOMETRY AND DEFORMATION 12**

Elements of woven fabric geometry – Pierce and Olofsson models – Jamming of threads – Cover factor – Crimp interchange in woven fabrics – Modification to Pierce model – Race track, saw tooth and bilinear models – Form factor, degree of set, extension behaviour of woven fabric, prediction of modulus, tensile properties in bias direction – Geometry of plain knitted structures, mechanics of nonwoven fabrics.

**Total: 60****TEXTBOOKS**

1. Hearle, J.W.S., Grosberg, P. and Backer, S., "Structural Mechanics of Fibres, Yarns and Fabrics", Wiley-Interscience, 1969.
2. Goswami, B.C., Martindale, J. and Scandio, "Textile Yarns: Technology, Structure and Application", Wiley-Interscience, 1977.

**REFERENCES**

1. Hearle, J.W.S., Thwaites, J.J. and Amirbayat, J. "Mechanics of Flexible Fibre Assemblies", Marryland, 1980.
2. Postle, R. De Jong, S. and Carnaby, G.A., "The Mechanics of Wool Structures", Ellis Horwood, 1988.

## **ELECTIVE III**

### **TT1009 – APPAREL MARKETING AND MERCHANDISING**

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**UNIT I ORGANIZATION OF THE APPAREL BUSINESS 12**

Introduction to apparel industry – Organization of the apparel industry types of exporters business concepts applied to the apparel industry – International trade.

**UNIT II MARKETING 12**

Functional organization of an apparel firm – Responsibilities of a marketing division – Marketing objectives and strategies – Marketing research – Types of markets: Retails and wholesale strategies for merchandise distribution – Retailers – Sourcing flows and practices – Marketing plan – Labeling and licensing.

**UNIT III MERCHANDISING 12**

Definition of merchandising – Functions of merchandising division – Role and responsibilities of a merchandiser – Different types of buyers – Communications with the buyers – Awareness of current market trends – Product development – Line planning line presentation.

**UNIT IV SOURCING 12**

Need for sourcing – Sourcing materials – Manufacturing resources planning – Principles of MRP – Overseas sourcing – Sourcing strategies – Supply chain and demand chain analysis – Materials management for quick response – JIT technology.

**UNIT V DOCUMENTATION 12**

Order confirmation – Various types of export documents – Pre-shipment post – Shipment documentation – Terms of sale, payment, shipment etc – Export incentives – Duty drawback – DEPB, I / E license – Exchange control regulation – Foreign exchange regulation acts – Export management risk – Export finance – WTO / GATT / MFA – Functions and objectives– Successes and failures.

**Total: 60**

#### **TEXT BOOKS**

1. Sinha, D., “Export Planning and Promotion”, - IIMS, Calcutta, 1989.
2. Nandi, T. K., “Import - Export Finance », IIMS, Calcutta, 1989.
3. Elaine Stone, Samples, J.A., “Fashion Merchandising” McGraw Hill Book Company, 1985.

#### **REFERENCES**

1. Shivaramu, S. “Export Marketing - A practical guide to Exporters”, Wheeler Publishing, 1996.
2. Jarnow, J.A.,Guerreiro, M. and Judelle, B., “Inside the Fashion Business”, Macmillan Publishing Company, 1987.

## **TT1010 – ENERGY MANAGEMENT IN TEXTILE INDUSTRY**

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### **UNIT I SOURCES 12**

Source of energy – Limitations of natural sources.

### **UNIT II TECHNOLOGIES 12**

New technologies for energy – Unexploited energy resources and problems in their exploitation.

### **UNIT III CONSUMPTION AND CONSERVATION 12**

Total energy concept energy consumption in spinning – Weaving and processing – Conservation of energy in such processes.

### **UNIT IV ENERGY SAVING 12**

Techniques of energy saving – Modification of technology or techniques towards saving in energy.

### **UNIT V ENERGY PRODUCTION 12**

Scope of utilisation of by-products for energy production – Captive power generation and its economics.

**Total: 60**

### **TEXT BOOKS**

1. “Heat economy in Textile mills”, ATIRA, Ahmedabad, 1984.
2. “Energy conservation in Textile Industry”, SITRA, Coimbatore, 1979.

### **REFERENCES**

1. Vallier, P., “Energy Uses in the Textile Finishing Industry”, Eurotex, 1990.
2. Sang Yang Kim, Grady, P.L. and Hersh, S.P., “Energy Consumption and Conservation in the Fibre Producing and Textile Industry”, Textile Progress, Vol. 13, No.3, Textile Institute., 1983.

## MG1003 – PROCESS ENGINEERING ECONOMICS

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### UNIT I MONEY 12

Value of money – Equivalence – Equations for economic studies and equivalence Amortization – Capital recovery – Depreciation – Depletion.

### UNIT II BALANCE SHEET 12

Capital requirements for process plants – Cost indices – Equipment costs – Service facilities – Capital requirements for complete plan – Balance sheet – Cost – Earnings – Profits and returns – variable costs – Fixed costs – Income statement – Economic production charts – Capacity factors.

### UNIT III METHODS 12

Economics of selecting alternates – Annual cost methods – Present worth method – Equivalent alternate – Rate of return and payment time – Cash flow analysis economic balance – Economic balance in batch operations – Cyclic operations and multiple equipment units.

### UNIT IV ECONOMICS 12

Micro economics – Elasticity of demand and supply – Demand forecasting methods – Economic analysis – Cost analysis – Time element – BEP – Micro economics – Keynesian Employment theory – Multiplier and accelerator – National income – Accounting – Business cycle.

### UNIT V MANAGEMENT 12

Concept of Management – Principles – Management functions – Scientific management – Advanced techniques management – Bar chart – CPM – Pert technique – Types of organizations – Merits and demerits – Concepts of marketing – Need – Research – Sales forecasting – Product cycle– Fundamentals of labour management and industries relation.

**Total: 60**

### TEXT BOOK

1. White, J.A. Kermath case and David Prat “Principles of Engineering Economics Analysis” 4th Edition, John – Wiley Publishers, 1997.

### REFERENCES

1. Schwyer, H.E., “Process Engineering Economics”, 1st Edition, McGraw Hill Book Co., 1962.
2. Peters and Timmer haus, “Plant Design and Economics for Chemical Engineering”, 4th Edition, McGraw Hill Book Co1991.

## TT1011 – TEXTILE MILL PLANNING AND MANAGEMENT

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### UNIT I PRINCIPLES OF MANAGEMENT 12

Planning – Organization – Coordination – Directing – Controlling.

### UNIT II PROJECT REPORT 12

Preparation of projects – Location layout – Selection of site for textile mills – Building structure – balancing of machinery for spinning and weaving.

### UNIT III MAINTENANCE OF MACHINERIES 12

Schedule for maintenance – Lubricants – Type and characteristics of lubricants.

### UNIT IV LIGHTING, VENTILATION AND AIR CONDITIONING 12

Lighting requirements for textile mills – Space for lighting humidification and ventilation – R.H. requirements – Air conditioning – Various systems of air conditioning and humidification – Motors electrical power and drives of various textile machinery.

### UNIT V MANAGEMENT 12

Material handling in textile mills – Selection and training of operatives workload of operatives – Preparation of financial statement – Reading and preparation of balance sheet and profit and loss account – Determination of the cost of yarn and fabrics.

**Total: 60**

### TEXT BOOKS

1. Shukla, M.C. “Business Organisation and Management”, Sultan Chand and Sons 1975.
2. “Management in the Textile Industries: Textile Institute Manchester”, Longmans, 1988.

### REFERENCES

1. Dudeja, D.V., “Management of textile industries”, Textile press, 1981.
2. Jaganathan, V., “Textile mill Technical Data Book”, Mahajan brothers, 1976.
3. Ormerod, A., “Textile Project Management”, Textile Institute, 1992.

## **ELECTIVE IV**

### **GE1001 – INTELLECTUAL PROPERTY RIGHTS (IPR)**

<b>L</b>	<b>T</b>	<b>P</b>
<b>4</b>	<b>0</b>	<b>0</b>

#### **UNIT I INTRODUCTION 12**

Introduction – Invention and creativity – Intellectual Property (IP) – Importance – Protection of IPR – Basic types of property (i. Movable Property ii. Immovable Property and iii. Intellectual property).

#### **UNIT II PATENTS 12**

IP – Patents – Copyrights and related rights – Trade marks and rights arising from trademark registration – Definitions – Industrial designs and integrated circuits – Protection of geographical indications at national and international levels - Application procedures.

#### **UNIT III WIPO AND GATT 12**

International convention relating to intellectual property – Establishment of WIPO – Mission and activities – History – General Agreement on Trade and Tariff (GATT).

#### **UNIT IV POLICIES 12**

Indian Position Vs WTO and strategies – Indian IPR legislations – Commitments to WTO – Patent ordinance and the bill – Draft of a national intellectual property policy – Present against unfair competition.

#### **UNIT V CASE STUDIES 12**

Case studies on – Patents (Basumati rice, turmeric, Neem, etc.) – Copyright and related rights – Trade marks – Industrial design and integrated circuits – Geographic indications – Protection against unfair competition.

**Total: 60**

#### **TEXT BOOKS**

1. Subbaram, N.R., " Handbook of Indian Patent Law and Practice", S. Viswanathan Printers and Publishers Pvt. Ltd., 1998.
2. Eli Whitney, United States Patent Number : 72X, Cotton Gin, March 14, 1794.

#### **REFERENCES**

1. Intellectual Property Today: Volume 8, No. 5, May 2001, [www.iptoday.com].
2. Using the Internet for non-patent prior art searches, Derwent IP Matters, July 2000. [www. ipmatters.net/features/000707 gibbs.html.

## **TT1012 – MECHANICS OF TEXTILE MACHINERY**

<b>L</b>	<b>T</b>	<b>P</b>
<b>4</b>	<b>0</b>	<b>0</b>

<b>UNIT I</b>	<b>MACHINE DESIGN</b>	<b>12</b>
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Design of cams – Gear trains– Clutches and brakes– Practical application in textile machines.

<b>UNIT II</b>	<b>ROTARY MOTION</b>	<b>12</b>
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Equations of rotary motion– Power transmitted by rope and belt drives– Energy stored in rotating masses – Balancing of rotating masses.

<b>UNIT III</b>	<b>SPINNING MACHINES</b>	<b>12</b>
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Auto levellers– Differentials and variable speed drives– Traveller and balloon dynamics – Design of machine components.

<b>UNIT IV</b>	<b>PREPARATORY MACHINES</b>	<b>12</b>
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Yarn winding calculation.

<b>UNIT V</b>	<b>WEAVING MACHINES</b>	<b>12</b>
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Kinematics of shedding – Picking and beat up – Let off and take up mechanisms.

**Total: 60**

### **TEXT BOOKS**

1. Booth, J.E., “Textile Mathematics”, Vol.1, 2 and 3, The Textile Institute, Manchester, 1987.
2. Slater, K., “Textile Mechanics”, Vol.1 and 2. The Textile Institute, 1987.

# TT1013 – TECHNOLOGY OF STAPLE-FIBRE YARN TWISTING

L	T	P
4	0	0

## UNIT I FUNDAMENTALS OF TWISTING 12

Mechanics of imparting strength to a staple-fibre strand by twisting meaning of twist multiplier and the basis of selection of required twist – Principles of false twisting – Fundamental requirements to create real twist in the strand.

## UNIT II TWISTING IN RING SPINNING 12

Principle of twist insertion in ring spinning – Limitation of ring twisting – Mechanics of balloon formed during twisting – Influence of twisting on spinning triangle size and the subsequent effect on yarn quality and spinning performance – Design features of rings and travellers used for twisting different types of yarns.

## UNIT III TWISTING IN OPEN-END SPINNING 12

Principle of twist insertion in open-end spinning – Application of this principle in rotor spinning and friction spinning machines – Advantages of this method of twisting over ring twisting method – Comparison of yarn tension developed during twisting in these two machines.

## UNIT IV TWISTING IN AIR-JET SPINNING 12

Principle of twist formation in air-jet spinning – Advantage of using two air nozzles – The merits and demerits of this method of twisting – Application of this method of twisting in plyfil yarn production.

## UNIT V TWO-FOR-ONE TWISTING AND TWISTING METHODS 12

Principle of two-for-one twisting – The advantages of this method of twisting working of two for one twister – Twisting of yarns in double-rove fed spinning machines – Operating principle involved in the twisting of wrap-spun yarns – Technological and economic interrelationships in these methods of twisting – Role of twisting in fancy yarn production.

**Total: 60**

### TEXT BOOKS

1. De Barr A.E and Catling H., “The Principle and Theory of Ring Spinning”, The Textile Institute, 1965.
2. Usenko V., “Processing of Man-made Fibres”, Mir Publishers, 1979.

### REFERENCES

1. Klein W., “New Spinning Systems”, The Textile Institute, 1993.
2. Grosberg P and Iype C., “Yarn Production; Theoretical Aspects”, The Textile Institute, 1999.
3. Lord P.R., “Yarn Production: Science, Technology and Economics”, The Textile Institute, 1999.

# TT1014 – TEXTILE MACHINERY MAINTENANCE

**L T P**  
**4 0 0**

## **UNIT I TYPES 12**

Objects of maintenance – Types of maintenance – Organizational structure – Duties of maintenance personnel – System and procedures of maintenance – Need for system and procedures – Planning – Scheduling – Controlling – Implementation of planned maintenance – Backlogs – Rescheduling. Maintenance schedule (frequency – man power – time required – special tools – gauges – lubricants) for Blow room, carding, drawframe, comber, and speed frame – Ring frame – Doubler and Rotor spinning machines.

## **UNIT II SCHEDULES 12**

Maintenance schedule for cone winding, reeling, bundling, baling, warping, sizing, pirn winding, plain and auto looms, kiers, washing machines, stenters, jiggers, padding mangles and calendering machines – House keeping – Machinery lay out – Cleanliness – Material handling and equipments – Machinery audit – Maintenance recording – Maintenance ledger – Machine cards – Maintenance cost control.

## **UNIT III MAINTENANCES 12**

Maintenance of power house – Electrical powerhouse, equipments – Motors – Starters – Lightings – Humidification plant – Generators – Lubrication: Lubricant types – Characteristics – Equipments – Roller eccentricity and its control – Tolerance for drafting rollers – Textile machinery erection procedures: Levelling – Instruments used – Erection of carding machine – Ring frame – Looms – Maintenance details: Maintenance of card clothing – Wire inspection – Grinding procedure – burnishing – Wire mounting and tops clipping – Flat end milling.

## **UNIT IV TOP ROLLER MAINTENANCE 12**

Top roller maintenance – Cot selection and cot mounting procedure – Equipment – Buffing frequency – Grinding stone type – Berkolising – Cot lift – Top roller greasing – Spindle oil characteristics – Specifications – Topping – Replenishing – Shuttle care – Selection – Seasoning – life of shuttle – Maintenance of reed cleaning – Rectification of damages in pitch – Bound and all metal reeds – Drop wires – Types and maintenance.

## **UNIT V PICKER MAINTENANCE 12**

Maintenance of picker – Picking bands – Healds – Heald frames – Pirns – Modernization and renovation: Economics – Priorities, modernization versus replacement – Policy decision factors – Modernisation programmes for card, speed frame, ring frame, sizing and loom.

**Total: 60**

## **TEXTBOOKS**

1. “Spinning, Weaving and Processing Machinery Maintenance in Textile Mills”, TAIRO, Baroda.
2. “Maintenance Management in Spinning”, SITRA, Coimbatore

## **REFERENCES**

1. “Maintenance Schedules, Practices and Checkpoints in Spinning”, BTRA, Bombay
2. “Process Control in Weaving”, ATIRA, Ahmedabad.