

ANNA UNIVERSITY
AFFILIATED INSTITUTIONS

R - 2009

B.TECH. (PART TIME) TEXTILE TECHNOLOGY
PART TIME I TO VII SEMESTERS CURRICULUM AND SYLLABI

SEMESTER I

SL. NO.	CODE NO.	COURSE TITLE	L	T	P	C
1	PTMA2111	<u>Applied Mathematics</u>	3	0	0	3
2	PTPH2111	<u>Applied Physics</u>	3	0	0	3
3	PTCY2111	<u>Applied Chemistry</u>	3	0	0	3
4	PTGE2111	<u>Fundamentals of Computing</u>	3	0	0	3
5	PTGE2151	<u>Engineering Mechanics</u>	3	0	0	3
TOTAL			15	0	0	15

SEMESTER II

SL. NO.	CODE NO.	COURSE TITLE	L	T	P	C
1	PTMA2211	<u>Transforms and Partial Differential Equations</u>	3	0	0	3
2	PTCH2202	<u>Mechanics of Solids</u>	3	0	0	3
3	PTTT2202	<u>Mechanical Engineering</u>	3	0	0	3
4	PTGE2021	<u>Environmental Science and Engineering</u>	3	0	0	3
5	PTTT2201	<u>Electrical Engineering</u>	3	0	0	3
TOTAL			15	0	0	15

SEMESTER III

SL. NO.	CODE NO.	COURSE TITLE	L	T	P	C
1	PTTT2251	<u>Chemistry for Textiles</u>	3	0	0	3
2	PTTT2255	<u>Structure and Properties of Fibres</u>	3	0	0	3
3	PTTT2203	<u>Spun Yarn Technology I</u>	3	0	0	3
4	PTTT2253	<u>Fabric Manufacture I</u>	3	0	0	3
5	PTTT2301	<u>Knitting Technology</u>	3	0	0	3
TOTAL			15	0	0	15

SEMESTER IV

SL. NO.	CODE NO.	COURSE TITLE	L	T	P	C
1	PTTT2302	<u>Process and Quality Control in spinning</u>	3	0	0	3
2	PTTT2254	<u>Spun Yarn Technology II</u>	3	0	0	3
3	PTTT2303	<u>Fabric Manufacture II</u>	3	0	0	3
4	PTTT2304	<u>Textile Chemical Processing I</u>	3	0	0	3
5	PTTT2354	<u>Woven Fabric Structure</u>	3	0	0	3
TOTAL			15	0	0	15

SEMESTER V

SL. NO.	CODE NO.	COURSE TITLE	L	T	P	C
1	PTTT2352	<u>Textile Chemical Processing II</u>	3	0	0	3
2	PTTT2305	<u>Textile Quality Evaluation</u>	3	0	0	3
3	PTTT2351	<u>Quality assurance in Fabric Manufacture and Garment production</u>	3	0	0	3
4	PTTT2403	<u>Bonded fabrics</u>	3	0	0	3
5	PTTT2357	<u>Textile Chemical Processing Laboratory</u>	0	0	3	2
TOTAL			12	0	3	14

SEMESTER VI

SL. NO.	CODE NO.	COURSE TITLE	L	T	P	C
1	PTMG2351	<u>Principles of Management</u>	3	0	0	3
2	PTTT2401	<u>Quality assurance in Chemical Processing</u>	3	0	0	3
3	PTTT2353	<u>Garment Technology</u>	3	0	0	3
4		Elective I	3	0	0	3
5		Elective II	3	0	0	3
TOTAL			15	0	0	15

SEMESTER VII

SL. NO.	CODE NO.	COURSE TITLE	L	T	P	C
1	PTGE2022	<u>Total Quality Management</u>	3	0	0	3
2	PTTT2402	<u>Mechanics of Textile Machinery</u>	3	0	0	3
3		Elective III	3	0	0	3
4	PTTT2452	Project Work	0	0	12	6
TOTAL			9	0	12	15

LIST OF ELECTIVES

ELECTIVE I

CODE NO.	COURSE TITLE	L	T	P	C
PTTT 2021	<u>Textured Yarn Technology</u>	3	0	0	3
PTTT 2022	<u>Silk Yarn Technology</u>	3	0	0	3
PTTT 2023	<u>Mechanics of Textile Structures</u>	3	0	0	3
PTTT 2031	<u>Fashion art and Design</u>	3	0	0	3
PTTT 2032	<u>Textile Machinery Maintenance</u>	3	0	0	3

ELECTIVE II

CODE NO.	COURSE TITLE	L	T	P	C
PTTT 2033	<u>Industrial Engineering in Textile Manufacture</u>	3	0	0	3
PTTT 2041	<u>Apparel Product Engineering and Plant Layout</u>	3	0	0	3
PTTT 2043	<u>Garment Production Machinery and Equipment</u>	3	0	0	3
PTTT 2071	<u>Apparel Production Control</u>	3	0	0	3
PTTT 2072	<u>Apparel Marketing and Merchandising</u>	3	0	0	3

ELECTIVE III

CODE NO.	COURSE TITLE	L	T	P	C
PTTT 2081	<u>Export Documentation & Global Marketing</u>	3	0	0	3
PTTT 2082	<u>Textile Costing</u>	3	0	0	3
PTFT 2026	<u>Creativity, Innovation and New Product Development</u>	3	0	0	3
PTTT 2083	<u>CAD / CAM for Apparel Products</u>	3	0	0	3

- UNIT I MATRICES 9**
Characteristic equation – Eigenvalues and Eigenvectors of a real matrix – Properties of eigenvalues and eigenvectors – Cayley – Hamilton Theorem – Diagonalization of matrices - Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms .
- UNIT II FUNCTIONS OF SEVERAL VARIABLES 9**
Partial derivatives – Homogeneous functions and Euler’s theorem – Total derivative – Differentiation of implicit functions – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor’s series for functions of two variables - Maxima and minima of functions of two variables.
- UNIT III ANALYTIC FUNCTION 9**
Analytic functions – Necessary and sufficient conditions for analyticity – Properties – Harmonic conjugates – Construction of analytic function – Conformal Mapping – Mapping by functions $w = a + z$, az , $1/z$, - Bilinear transformation.
- UNIT IV COMPLEX INTEGRATION 9**
Line Integral – Cauchy’s theorem and integral formula – Taylor’s and Laurent’s Series – Singularities – Residues – Residue theorem – Application of Residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour with no pole on real axis.
- UNIT V LAPLACE TRANSFORMS 9**
Existence conditions – Transforms of elementary functions – Basic properties – Transforms of derivatives and integrals – Initial and Final value theorems – Inverse transforms – Convolution theorem – Transform of periodic functions – Application to solution of linear ordinary differential equations with constant coefficients.

TOTAL : 45 PERIODS

TEXT BOOKS

1. Grewal B.S., Higher Engineering Mathematics (40th Edition), Khanna Publishers, Delhi (2007).
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill Co. Ltd., New Delhi (2007).

REFERENCE BOOKS

1. Glyn James, Advanced Modern Engineering Mathematics, Pearson Education (2007).
2. Veerarajan, T., Engineering Mathematics (For First Year), Tata McGraw-Hill Pub. Pvt Ltd., New Delhi (2006).

UNIT I ULTRASONICS

Introduction – Production – magnetostriction effect - magnetostriction generator- piezoelectric effect - piezoelectric generator- Detection of ultrasonic waves properties – Cavitations - Velocity measurement – acoustic grating - Industrial applications – drilling, welding, soldering and cleaning – SONAR - Non Destructive Testing – pulse echo system through transmission and reflection modes - A, B and C –scan displays, Medical applications - Sonograms

UNIT II LASERS **9**

Introduction – Principle of Spontaneous emission and stimulated emission. Population inversion, pumping. Einstein's A and B coefficients - derivation. Types of lasers – He-Ne, CO₂, Nd-YAG, Semiconductor lasers - homojunction and heterojunction (Qualitative)- Industrial Applications - Lasers in welding, heat treatment and cutting – Medical applications - Holography (construction and reconstruction).

UNIT III FIBER OPTICS & APPLICATIONS **9**

Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle - Types of optical fibres (material, refractive index, mode) – Double crucible technique of fibre drawing - Splicing, Loss in optical fibre – attenuation, dispersion, bending - Fibre optical communication system (Block diagram) - Light sources - Detectors - Fibre optic sensors – temperature and displacement - Endoscope.

UNIT IV QUANTUM PHYSICS **9**

Black body radiation – Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh – Jeans' Law from Planck's theory – Compton effect - Theory and experimental verification – Matter waves – Schrödinger's wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one-dimensional box - Electron microscope - Scanning electron microscope - Transmission electron microscope.

UNIT V CRYSTAL PHYSICS **9**

Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – 'd' spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – NaCl, ZnS, diamond and graphite structures – Polymorphism and allotropy - Crystal defects – point, line and surface defects- Burger vector.

TOTAL: 45 PERIODS**TEXT BOOKS:**

1. Palanisamy, P.K., 'Engineering Physics' Scitech publications, Chennai, (2008).
2. Arumugam M. ' Engineering Physics', Anuradha Publications, Kumbakonam, (2007)
3. Sankar B.N and Pillai S.O. 'A text book of Engineering Physics', New Age International Publishers, New Delhi, 2007.

REFERENCES:

1. R. K. Gaur and S.C. Gupta, 'Engineering Physics' Dhanpat Rai Publications, New Delhi (2003)
2. M.N. Avadhanulu and PG Kshirsagar, 'A Text book of Engineering Physics', S.Chand and company, Ltd., New Delhi, 2005.
3. Serway and Jewett, 'Physics for Scientists and Engineers with Modern Physics', 6th Edition, Thomson Brooks/Cole, Indian reprint (2007)

UNIT I WATER TREATMENT AND POLLUTION CONTROL**9**

Treatment of water –impurities and disadvantages of hard water-Domestic and Industrial treatment - zeolite and ion exchange processes-Portable water-Boiler feed water – conditioning of boiler feed water. Scale and sludge formation –prevention –caustic embrittlement-boiler corrosion–priming and foaming Sewage treatment–Primary, secondary and tertiary treatment–significance of DO, BOD and COD-desalination – reverse osmosis. Control of water, air and land pollution.

UNIT II FUELS**9**

Classification of fuels-Proximate and ultimate analysis of coal- coke manufacture-Otto Hoffman by product method-cracking-thermal and catalytic (fixed bed and fluidized bed)-petroleum-refining-fractions-composition and uses synthetic petrol-fischer drops methods- Bergius process- knocking-octane number and cetane number-Preparation, composition and uses of producer gas , water gas and natural gas. Flue gas analysis-Orsat apparatus- gross and net calorific values- calculation of minimum requirement of air(simple calculations)- Explosive range –spontaneous ignition temperature

UNIT III THERMODYNAMICS AND SURFACE CHEMISTRY**9**

Second law of thermodynamics-entropy and its significance- criteria for spontaneity- free energy-Gibbs, Helmholtz and Gibbs-Helmholtz equation-applications and problems – Adsorption –types of adsorption- adsorption of gases on solids- adsorption isotherm-Freundlich and Langmuir isotherms-adsorption of solutes from solutions- applications

UNIT IV ELECTROCHEMISTRY - CORROSION AND CATALYSIS**9**

Reversible and irreversible cells-electrode potentials-types of electrodes-cell reactions-Nernst equations- electrochemical and galvanic series-fuel cells and solar cells-corrosion-chemical and electrochemical-factors affecting corrosion-sacrificial anode-impressed current cathodic protection-surface treatment and protective coating-Catalysis –classification-characteristics of catalysis – auto catalysis- enzyme catalysis

UNIT V POLYMERS-COMPOSITES AND NANOCHEMISTRY**9**

Polymers-definition-classification-thermoplastics and thermosetting plastics differences Preparation, properties and uses of polystyrene, bakelite, PET, polyurethane, Teflon, ureaformaldehyde, polycarbonates-Elastomers-Preparation, properties of Buna-S, nitrile, neoprene and butyl rubber, silicon rubber. Composites-FRP. Nanochemistry-introduction to nanochemistry- preparation and properties of nonmaterial-nano rods, nano wires-nanotubes-carbon nanotubes and their applications.

TOTAL : 45 PERIODS**TEXT BOOKS:**

1. Dhara S S A text book of Engineering Chemistry, S.Chand & Co Ltd, New Delhi,2002
2. Jain. P.C and Monica Jain, Engineering Chemistry,Dhanpet Rai & Sons, New Delhi 2001

REFERENCE BOOKS:

1. Puri B R.,Sharma L R and Madhan S. Pathania, Principles of Physical Chemistry Shoban Lal Nagin Chand & Co. Jalandar-2000.
2. G.B. Sergeev, Nanochemistry.Elsevier Science, New York,2006
3. V.R.Gowarikar, N.V.Viswanathan and Jayadev Sreedhar, Polymer Science, Wiley Eastern Limited, Madras (2006).

AIM:

- To introduce the basics of computing and the fundamentals of C programming.

OBJECTIVES:

- To introduce the fundamentals of computing systems.
- To introduce the concepts of internet and WWW.
- To teach programming in C.

UNIT I**9**

Computer systems – Exploring computers – Inside the system – Processing data – CPUs – Types of storage devices - Operating systems basics – Networking basics.

UNIT II**9**

The internet and the WWW – Internet services – connecting to the internet - Working with applications software – productivity software – graphics and multimedia – Data base Management systems – Creating computer program.

UNIT III**9**

C programming fundamentals – compilation process – variables – Data types – Expressions – looping – decisions.

UNIT IV**9**

Arrays - Working with functions – structures – character strings – pre-processor.

UNIT V**9**

Pointers – Dynamic memory allocation – linked list – Applications

TOTAL: 45 PERIODS**TEXT BOOKS**

1. Peter Norton, "Introduction to Computers", Sixth Edition, Tata McGraw Hill, 2007.
2. Stephen G. Kochan, "Programming in C", Third Edition, Pearson Education, 2007.

REFERENCES

1. Kernighan,B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2006
2. Ashok N. Kamthane, "Computer programming", Pearson Education, 2007.
Kenneth A. Reek, "Pointers on C", Pearson Education, 2007.
3. Dromey,R.G, "How to solve it by Computer", Pearson Education, 2007.

OBJECTIVE

At the end of this course the student should be able to understand the vectorial and scalar representation of forces and moments, static equilibrium of particles and rigid bodies both in two dimensions and also in three dimensions. Further, he should understand the principle of work and energy. He should be able to comprehend the effect of friction on equilibrium. He should be able to understand the laws of motion, the kinematics of motion and the interrelationship. He should also be able to write the dynamic equilibrium equation. All these should be achieved both conceptually and through solved examples.

UNIT I BASICS & STATICS OF PARTICLES**9**

Introduction – Units and Dimensions – Laws of Mechanics – Lamé's theorem, Parallelogram and triangular Law of forces – Vectors – Vectorial representation of forces and moments – Vector operations: additions, subtraction, dot product, cross product – Coplanar Forces – Resolution and Composition of forces – Equilibrium of a particle – Forces in space – Equilibrium of a particle in space – Equivalent systems of forces – Principle of transmissibility – Single equivalent force.

UNIT II EQUILIBRIUM OF RIGID BODIES**9**

Free body diagram – Types of supports and their reactions – requirements of stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon's theorem – Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions – Examples \

UNIT III PROPERTIES OF SURFACES AND SOLIDS**9**

Determination of Areas and Volumes – First moment of area and the Centroid of sections – Rectangle, circle, triangle from integration – T section, I section, - Angle section, Hollow section by using standard formula – second and product moments of plane area – Rectangle, triangle, circle from integration – T section, I section, Angle section, Hollow section by using standard formula – Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia – Principal moments of inertia of plane areas – Principal axes of inertia – Mass moment of inertia – Derivation of mass moment of inertia for rectangular section, prism, sphere from first principle – Relation to area moments of inertia.

UNIT IV DYNAMICS OF PARTICLES**9**

Displacements, Velocity and acceleration, their relationship – Relative motion – Curvilinear motion – Newton's law – Work Energy Equation of particles – Impulse and Momentum – Impact of elastic bodies.

UNIT V FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS**9**

Frictional force – Laws of Coloumb friction – simple contact friction – Rolling resistance – Belt friction.

Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion.

TOTAL: 45 PERIODS**TEXT BOOK:**

1. Beer, F.P and Johnson Jr. E.R. "Vector Mechanics for Engineers", Vol. 1 Statics and Vol. 2 Dynamics, McGraw-Hill International Edition, (1997).

REFERENCES:

1. Rajasekaran, S, Sankarasubramanian, G., "Fundamentals of Engineering Mechanics", Vikas Publishing House Pvt. Ltd., (2000).
2. Hibbeler, R.C., "Engineering Mechanics", Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd., (2000).
3. Palanichamy, M.S., Nagam, S., "Engineering Mechanics – Statics & Dynamics", Tata McGraw-Hill, (2001).
4. Irving H. Shames, "Engineering Mechanics – Statics and Dynamics", IV Edition – Pearson Education Asia Pvt. Ltd., (2003).
5. Ashok Gupta, "Interactive Engineering Mechanics – Statics – A Virtual Tutor (CDROM)", Pearson Education Asia Pvt., Ltd., (2002).

**PTMA2211 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS L T P C
3 0 0 3****AIM:**

To facilitate the understanding of the principles and to cultivate the art of formulating physical problems in the language of mathematics.

OBJECTIVES:

- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems
- To acquaint the student with Fourier transform techniques used in wide variety of situations in which the functions used are not periodic
- To introduce the effective mathematical tools for the solutions of partial differential equations that model physical processes
- To develop Z- transform techniques which will perform the same task for discrete time systems as Laplace Transform, a valuable aid in analysis of continuous time systems

UNIT I FOURIER SERIES 9

Dirichlet's conditions – General Fourier series – Odd and even functions – Half-range Sine and Cosine series – Complex form of Fourier series – Parseval's identity – Harmonic Analysis.

UNIT II FOURIER TRANSFORM 9

Fourier integral theorem – Fourier transform pair-Sine and Cosine transforms – Properties – Transform of elementary functions – Convolution theorem – Parseval's identity.

UNIT III PARTIAL DIFFERENTIAL EQUATIONS 9

Formation – Solutions of first order equations – Standard types and Equations reducible to standard types – Singular solutions – Lagrange's Linear equation – Integral surface passing through a given curve – Solution of linear equations of higher order with constant coefficients.

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 9

Method of separation of Variables – Solutions of one dimensional wave equation and one-dimensional heat equation – Steady state solution of two-dimensional heat equation – Fourier series solutions in Cartesian coordinates.

UNIT V Z – TRANSFORM AND DIFFERENCE EQUATIONS 9
Z-transform – Elementary properties – Inverse Z-transform – Convolution theorem – Initial and Final value theorems – Formation of difference equation – Solution of difference equation using Z-transform.

TOTAL : 45 PERIODS

TEXT BOOKS

4. Grewal, B.S. “Higher Engineering Mathematics”, Khanna Publications (2007)

REFERENCES:

1. Glyn James, “Advanced Modern Engineering Mathematics, Pearson Education (2007)
2. Ramana, B.V. “Higher Engineering Mathematics” Tata McGraw Hill (2007).
3. Bali, N.P. and Manish Goyal, “A Text Book of Engineering 7th Edition (2007) Lakshmi Publications (P) Limited, New Delhi.

PTCH2202

MECHANICS OF SOLIDS

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

(Common to Chemical & Textile Technology)

AIM

To impart knowledge on structural, Mechanical properties of Beams and columns.

OBJECTIVES

The students will be able to design the support column, beams, pipelines, storage tanks and reaction columns and tanks after undergoing this course. This is precursor for the study on process equipment design and drawing.

UNIT I STRESS, STRAIN AND DEFORMATION 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 – welded joints – design.

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, simply – supported beams and over hanging beams – relationships between loading, S.F. and B.M. in beams and their applications – S.F.& B.M. diagrams.

UNIT III DEFLECTIONS OF BEAMS 9

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 – determination of shear stress in flanged beams.

UNIT V TORSION 9

Torsion of circular shafts – derivation of torsion equation ($T/J = C/R = G\theta/L$) – stress and deformation in circular and hollow shafts –stepped shafts – shafts fixed at both ends – stresses in helical springs – deflection of springs – spring constant

COLUMNS

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.

TOTAL : 45 PERIODS

TEXT BOOKS

1. Junarkar, S.B., Mechanics of Structure Vol. 1, 21st Edition, Character Publishing House, Anand, India, (1995)
2. William A.Nash, Theory and Problems of Strength of Materials, Schaum's Outline Series. McGraw Hill International Editions, Third Edition, 1994.

REFERENCES

1. Elangovan, A., Thinma Visai Iyal (Mechanics of Solids in Tamil), Anna University, Madras, 1995.

PTTT2202

MECHANICAL ENGINEERING

**LT P C
3 0 0 3**

(Common to Textile Technology & Fashion Technology)

AIM

To introduce the Mechanical Engineering Fundamentals.

OBJECTIVES

Students gain knowledge in the application of Mechanical and Thermodynamic principles in the design and operation of Equipments and machineries.

UNIT I LAWS OF THERMODYNAMICS 10

Basic concepts and hints; Zeroth law; First Law of Thermodynamics – Statement and application; Steady flow energy equation; Second law of Thermodynamics—Statement; Limitations Heat Engine; Heat Pump, Available energy, Kelvin—Plank statement and Clausius statement; Equivalence entropy; Reversibility: Entropy charts; Third law of Thermodynamics—Statement.

UNIT II HEATING AND EXPANSION OF GASES 5

Expressions for; work done; Internal energy, Hyperbolic and polytropic processes; Free expansion and Throttling.

UNIT III AIR STANDARD EFFICIENCY 5

Carnot cycle; Stirlings Cycle: Joule Cycle; Otto Cycle; Diesel Cycle; Dual combustion Cycle.

UNIT IV I.C. ENGINES 4

Engine nomenclature and classifications; SI Engine: CI Engine; Four Stroke cycle Two stroke cycle; Performance of I.C. Engine; Brake thermal efficiency; Indicated Thermal Efficiency, Specific fuel consumption.

UNIT V	STEAM AND ITS PROPERTIES	4
Properties of steam; Dryness fraction; latent heat; Total heat of wet steam; Superheated steam. Use of steam tables; volume of wet steam; Volume of superheated steam; External work of evaporation; Internal energy; Entropy of vapour, Expansion of vapour, Rankine cycle; Modified Rankine cycle.		
UNIT VI	STEAM ENGINES AND TURBINES	3
Hypothetical indicator diagram of steam engine; Working of a simple steam engine; steam turbines—Impulse and Reaction types—Principles of operation.		
UNIT VII	SIMPLE MECHANISM	3
Kinematic Link, Kinematic Pair Kinematic Chain; Slider Crank mechanism and inversions; Double slider crank mechanism and inversions.		
UNIT VIII	FLY WHEEL	4
Turning moment Diagram; Fluctuation of Energy; Design of fly wheel.		
UNIT IX	DRIVES	5
Belt and rope drives; Velocity ratio; slip; Ratio of tensions; Length of belt; Maximum HP; simple, compound and Epicyclic gear trains.		
UNIT X	BALANCING	2
Balancing of rotating masses in same plane; Balancing of masses rotating in different planes.		

TOTAL : 45 PERIODS

TEXT BOOKS

1. Smith, Chemical Thermodynamics, Reinhold Publishing Co., 1977.
2. Bhaskaran, K.A., and Venkatesh, A., Engineering Thermodynamics, Tata McGraw-Hill, 1973.

REFERENCES

1. A.Pandya and Shah, Theory of Machines, Charatakar Publisheres, 1975.
2. NAG, P.E., Engineering thermodynamics, II Edition, Tata McGraw-Hill Publishing Co., Ltd., 1995.

PTGE2021 ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C
3 0 0 3

AIM:

To create awareness in every engineering graduate about the importance of environment, the effect of technology on the environment and ecological balance and make them sensitive to the environment problems in every professional endeavour that they participates.

OBJECTIVE:

- At the end of this course the student is expected to understand what constitutes the environment, what are precious resources in the environment, how to conserve these resources, what is the role of a human being in maintaining a clean environment and useful environment for the future generations and how to maintain ecological balance and preserve bio-diversity. The role of government and non-government organization in environment managements.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

Field study of common plants, insects, birds

Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 8

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.

Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES 10

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization- environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6
Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Gilbert M.Masters, "Introduction to Environmental Engineering and Science", 2nd edition, Pearson Education, 2004.
2. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2006.

REFERENCES

1. R.K.Trivedi, "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media.
2. Cunningham, W.P. Cooper, T.H. Gorhani, "Environmental Encyclopedia", Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, "Environmental law", Prentice hall of India PVT LTD, New Delhi, 2007.
4. Rajagopalan, R, "Environmental Studies-From Crisis to Cure", Oxford University Press, 2005.

PTTT2201 ELECTRICAL ENGINEERING L T P C
3 0 0 3

(Common to Textile & Fashion Technology)

AIM

To introduce the principles of Electrical Engineering and the concepts of DC and AC machines.

OBJECTIVES

After the completion of this course, students gain knowledge in fundamentals of Electrical Engineering and the operational and design aspects of DC and AC motors and drives.

UNIT I 9

SI units law, series, and parallel circuits, Kirchhoffs laws, Mechanical, Star-delta transformation – magnetic circuits – force on a current carrying conductor – electromagnetic induction, Faraday's Law, Lenz's law – effects of hysteresis & eddy currents – Self and mutual inductances.

UNIT II 9

Generation of an alternating emf – average and rms values of alternating quantity – representation of alternating quantities by phasors – single phase circuits – resonance – three phase balanced systems – single and three phase power calculations.

UNIT III **9**
Principle of operation of DC machines - emf equation – types of generators – Magnetization and Load characteristics of DC generators – types and characteristics of DC motors – torque equation – DC motor starters (three point) – Efficiency calculation and Swinburne's test O Speed control.

UNIT IV **9**
Construction and principle of operation of single phase transformer – emf equation O.C. & S.C. tests – efficiency and regulation – 3F Transformers, Transmission and distribution – principle and operation of three phase induction motors – types – slip torque characteristics – principle and operation of alternators – O.C. & S.C. tests – regulations by synchronous impedance method.

UNIT V **9**
Basic principles of indicating instruments – moving coil and moving iron instruments – dynamometer type wattmeters – induction types energy meter – measurement of single and three phase power.

TOTAL : 45 PERIODS

TEXT BOOKS

1. Electrical Engineering Fundamentals/Del Toro 2nd edition / Prentice Hall Publishers.
2. Fundamental of Electrical Engineering / Ashfaq Husain, 2nd edition / Dhanpat Rai & Co.

REFERENCES

1. Electrical technology – Edward Hughes.
2. Introduction to electrical Engineering – Naidu & Kamakshaiah
3. Theory and Problems of Basic Electrical Engineering / D.P.Kothari & I.J. Nagrath, PHI Publishers, 1998.
4. Basic Electrical Engineering / V.N.Mittle / TMH 1998.
5. Electrical Technology – Vincent Del toro

PTTT2251

CHEMISTRY FOR TEXTILES

L T P C
3 0 0 3

AIM

To impart a sound knowledge of theoretical aspects of Carbohydrates, Aminoacids and Proteins, Oils, Fats and Waxes, Bleaching agents, Dyes.

OBJECTIVES

Students should be conversant with:

Structure and properties of cellulose

- Chemical composition, properties (chemical and physical) of different fibres
- Methods of Bleaching and Dyeing techniques

UNIT I **CARBOHYDRATES** **9**

Introduction, mono- and di-saccharides – important reactions. Polysaccharides-Starch and Cellulose- Structure and properties. Reactions of cellulose. Derivatives of cellulose-carboxy-methyl cellulose, secondary cellulose acetate and cellulose triacetate. Lignin – structure and properties. Delignification of lignocelluloses- chemistry and mechanism. Preparation, physical and chemical properties of regenerated cellulose and its textile uses.

UNIT II AMINOACIDS AND PROTEINS, OILS, FATS AND WAXES 9
Classification of proteins, test for proteins, denaturation. Wool and silk - chemical composition, properties (chemical and physical), structural aspects and application. Analysis of oils and fats- Classification of waxes. Fatty, waxy/gummy and protein materials present in natural fibres (cotton, silk, wool etc) and their removal.

UNIT III BLEACHING AGENTS 9
Oxidative (chlorite, hypochlorite and hydrogen peroxide) and reductive (borohydrides, sulphites, hydrosulphites etc) bleaching agents and their mechanism of action in textile bleaching.
Heterocyclic compounds
Furan, thiophene, pyrrole, pyridine and indole- their important derivatives.

UNIT IV DYES 9
Colour and constitution. Light absorption properties of dyes. Beer-Lambert law. Dye estimation by spectrophotometer.
Classification of dyes and intermediates viz, azines, oxazines, thiazine, acridine, thiazole, quinoline, cyanide dyes, diphenyl and triphenyl methane dyes. Structure and synthesis of important azo dyes (methyl orange, congo red and methyl red), diphenyl methane dyes (malachite green, para rosaniline) and anthraquinone dyes (alizarin). Indigoid, thioindigoid, solubilized vat dyes, reducing agents in vat dyeing and their reduction potentials, sulphur color, phthalocyanine and phthalin dyes, reactive dyes and mordant dyes. Disperse dyeing and its mechanism. Cationic dyestuff. Natural dyes - source, extraction and the structure of the dye component. Fluorescent brightening agents- their chemistry, preparation and uses.

UNIT V THEORY OF DYEING 9
Polymer-dye interactions. Substantivity and affinity. Kinetics and thermodynamics of dyeing. Derivation of affinity equation. Various adsorption isotherms in dyeing and their thermodynamic derivations. Dye diffusion (Ficks first and second laws), equilibrium adsorption, partition coefficient, time of half-dyeing, dyeability and dye diffusion temperature. Derivation of William Landed Ferry (WLF) equation and its significance. Free volume and solubility parameter concepts in dyeing.

TOTAL : 45 PERIODS

TEXT BOOKS

1. Introduction to chemistry of dyestuffs, V.A.Shenai, Sevak Publications, Mumbai, 1995.
2. Textile chemistry, R.H.Peters, Vol. III, The physical chemistry of dyeing, Elsevier, 1975.

REFERENCES

1. Bahl, B.S and Arun Bahl, Advanced organic chemistry, Sultanchand and Sons, New Delhi, 1994.
2. The chemistry of synthetic dyes, vol.I and II, Academic press, London, 1971.
3. The theory of colouration of textiles, eds.; C.L.Bird and W.S.Boston Dyers company publications trust, England, 1975
4. Dyeing and chemical technology of textile fibres, Trotman E.R, Edward Arnold Kent, England.
5. Synthetic organic chemistry, Agarwal O.P, Fifth edition, Goel Publishing house, Meerut, 1981.

AIM

To provide a sound knowledge of the fibre structure and their important physical properties

OBJECTIVE

- To study the fibre structure and its important characterisation methods
- To study the important fibre properties such as moisture absorption, mechanical properties, optical and frictional properties, electrical and thermal properties.

UNIT I STRUCTURE OF FIBRES 9

Basic requirements for fibre formation. Structure of natural and man-made textile fibres – chemical structure, fine structure, and morphological structure of cotton, viscose, acetate, polyester, polyamide, polyacrylonitrile, polyethylene, polypropylene and bast fibres. Basic concepts of intra- and inter-molecular forces, degree of order, degree of orientation of molecular chains, ordered and disordered regions. Models of fibre structure – fringed micelle model, modified-fringed micelle model, fringed fibril model. Similarities and differences amongst the structural features of natural and man-made fibres. Investigation of fibre structure – Electron microscopy, X-ray diffraction methods, Infra-red radiation techniques, density measurement.

UNIT II MOISTURE ABSORPTION PROPERTIES OF FIBRES 9

Definitions of humidity – absolute humidity and relative humidity, moisture content and regain. Hygroscopic nature of fibres – regain curves. Measurement of regain and determination of correct invoice mass in fibres. Hysteresis in moisture absorption. Equilibrium absorption of moisture by fibres. Effect of fibre structure – hydrophilic groups and non-crystalline regions on moisture absorption. Effect of ambient conditions – relative humidity and temperature on regain of fibres. Heats of sorption – differential and integral - relation with fibre structure and regain, measurement of heat of wetting. Conditioning of fibres – mechanism of conditioning, factors influencing rate of conditioning, effect of conditioning on fibre properties. Swelling of fibres – axial swelling, transverse swelling, area swelling and volume swelling.

UNIT III MECHANICAL PROPERTIES OF FIBRES 9

Tensile testing of fibres – cotton, viscose, acetate, modal, lyocel, polyester, polyamide, polyacrylonitrile, polyethylene, polypropylene, jute and flax fibres. Definitions of terms – load, elongation, breaking strength, breaking extension, tensile stress, tensile strain, mass specific stress, yield point, initial modulus, work of rupture and work factor. Stress-strain curves for various textile fibres and their significance. Influence of fibre structure, humidity and temperature on stress-strain characteristics of fibres. Methods of tensile testing – constant rate of loading and constant rate of extension, differences between the two methods of test. Elastic properties – elasticity, elastic recovery and its relation to stress and strain, work recovery, typical values of elastic recovery and work recovery for various textile fibres. Mechanical conditioning of fibres – advantages. Time effects – stress relaxation and creep phenomena. Dynamic tensile testing of fibres. Torsional rigidity – its relation to other fibre properties, measurement techniques. Flexural rigidity – its relation to other fibre properties, measurement techniques.

UNIT IV OPTICAL AND FRICTIONAL PROPERTIES 9

Refractive index of fibres – definition, factors influencing and measurement. Birefringence – measurement techniques, effect of factors like fibre orientation, density

and regain. Optical orientation factor, its relation with refractive index and birefringence. Reflection of light – specular and diffused reflection, lustre, lustre index, factors influencing lustre. Absorption of light – dichroism, dichroic ratio. Introduction to fibre friction. Theories of friction – Amonton’s law, Bowden’s adhesion shearing mechanism, Lincoln’s law. Measurement of friction – friction between single fibres, friction between fibre assemblies. Factors influencing fibre friction. Role of friction in fibre processing. Friction in wool – directional frictional effect, felting.

UNIT V ELECTRICAL AND THERMAL PROPERTIES 9

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 : 45 PERIODS

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.

PTTT2203

SPUN YARN TECHNOLOGY I

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

AIM

To impart basic knowledge of various preparatory processes in Yarn manufacture.

OBJECTIVES

Students will be familiar with

Mechanism, Working and implication of Ginning process

The operation and manipulation of process parameters in

- Opening and Cleaning machines
- Card
- Draw Frame
- Comber
- Speed frame

UNIT I GINNING AND BLOWROOM 9
 Objectives of ginning, Study of working of different gins – Knife roller gin, Saw gin. Ginning out-turn. Effect of ginning performance on yarn quality – Power requirement in ginning.
 Objectives of blowroom. Principle and description of Opening, Cleaning and Blending machines. Concepts of Opening intensity and Cleaning efficiency. Settings and speeds of various Openers/cleaners. Sequence of machines in modern blowroom line. Blowroom line for cotton and man-made fibres and their blends. Dust extractors, Filters, Waste collection. Mechanism of lap formation, Chute feed. Power requirement in blowroom.

UNIT II CARDING 9
 Objectives of carding. Basics of Opening, Cleaning and fibre individualisation. Study of working of semi high production, high production cards. Speeds and setting of functional elements. Concept of auto levelling in carding. Drives, Card clothing and Production calculation. Concept of Cylinder loading and the factors influencing it. Latest developments in carding to increase production and sliver quality.

UNIT III DRAWFRAME 9
 Basic principles of doubling and drafting. Description of working of various drafting systems. Concept of roller flutes, roller setting, roller pressure, web condensation and roller lapping. Study of stop motions. Draft and production calculation. Effect of roller defects, roller setting, roller pressure, break draft and draft distribution on sliver quality. Process parameters for processing cotton, man-made fibres and blends. Working of autoleveller on drawframe. Developments in drawframe machines. Influence of drawframe sliver quality on yarn characteristics.

UNIT IV COMBER 9
 Requirement and objectives of comber preparatory process. Methods of lap preparation – lap doubling process, sliver doubling process, their merits and limitations. Objectives and principles of combing. Working of comber – sequence and timing of operations in combing. Types of feeding – concurrent feed and counter feed, Degree of combing. Combing efficiency. Concept of piecing waves, asymmetric web condensation. Comber waste in relation to pre-comber draft, direction of fibre hooks, type of feed, top comb setting. Settings and production calculation. Determining optimum level of comber waste for different mixings and yarn counts. Introduction to modern combers.

UNIT V SPEEDFRAME 9
 Objectives of speedframe. Principle of working of modern speedframe. Differences between bobbin lead / flyer lead roving processes. Mechanism of winding and bobbin building. Settings and speeds. Draft, twist and production calculations. Effect of roller setting, roller pressure, apron spacing on roving quality. Importance of roving quality on ringframe performance and yarn quality.

TOTAL : 45 PERIODS

TEXTBOOKS

1. Klein W., Vol. 1-3, “The Technology of Short Staple Spinning”, “A Practical Guide to Opening & Carding” and “A Practical Guide to Combing, Drawing, and Roving frame”, The Textile Institute, Manchester, U.K., 1998.
2. Chattopadhyay R. (Ed), Advances in Technology of Yarn Production, NCUTE, IIT Delhi, 2002.

REFERENCES

1. Chattopadhyay R., Technology of Carding, NCUTE, IIT Delhi, 2003.
2. Chattopadhyay R. & Rengasamy R., "Spinning, Drawing, Combing & Roving, NCUTE Pilot Programme.
3. Salhotra K. R. & Chattopadhyay R., Book of papers on "Blowroom and Carding", IIT Delhi 1998.
4. Duraiswamy I, Chellamani P & Pavendhan A., "Cotton Ginning" Textile Progress, The Textile Institute, Manchester, U.K., 1993.
5. Lord P. R., Yarn Production: Science Technology and Economics", The Textile Institute, Manchester, U.K., 1999.

PTTT2253

FABRIC MANUFACTURE – I

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

AIM

To impart basic of different processes in the sequence of fabric manufacture like cone winding, warping, sizing, drawing in and pirn winding.

OBJECTIVE

- To know the objectives of different processes.
- To get thorough knowledge in the concepts involved in these processes.
- To study the mechanism involved in the different processes.
- To get exposure to the latest developments in these processes.

UNIT I

9

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

9

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

9

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

9

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**9**

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 : 45 PERIODS**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.

PTTT2301**KNITTING TECHNOLOGY****L T P C
3 0 0 3****AIM**

To impart basic knowledge in knitting technology

OBJECTIVES

- To study the differences between weaving and knitting processes
- To get thorough knowledge of the concepts involved in weft knitting.
- To study the mechanism involved in warp knitting.
- To get exposure to the latest developments in knitted fabric production

UNIT I**9**

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**9**

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 **9**
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 **9**
Warp knitting fundamentals, Basic Warp knitted structures, closed lap and Open lap stitches. Classification of Warp Knitting Machines – Knitting elements of Rachel and Tricot knitting machine, Points of difference between Rachel and Tricot knitting machine. Representation of Warp – Knit structure.

UNIT V **9**
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 : 45 PERIODS

TEXT BOOKS

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

REFERENCES

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

PTTT2302 **PROCESS AND QUALITY CONTROL IN SPINNING** **L T P C**
3 0 0 3

AIM

To provide an in-depth knowledge of theoretical concepts and the modern technological aspects of process and quality control in spinning

OBJECTIVES

- To make the student to be conversant with following studies of process and quality control in spinning Scope of process control and statistical application Control of raw material quality, waste generation, yarn quality and productivity

UNIT I **PROCESS CONTROL CONCEPT AND STATISTICAL APPLICATION** **9**

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** **9**

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 9

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

UNIT IV YARN QUALITY CONTROL 9

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 9

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: 45 PERIODS

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

PTTT2254

SPUN YARN TECHNOLOGY II

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

AIM

To impart a sound knowledge in conventional and modern methods of yarn manufacture with latest developments.

OBJECTIVE

- To enhance the latest know how of Ring spinning, Rotor spinning, Friction spinning and Jet spinning
- To improve the technology in the newer methods of spinning

UNIT I RING SPINNING 9

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 travellers – symmetric and asymmetric rings – ring / traveller interaction and profile matching – antiwedge ring and elliptical traveller, orbit ring / traveller, zenith ring / traveller. 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 9

History of development of open end spinning, Principle of open end rotor spinning, Mechanism of yarn formation – fibre individualisation, 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 9

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 9

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.

UNIT V OTHER SPINNING METHODS 9

Wrap spinning – principle of operation, raw materials for core and wrapper, yarn structure and properties, spinning limits, applications of yarns.

Double-rove spinning – operating principle, process monitor, spinning geometry, 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 : 45 PERIODS

TEXT BOOKS

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

REFERENCES

1. Chattopadhyay R. (Ed), Advances in Technology of Yarn Production, NCUTE, IIT Delhi, 2002.
2. Lawrence C.A. and Chen K.Z, "Rotor Spinning", Textile Progress, Vol. 13, No.4, Textile Institute, U.K., 1981.
3. Basu A., "Progress in Air-jet Spinning", Textile Progress, Vol. 29, No.3, Textile Institute, U.K., 1997.
4. Ishtiaque, S.M., Salhotra K.R. and Gowda R.V.M, "Friction Spinning", Textile Progress, Vol. 33, No.2, Textile Institute, U.K., 2001.

PTTT2303

FABRIC MANUFACTURE – II

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

AIM

To impart basic knowledge in different aspects and methods of fabric manufacture.

OBJECTIVES

- To know the objective of different processes.
- To get thorough knowledge in the concepts involved in these processes.
- To study the mechanism involved in the different processes.
- To get exposure in the latest developments in fabric production

UNIT I

9

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 dobbie pegging.

UNIT II

9

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 **9**
Weaving Accessories -Types and Selection of Heald Wires, Heald Frames, Reeds, Shuttles, Picking Accessories, Drop Wires, and 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 **9**
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, Techno economics of shuttleless weaving.

UNIT V **9**
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: 45 PERIODS

TEXT BOOKS

1. Sriramulu P.K., Ajgaonkar D.B. & Talukdar M.K., Weaving Machines: Mechanisms, Management, Mahajan Publishers, Ahmedabad, 1998.
2. Marks P & 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, Smt.Chakravorthy serampore W.B.1982.
3. Ormerod, Modern Preparation and Weaving, Butterworths & Co. Ltd., 1983.
4. Talavasek O. & Svaty V., Shuttleless Weaving Machines, Elsevier Scientific Pub. Co., New York 1981.
5. Adanur S., Handbook of Weaving, Technomic Publishing Co., Inc., 2001.

PTTT2304

TEXTILE CHEMICAL PROCESSING – I

L T P C
3 0 0 3

AIM

To impart basic knowledge in the area of textile wet processing of fabrics and garments.

OBJECTIVES

- To study the various processes involved in chemical processing
- To understand the processes of scouring, bleaching, mercerizing
- To study the fundamental aspects of dyeing- methods and machines.

UNIT I **9**

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 **9**
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.
Mercerization: Theory of Processes – Methods-Chemicals-Effects. Yarn mercerizer, Chain and Chainless Mercerizers, Circular mercerizing machine. Liquid ammonia treatment-Equipments-Kier-J box-Pad roll, Mangles, Jigger, Winch, Jet and Softflow machines, Detwisters, Dryers, Stenter and Stretching devices.

UNIT III **9**
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 **9**
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 **9**
Color Measurement: Application of Computer Color Matching system to evaluate strength of dye, shade matching, whiteness / yellowness index. Fastness properties of dyed products

TOTAL: 45 PERIODS

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", Color 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.

AIM

To impart basic knowledge of woven fabric structures, like plain, Twill, Satin, Bedford cord, Double cloth, Swivel and Lappet designs, pile fabrics and Lenos, mechanisms of the machines producing these structures and colour theory.

OBJECTIVES

- To study the fabric structure in depth.
- To understand the concepts of production of fabrics with these structures.
- To know the characteristics and application/end uses of the fabric with these structures.
- To impart exposure about colour theory which is relevant in production of fabrics with various colour combinations and designs
- To study the mechanism or motions of the loom, loom attachments, like dobby/jacquard for the production of fabrics with these structures.

UNIT I**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**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**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**9**

Pile fabrics – Warp pile, Fast wire pile – Terry weaves – Terry stripe and checks. Weft pile – Plain back and 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**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 – Sectional – Inverted hook – Border jacquards.

TOTAL: 45 PERIODS**TEXT BOOKS**

1. Grosicki Z.J, "Textile Design and Colour" – Butterworths London, 1950.
2. Grosicki Z.J, "Advanced Textile Design & Colour" Butterworths, London, 1952.

REFERENCES

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

AIM

To impart an in depth knowledge in the area of textile wet processing of fabrics and garments.

OBJECTIVES

- To study the various processes involved in Chemical Processing
- To understand the processes of Printing, Finishing
- To study the fundamental aspects of ecofriendly processing in Textile Finishing

UNIT I**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**9**

Introduction to 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**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. Anti microbial finishes, Insect-Resist finishes, Softeners Finishing of knits, garment processing: value added finishing of garments.

UNIT IV**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**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

TOTAL: 45 PERIODS**TEXT BOOKS**

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

REFERENCES

1. LWC Miles, (Editor) "Textile Printing", Dyers Company of Publications trust, U.K, 1981.
2. Marsh, J.T., "An Introduction to Textile Finishing", Chapman and Hall Ltd., London, 1979.
3. Padmavankar, Textile Effluent NCUTE, IIT, Publication, 2002.
4. From waste to Profits, Technical Manual Series III, National Productivity Council, New Delhi, 1998.

AIM

To impart fundamental knowledge in the area of fiber, yarn and fabric quality evaluation

OBJECTIVES

- To study the aims of quality evaluation
- To understand the techniques of design of experiments and their role in quality evaluation
- To know in detail the various aspects of fiber properties, yarn properties, and Fabric properties

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, Fibre sampling from 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, Textechno'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 and Water repellency, Abrasion resistance & Pilling, Color fastness, Comfort, Objective evaluation of fabric handle, Advances in fabric quality evaluation.

TOTAL: 45 PERIODS

TEXT BOOKS

1. V. K. Kothari (Ed), Testing and Quality Management, Vol.1, IAFL Publications, New Delhi, India, 1999.
2. B. P. Saville, Physical Testing of Textiles, Woodhead Publishing Ltd., England, 1999.

REFERENCES

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

AIM

To impart basic knowledge in the area of Quality Assurance in Fabric Manufacture and Garment Production

OBJECTIVES

- To study the concepts of Quality Assurance
- To study the Process and Quality Control Parameters in Fabric and Garment Production
- To know in detail the various aspects of Quality Management related to Garment Production

UNIT I**9**

Introduction –definition of quality – Quality control and its necessity – inspection and its importance – functions of inspection – systems of inspection- types of inspection – hundred percent inspection – sampling inspection – comparison of 100% inspection & sampling inspections- AQL standards- Quality assurance - Difference between quality assurance and quality inspection.

UNIT II**9**

Quality standards, statistical quality control– control charts, applications – sampling – importance, and use of sampling techniques. ISO 9000-Quality Management System. Total quality management, Quality circles.

UNIT III**9**

Types of control forms – basic production systems – principles for choosing a production system – evaluating systems –flow process and grid charts– flow process grid for production control – scheduling calculations-graph method – schedules for producing many styles simultaneously – producing many styles continuously in one line.

UNIT IV**9**

Quality control for fabrics – different types of defects in fabrics – major and minor faults – fabric inspection system. Quality control in pattern making, grading, marking and marker efficiency – Quality control in stitching and production analysis – co-coordinating department activities – Distribution of tickets & maintenance of records. Establishing merchandising standards. The quality control of trims and accessories.

UNIT V**9**

Tolerance and quality standards for fabrics, processing, cutting, stitching in garment industry, tolerances and quality standard for finished garments – quality control and inspection agencies – Government and private agencies – AEPC, Textiles Committee Quality control system and standards for packing and packed goods, ware housing & shipping – cost of quality – cost of conformance- cost of non-conformance.

TOTAL: 45 PERIODS**TEXT BOOKS**

1. Ruth E.Glock, Grace I.Kunz, Apparel Manufacturing Sewn Product Analysis, Blackwell Scientific Publications. (1983).
2. Paliwal M.C. and Kimothy P.D., "Process Control in Weaving ATIRA 1983.

REFERENCES

1. Jacco Solinger, "Apparel Manufacturing Handbook", Prentice Hall, 1993.
2. Sammel Eliou, "Production Planning & Control", Wiley Eastern Pvt. Ltd
3. Grover E G and Hamby D. S "Handbook of Textile Testing and Quality Control", Wiley Eastern Pvt. Ltd., New Delhi, 1969.
4. Kothari V. K. "Testing and Quality Management" Volume 1, IAFL Publications, New Delhi.
5. Quality Control for Textile and Apparel Industries, WorkShop Manual - May 1997, IIT, New Delhi.

PTTT2403

BONDED FABRICS

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

UNIT I INTRODUCTION

5

Definitions and classification of bonded fabrics; fibres and their characteristics for the production of bonded fabrics, uses; production methods and consumption of non-wovens

UNIT II WEB FORMING

9

Production of staple-fibre web by dry and wet methods; web laying methods and its influence on fabric properties; manufacture of web from filaments; uniformity and quality control of web

UNIT III BONDING

13

Bonded fabric production by needling, stitching, water jet consolidation, thermal and chemical methods; production of bonded fabrics by spun bonding and melt blown process; effect of processing parameters on fabric properties

UNIT IV FINISHING

9

Dry finishing – shrinkage, wrenching and creping, calendaring, perforating, slitting and splitting; wet finishing – washing, dyeing, printing; softening, flame proofing; coating; laminating; flocking

UNIT V EVALUATION

9

Various end uses of bonded fabrics; evaluation of non-woven fabrics; structure- property relationship in bonded fabrics

TOTAL : 45 PERIODS

REFERENCES

1. Lunenschloss J., Albrecht W. and David Sharp., "Non-woven Bonded Fabrics", Ellis Horwood Ltd, New York, 1985, ISBN: 0-85312-636-4.
2. Gulrajani M.L., "Non wovens", Textile Institute, Manchester, 1992.
3. Mrstina V. and Feigl F., "Needle punching Textile Technology", Elsevier, New York, 1990.
4. Dharmadhikary R.K., Gilmore T.F., Davis H.A. and Batra S.K., "Thermal bonding of nonwoven fabrics", Textile Progress, Vol.26, No.2, Textile Institute Manchester, 1995, ISBN: 1870812786
5. Jirsak O. and Wadsworth L.C., "Non woven Textiles", Textile Institute, Manchester, 1999, ISBN: 0 89089 9788
6. Russell S., "Hand book of nonwovens", Textile Institute, Manchester, 2004, ISBN: 1 85573 603 9.

AIM

To develop the practical skills among the students in chemical processing

OBJECTIVES

- To study the various methods of pretreatment of yarns, fabrics.
- To study the various dyeing methods.

LIST OF EXPERIMENTS

(Minimum of Ten Experiments shall be offered)

Identification of dyes on fibre

Scouring of cotton fabrics

Bleaching of cotton using hypochlorite

Bleaching of cellulosic fibres using hydrogen peroxide

Yarn and fabric mercerisation.

Dyeing of cotton / viscose yarns using direct dyes

Dyeing of cotton yarn using vat dyes

Dyeing of cotton yarn using reactive dyes

Dyeing of cotton fabric with reactive dyes pad-batch methods

Dyeing of polyester using carrier

Dyeing of polyester / cotton blends

Dyeing of silk, wool with acid, reactive dyes

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 PERIODS

OBJECTIVE

Knowledge on the principles of management is essential for all kinds of people in all kinds of organizations. After studying this course, students will be able to have a clear understanding of the managerial functions like planning, organizing, staffing, leading and controlling. Students will also gain some basic knowledge on international aspect of management.

UNIT I OVERVIEW OF MANAGEMENT

9

Organization - Management - Role of managers - Evolution of Management thought - Organization and the environmental factors - Managing globally - Strategies for International Business.

UNIT II PLANNING 9

Nature and purpose of planning - Planning process - Types of plans – Objectives - - Managing by objective (MBO) Strategies - Types of strategies - Policies - Decision Making - Types of decision - Decision Making Process - Rational Decision Making Process - Decision Making under different conditions.

UNIT III ORGANIZING 9

Nature and purpose of organizing - Organization structure - Formal and informal groups / organization - Line and Staff authority - Departmentation - Span of control - Centralization and Decentralization - Delegation of authority - Staffing - Selection and Recruitment - Orientation - Career Development - Career stages – Training - - Performance Appraisal.

UNIT IV DIRECTING 9

Creativity and Innovation - Motivation and Satisfaction - Motivation Theories Leadership - Leadership theories - Communication - Hurdles to effective communication - Organization Culture - Elements and types of culture - Managing cultural diversity.

UNIT IV CONTROLLING 9

Process of controlling - Types of control - Budgetary and non-budgetary control techniques - Managing Productivity - Cost Control - Purchase Control - Maintenance Control - Quality Control - Planning operations.

TOTAL : 45 PERIODS

TEXT BOOKS

1. Stephen P. Robbins and Mary Coulter, 'Management', Prentice Hall of India, 8th edition.
2. Charles W L Hill, Steven L McShane, 'Principles of Management', Mcgraw Hill Education, Special Indian Edition, 2007.

REFERENCES

1. Hellriegel, Slocum & Jackson, ' Management - A Competency Based Approach', Thomson South Western, 10th edition, 2007.
2. Harold Koontz, Heinz Weihrich and Mark V Cannice, 'Management – A global & Entrepreneurial Perspective', Tata Mcgraw Hill, 12th edition, 2007.
3. Andrew J. Dubrin, 'Essentials of Management', Thomson Southwestern, 7th edition, 2007.

**PTTT2401 QUALITY ASSURANCE IN CHEMICAL PROCESSING L T P C
3 0 0 3**

AIM

To impart knowledge to the students in wet processing of textile materials

OBJECTIVES

- To study the importance of process and quality control in textile finishing
- To understand the various quality control techniques in Bleaching, Dyeing and Printing
- To create awareness in the latest developments in Fabric and Garment Processing With respect to quality

UNIT I **9**
Role of Quality and Process Control: Selection and standardization of incoming raw materials – Auxiliaries evaluation of the end products. Development of auxiliary products for in house consumption Major areas of process and quality control bleaching, dyeing, printing and finishing

UNIT II **9**
Determination of impurities of natural and man made fibres – cotton; wax content, ash content, colouring matter, Silk – Degumming – Wool percentage of vegetable impurities, oils and greases. Synthetic materials – fibre finishes. Evaluation of desizing efficiency residual size content – Evaluation of scouring efficiency drop absorbency, residual wax, weight loss, degree of impurities.

UNIT III **9**
Evaluation of bleaching – degree of whiteness, change in mechanical properties, presence of carboxyl groups and aldehyde groups, fluidity, ash content, uniformity of grey preparation. Evaluation of mercerisation – deconvolution count, lustre, change in mechanical properties, barium activity number, change in dye absorbency.

UNIT IV **9**
Quality evaluation of dyed / printed materials, colour fastness to washing, light, crock (dry and wet), perspiration, bleaching, sublimation, uniformity of dyeing, shade matching. Quality evaluation of finished fabric for water repellancy, air permeability, stiffness, crease, flame resistance, anti static and soil release.

UNIT V **9**
Brief introduction to testing instruments for above methods and quality standards, ISO, AATCC Computer Colour Matching: Theory – Concepts and recipe production.

TOTAL: 45 PERIODS

TEXTBOOKS

1. Shenai V A “Evaluation of Textile Chemicals” Sevak Publication, Bombay, 1980.
2. Vaidya, S. S. Trivedi “Textile Auxiliaries and Finishing Chemicals”, Publication, ATIRA, Ahmedabad.

REFERENCE

Chemical Processing Tablet “Process and Quality Control in Chemical Processing”- TAI, Publication, 1984.

PTTT2353

GARMENT TECHNOLOGY

L T P C
3 0 0 3

AIM

To provide a broad conceptual and theoretical perspective of apparel manufacturing for future apparel professionals.

OBJECTIVES

- To create awareness among the students about:
- Aspects of the apparel business that make it unique
- The terminology as used by the apparel manufacturing industry.
- Nature of the global textile and apparel industry as a source for materials and production capacity
- Effect of equipment on product quality and performance

UNIT I **9**
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 **9**
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 **9**
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 **9**
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 – scan Dimensions – classes. Sewing threads – functions of sewing thread – characteristics of threads – Thread size – ticket number. Types of Plackets, Cuff, Pockets.

UNIT V **9**
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: 45 PERIODS

TEXT BOOKS

1. Jacob Solinger., “ Apparel Manufacturing Handbook”, VanNostrand Reinhold Company (1980).
2. Ruth E.Glock, Grace I.Kunz, Apparel Manufacturing Sewn Product Analysis, Blackwell Scientific Publications. (1983).

REFERENCES

1. Peyton B.Hudson, “Guide to Apparel Manufacturing” MEDIAppearl Inc (1989).
2. Carr.H, 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, U.K., 1995.

UNIT I	INTRODUCTION	9
Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of manufacturing and service quality - Basic concepts of TQM - Definition of TQM – TQM Framework - Contributions of Deming, Juran and Crosby – Barriers to TQM.		
UNIT II	TQM PRINCIPLES	9
Leadership – Strategic quality planning, Quality statements - Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement – PDSA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.		
UNIT III	TQM TOOLS & TECHNIQUES I	9
The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to manufacturing, service sector including IT – Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types.		
UNIT IV	TQM TOOLS & TECHNIQUES II	9
Quality circles – Quality Function Deployment (QFD) – Taguchi quality loss function – TPM – Concepts, improvement needs – Cost of Quality – Performance measures.		
UNIT V	QUALITY SYSTEMS	9
Need for ISO 9000- ISO 9000-2000 Quality System – Elements, Documentation, Quality auditing- QS 9000 – ISO 14000 – Concepts, Requirements and Benefits – Case studies of TQM implementation in manufacturing and service sectors including IT.		

TOTAL : 45 PERIODS

TEXT BOOK

1. Dale H.Besterfield, et al., "Total Quality Management", Pearson Education Asia, Third Edition, Indian Reprint (2006).

REFERENCES

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", (6th Edition), South-Western (Thomson Learning), 2005.
2. Oakland, J.S. "TQM – Text with Cases", Butterworth – Heinemann Ltd., Oxford, Third Edition (2003).
3. Suganthi, L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd. (2006)
4. Janakiraman, B and Gopal, R.K, "Total Quality Management – Text and Cases", Prentice Hall (India) Pvt. Ltd. (2006)

UNIT I	MACHINE DESIGN	9
Equations of forces, motion and energy; design of cams; gear trains and draft calculations; principles of clutches and brakes - practical application in textile machines		
UNIT II	ROTARY MOTION	9
Equations of rotary motion; energy stored in rotating masses; power transmitted by rope and belt drives; friction calculations; balancing of rotating masses		
UNIT III	SPINNING MACHINERY	9
Differentials and variable speed drives – principles, application in textile machines; design of cone drums – piano feed regulation, speed frame builder mechanism; balloon and traveller dynamics.		
UNIT IV	WEAVING MACHINERY	9
Design of winder drums; kinematics of shedding; picking – cams, torsion bars and other mechanisms; beat up; back rest.		
UNIT V	PRINCIPLE OF MOMENTS	9
Kinetic and potential energy calculation in Textile Machines, principle of moments – ring frames a top arm loading, forces in heald reversing system.		

TOTAL : 45 PERIODS**REFERENCES**

1. Booth J. E., "Textile Mathematics", Vol.2&3, The Textile Institute, Manchester, 1975, ISBN-10: 0900739193.
2. Slater K., "Textile Mechanics", Vol. 1&2, The Textile Institute, Manchester, 1977, ISBN: 0900739274.
3. Rengasamy R. S., "Mechanics of spinning machines", NCUTE, Ministry of Textiles, Govt of India, 2000.
4. Hanton, W.A : Mechanics of Textile Machinery, Textile Institute Manchester.

AIM

To study about the technology of textured yarn production.

OBJECTIVE

- To impart knowledge about technological aspects textured yarn production.

UNIT I		9
Need for bulking of synthetic fibres – texturing – basic definition and classifications – developments in high speed spinning – POY.		
UNIT II		9
Heat setting – need-factors involved – types of setting – effects on fibre morphology and mechanical properties – fundamentals of thermo-mechanical texturing – Helanca process.		

UNIT III **9**
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 **9**
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 **9**
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: 45 PERIODS

TEXTBOOKS

1. Hes L. Ursiny P., “Yarn Texturing Technology”, Eurotex, U.K., 1994.
2. Behery H.M. and Demir A., “Synthetic Filament Yarn Texturing Technology”, Prentice Hall, 1996, ISBN 0134400259.

REFERENCES

1. Gulrajani M.L. (Edr.), “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, Manchester, U.K., 1991.
3. Gupta V.B. (Edr.), “Winter School on Man-made Fibers – Production, Processing, Structure, Properties and Applications”, Vol. 1, 1988.
4. Wilson D.K. & Kollu T., “Production of Textured Yarns by Methods Other than False Twist Technique”, Text. Prog., Vol. 16, No.3. Textile Institute, 1981.
5. Demir & H. El-Behery, “Synthetic Yarn Production”, Prentice Hall Inc., 1996.

PTTT2022

SILK YARN TECHNOLOGY

L T P C
3 0 0 3

AIM

To study the various technological aspects of silk

OBJECTIVE

- To impart knowledge on various issues related to silk production technology.

UNIT I **9**

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 **9**
Cocoon drying, Storage and Sorting: Objective of cocoon drying, Mechanism of cocoon drying, and 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 **9**
Re-reeling and Finishing: 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 **9**
Utilization of By-products: 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 **9**
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: 45 PERIODS

TEXT BOOKS

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

PTTT2023 **MECHANICS OF TEXTILE STRUCTURES** **L T P C**
3 0 0 3

AIM

To study the fundamentals of mechanics of textile structures.

OBJECTIVE

- To impart the fundamental knowledge about yarn geometry, fibre migration, mechanics of staple-fibre and filament yarns, and fabric geometry related issues concerning textile structures.

UNIT I **YARN GEOMETRY** **9**

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 9

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 9

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 9

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 9

Elements of woven fabric geometry, Peime 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 : 45 PERIODS

TEXT BOOKS

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

REFERENCES

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

PTTT2031

FASHION ART AND DESIGN

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

AIM

To study about various aspects related to fashion art and design.

OBJECTIVE

- To impart the fundamental knowledge of fashion art and design.

UNIT I

9

Origin of clothing – Grouping of dress out of painting, cutting and other methods. Role of costumes as a status symbol, sex appeal, Fashion and seasons. Costumes of ancient civilizations - Egypt, Greece, Roman, English, French empires during Renaissance 1500 - 1600 AD.

UNIT II **9**
Costumes of India. History of Indian costumes up to Mughal period, History of Indian costumes post Mughal period. Traditional costumes of different states. Factors influencing costumes changes in India – Accessories and Garments used in India. Costumes of Pakistan, Srilanka, Burma, China and Japan.

UNIT III **9**
Lines - Colours, Light theory of colour, Prang of color system - Proportions - Rhythm - Balance. Emphasis, Harmony – Sketching and Drawing - Fashion. Classification and types of fashion. Origin of Fashion language – Philosophy and Design – Street Fashion – study of leading fashion designers – French, Italian, American, Indian and English.

UNIT IV **9**
Concepts of Design - Background to the world of Fashion Design – Definition of Fashion Designing – Initial steps of Fashion Designing – Ingredients of Fashion Designing – Designing Equipments – Computer Aided Designing. Knowledge of latest Fashions – Based on Age, sex, Nationality, Occupation, Socio-economic status.

UNIT V **9**
Study of Dacca Muslin, Jamdhani, Himrus & Amrus, carpets, Kashmir shawls, Kancheepuram and Baluchari saris, Paithani saris, Bandhani, Patola, Ikkat, Kalamkari & other styles of printing and dyeing textiles. Factors determining changes in costumes from period to period.

TOTAL : 45 PERIODS

TEXT BOOKS

1. Russel Gillow, Nicholas Barnard, “Traditional Indian Textiles”, Thames and Hudson Ltd.
2. Elizabeth Rouse, “Undertaking Fashion”, Blackwell Scientific Publication, Oxford, 1989.

REFERENCES

1. S.N. Dar, “Costumes of India and Pakistan”, D.B Tataporevala Sons & Co. Ltd. 1982.
2. G.S. Churye, “Indian Costume”, Ramdas Bhaatkal for Popular Prakashan Pvt. Ltd., Bombay, 1995.
3. Corter Ernestine, “The Changing World of Fashion”, OM Book Service, 1900 to present.
4. Hatanaka Kokyo Collection – “Textile Arts of India”, Chronide Books, 1996.
5. Madhubani, K. Prakash, “An Invaluable book on Original Art Tradition”, Design Point, 1994.

AIM

To study the maintenance aspects of textile machinery

OBJECTIVE

- To impart complete knowledge about maintenance aspects of textile machinery

UNIT I**9**

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, Speed frame – Ring frame – Doublor and Rotor spinning machines.

UNIT II**9**

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**9**

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**9**

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**9**

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 : 45 PERIODS**TEXT BOOKS**

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.

UNIT I **5**
Industrial Engineering - evolution, functions, role of industrial engineer

UNIT II **13**
Methods study – introduction, techniques of recording; method analysis techniques; principles of motion economy; method study in garment manufacture; ergonomics-importance, workplace design, fatigue

UNIT III **13**
Work measurement – introduction; time study – equipment and procedure; standard data; predetermined time standards; work sampling techniques; incentive wage system; work measurement applied to garment industry

UNIT IV **5**
Site selection for textile industry; plant layout - types of layouts suitable for textile industry, methods to construct layout; line balancing

UNIT V **9**
Statistical Process Control – data collection; concept of AQL, control charts in quality control; process capability

TOTAL : 45 PERIODS

REFERENCES

1. Khanna O. P. and Sarup A., "Industrial Engineering and Management", Dhanpat Rai Publications, New Delhi, 2005.
2. "Industrial engineering manual for textile industry ", Wiley Eastern (P) Ltd., New Delhi, 1988.
3. "Introduction to work study ", ILO, Geneva, 1989.
4. Enrick N. L., "Time study manual for Textile industry", Wiley Eastern (P) Ltd., 1989.
5. Chuter A. J., "Introduction to clothing production management", Black well science, U. S. A., 1995.
6. Richard I. Levin. and David S. Rubin., "Statistics for Management", 7th edition, Prentice Hall of India Pvt. Ltd., New Delhi, 1997.
7. David M. Levine, Timothy C. Krehbiel and Mark L. Berenson., "Business Statistics: A First Course", Pearson Education Asia, New Delhi, 2nd edition, 2000.
8. Panneerselvam R., "Production and Operation Management", Prentice Hall of India, 2002.
9. Edward S. Buffa and Rakesh Sarin., "Modern Production and Operations Management", John Wiley & sons, U. S. A., 1987.
10. Lee J. Krajewski and Larry P. Ritzman., "Operations Management: Strategy and Analysis", Addison Wesley, 2000.
11. Chase., Aquilano and Jacobs., "Production and Operations Management", Tata McGraw- Hill, New Delhi, 8th Edition, 1999.

PTTT2041 APPAREL PRODUCT ENGINEERING AND PLANT LAYOUT L T P C
3 0 0 3

AIM

To study the plant layout and engineering aspects of apparel products.

OBJECTIVE

- To impart knowledge regarding the various aspects of apparel product engineering, including time and motion study, and plant layout.

UNIT I PRODUCT ANALYSIS 9

Relationship between quality and construction of a sewn product, geometric principles of draping, drafting and industrial patterns product specifications.

UNIT II PRODUCTION CONTROL AND ENGINEERING 9

Industrial engineering concepts-development and application of standard data for pre-costing and factory scheduling-basic production systems - production control charts. Manufacturing information system: systems and procedures.

UNIT III PRODUCTION MANAGEMENT ANALYSIS 9

Analysis of techniques for material utilization and cutting of raw materials for all types of sewn products, principles and methods of costing, evaluation of equipment for examining, spreading, cutting, marking and ticketing - solution of production problems in spreading, cutting and cost control.

UNIT IV PLANT LAYOUT 9

Definition-Types of production layout, criteria for evaluation of a plant layout, determining minimum space requirement, calculation grid, plant size location, basic production line layout, Government regulations for plant layout.

UNIT V TIME AND MOTION STUDY 9

General approach for making a time and motion study, preliminary data for time and motion study sheet, sewing work study, principles of work cycle timing methods, objectives of time study, statistical approaches – statistical calculation of time study. Operator efficiency distributions. Evaluating motion study data principles for improving sewing and pressing operations.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Jacob Solinger, "Apparel Manufacturing Handbook", VanNoStrand Reinhold Company (1980).
2. Bethel, Tann, Atwater and Rung, "Production Control", McGraw-Hill Book Co., New York, (1948).

REFERENCES

1. Biegel, John E., "Production Control", A Quantitative Approach", Prentice Hall Inc., (1971), 2nd edition.
2. Apple, J. M., "Plant Layout and Materials Handling", The Ronald Press Co., New York (1950).
3. Immer, John R., "Layout Planning Techniques", McGraw-Hill, New York, (1950).
4. Barnes Ralph M., "Motion and Time Study", John Wiley and Sons, New York, (1958) 4th edition.

AIM

To study the production aspects of garments and the equipment used in producing them.

OBJECTIVE

- To impart the knowledge of various steps that the fabric undergoes during the garment manufacturing process.

UNIT I**9**

Introduction to spreading machines and cutting machines – types and functions. History of sewing machines and development. Sewing machinery – classification according to bed types, stitch types (hook or looper), material wise (extra light to heavy weight).

UNIT II**9**

Major parts of sewing machinery and functions. Adjustment of major parts of single needle lock stitch machine: Non-UBT: stand height, pedal, presser foot, height of needle bar, needle to hook relationship, height of feed dog, normal and reverse feed stitch length, feed timing, presser foot pressure, needle and bobbin thread tension, bobbin winding assembly, belt tension. Sewing machine safety regulations.

UNIT III**9**

Sewing needle and sewing thread, thread consumption, thread routing. Adjustment on SNLS – UBT: Needle stop position, wiper, thread timing sequence, timing of thread trimmer cam, positioning the moving knife, installation, sharpening, replacing moving knives, adjusting the floating amount of the auxiliary tension disk.

UNIT IV**9**

Parts, functions and adjustments of over lock: Needle height, feed dog height, differential feed ratio, tilt of the feed dog, position of the upper and lower knives, sharpening of knife and loopers, trouble shooting in over lock.

UNIT V**9**

Work-aids and attachments, functions of pullers, guides and folders compensating presser foots- left, right, double; feller, hemmer, etc. Collar turning machines, folding machinery, fusing and pressing machinery. Computer controlled cutting, sewing and folding machinery.

TOTAL : 45 PERIODS**TEXT BOOKS**

1. Jacob Solinger, "Apparel Manufacturing Handbook", VanNostrand Reinhold Company (1980).
2. Peyton B. Hudson, "Guide to Apparel Manufacturing", MediApparel Inc. (1989), ISBN: 0-945116-08-X.

REFERENCE

1. Carr H. and Latham B., "The Technology of Clothing Manufacture", Blackwell Scientific Publications (1988).

AIM

To study the various aspects of apparel production control.

OBJECTIVE

- To impart knowledge of various control mechanisms involved in apparel production.

UNIT I**9**

Introduction: 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**9**

Operation sequence development: Garment breakdown with machine and attachment details, development of production grid for garment construction, development of production flowchart.

UNIT III**9**

Bundle tickets: Guidelines for bundle ticket design, functions of bundle tickets, bundle ticket control. Different manufacturing systems: Make through and Assembly line manufacturing - advantages and disadvantages. Lay lot planning: Numerical exercises on lay lot planning to optimize cutting cost, bundling, ticketing and cutting room control formats.

UNIT IV**9**

Production planning and control: 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**9**

Quality in product development: 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: 45 PERIODS**TEXT BOOKS**

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

AIM

To study the various concepts involved in apparel marketing and merchandising.

OBJECTIVE

- To impart the knowledge of organization, marketing, merchandising, sourcing and documentation aspects of apparel business.

UNIT I**9**

Organization of the Apparel Business: Introduction to apparel industry – Organization of the apparel industry – Types of exporters – Business concepts applied to the apparel industry International trade.

UNIT II**9**

Marketing: 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**9**

Merchandising: 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**9**

Sourcing: 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**9**

Documentation: 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 : 45 PERIODS**TEXT BOOKS**

1. Elaine Stone, Jean A. Samples, "Fashion Merchandising", McGraw-Hill Book Company (1985), ISBN: 0-07-061742-2.
2. S.Shivaramu. "Export Marketing" – A Practical Guide to Exporters", Wheeler Publishing (1996), ISBN: 81-7544-166-6.

REFERENCES

1. D. Sinha, "Export Planning and Promotion", IIM, Calcutta (1989).
2. Tuhin K. Nandi, "Import-Export Finance", IIM, Calcutta (1989).
3. J.A. Jamow, M.Guerreiro, B.Judelle, "Inside the Fashion Business", MacMillan Publishing Company (1987), ISBN: 0-02-360000-4.

PTTT2081 EXPORT DOCUMENTATION & GLOBAL MARKETING

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

AIM

To study about the various issues related to export documentation and global marketing.

OBJECTIVE

- To impart the knowledge of various aspects of export documentation and global marketing

UNIT I

9

Export credit - short term, anticipatory letter of credit, and packing of credit. Negotiation of bills, source of short-term credit, medium-term and long-term export credits, methods, roll of terms of payment in international marketing, Factors responsible for counter trade growth.

UNIT II

9

Domestic trade Vs international trade, Regional trade blocks. Foreign exchange market – Nature of foreign exchange market, Main functions Business and environment – Social environment, Logical environment, Business ethics

UNIT III

9

Balance of payment, deficit in balance of payment, debits & credits, foreign exchange market, commercial bank credit for export trade

UNIT IV

9

Standard policies - Indian trade police, India's foreign trade policy, exports and imports policy.

UNIT V

9

Major documents for exports – International codes for products and services – principal documents, auxiliary documents, documents for claiming export assistance.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Jeannette Jamow, Kitty G.Dickerson, "Inside the Fashion Business", Prentice Hall, 1997.
2. Richard M.Hill, Ralph S.Alexander, James S.Cross, "Industrial Marketing", Aitbs Publishers & Distributors, 1998.

PTTT2082

TEXTILE COSTING

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

AIM

To study about various costing aspects involved in apparel products manufacturing.

OBJECTIVE

- To impart the knowledge of costing techniques used in manufacturing of apparel products.

UNIT I **9**
Introduction to costing, Aims of costing, Types of costing, Aims of estimation, Difference between Estimation and Costing, Types of estimates.

UNIT II **9**
Elements of cost – Material cost – Labour cost – Different types of expenses – Cost of product – Advertisement cost. Selling cost and pricing, Full-cost pricing, Marginal cost pricing.

UNIT III **9**
Analysis of over head expenses – Factory expenses – Administrative expenses – Selling and distribution expenses – Allocation of over head expenses – Depreciation – Reasons for depreciation – Methods of calculating depreciation – Simple problems

UNIT IV **9**
Costing of garments, Factors that determine the price of garments – Material cost – Cost of yarn, Cost of fabric production, Cost of fabric processing and design. Lot size, Cost of components, cutting cost – Making and trim cost, simple problems.

UNIT V **9**
Packing and labeling cost – different types and functions. Uses of brand and size label – Duty drawback Cost of bought out components, Thread, Button, Zippers, Interlining Shipment cost, Cost calculation of Ladies and Men and Children's wear – Woven and Knitted - Simple problems.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Johnson Maurice, E. Moore, "Apparel Product Development", Om Book Service, 2001.
2. Katherin McKelvy, "Fashion Source Book", Om Book Service, 2001.

PTFT2026 **CREATIVITY, INNOVATION AND NEW PRODUCT DEVELOPMENT** **L T P C**
3 0 0 3

AIM

To study the various issues related to Creativity, Innovation and New Product Development.

OBJECTIVES

- To impart the knowledge of various aspects of Creativity, Innovation and New Product Development

UNIT I **INTRODUCTION** **9**
The process of technological innovation - factors contributing to successful technological innovation - the need for creativity and innovation - creativity and problem solving - brain storming - different techniques

UNIT II **PROJECT SELECTION AND EVALUATION** **9**
Collection of ideas and purpose of project - Selection criteria - screening ideas for new products (evaluation techniques)

UNIT III NEW PRODUCT DEVELOPMENT 9
Research and new product development - Patents - Patent search - Patent laws - International code for patents - Intellectual property rights (IPR).

UNIT IV NEW PRODUCT PLANNING 9
Design of proto type - testing - quality standards - marketing research - introducing new products

UNIT V MODEL PREPARATION & EVALUATION 9
Creative design - Model Preparation - Testing - Cost evaluation - Patent application

TOTAL: 45 PERIODS

TEXT BOOKS

1. Brain Twiss, "Managing Technological Innovation", Pitman Publishing Ltd., 1992.
2. Harry B.Watton, "New Product Planning", Prentice Hall Inc., 1992.

REFERENCES

1. Harry Nystrom, "Creativity and Innovation", John Wiley & Sons, 1979.
2. N.Khandwalla – "Fourth Eye (Excellence through Creativity) - Wheeler Publishing", Allahabad, 1992.
3. I.P.R. Bulletins, TIFAC, New Delhi, 1997.

PTTT2083 CAD / CAM FOR APPAREL PRODUCTS L T P C
3 0 0 3

AIM

To study computer aided design and computer aided manufacture of apparel products.

OBJECTIVE

- To impart skills in computer aided design and computer aided manufacture of apparels.

UNIT I 9
Introduction to computer - Concepts of CAD / CAM CAM in garment manufacturing complete pattern design system in preparation for grading, marker making and pattern manipulation

UNIT II 9
Computerized production pattern making - Hardware, software and system programming to produce a sample production pattern Computer aided manipulation of pattern pieces to create individual styles. Operation of garment CAD software. Computer used for purchase, inventory control and sales, computerization in quality control and production control. Computer aided production planning in garment manufacturing.

UNIT III 9
Introduction to finite scheduling concept and fast react software. Creating product and order planning, updating. Eliminate late deliveries – General set up, allowances and matrices – Analyzing loan balancing in different departments – control mechanisms – critical path and timetables.

UNIT IV**9**

Computer controlled machinery for garment manufacturing – automated layout planning by various techniques – Algorithm for computer production garment parts – intelligent systems – 3D scanning technology. Use of microcomputers for production control in garment industry Imaging techniques for various designs Development of robotics for CAM.

UNIT V**9**

Management Information System in garment industry – EDI in garment technology Concept of Enterprise Resource Planning (ERP) and computerization in exports / documentation

TOTAL: 45 PERIODS**TEXT BOOKS**

1. Stephen Gray, "CAD/CAM in Clothing and Textiles", Gower Publishing Limited, 1998, ISBN 0-566-07673X.
2. Compilation of Papers Presented at the Annual World Conference, "Computers in the World of Textiles", Sep. 26 -29, 1984, Hong Kong, The Textile Institute, ISBN: 0-0900739-69X.

REFERENCES

1. W. Aldrich, "CAD in Clothing and Textiles", Blackwell Science 2nd edition, 1992, ISBN: 0-63 -3893 -4.
2. Jacob Solinger, "Apparel Manufacturing Handbook", VanNostrand and R. Einhold Company, 1980, ISBN: 0-442-21904-0.\