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**TOTAL NUMBER OF CREDITS: 109**

## LIST OF ELECTIVES FOR TEXTILE TECHNOLOGY

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OBJECTIVES

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

OUTCOMES

- To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow of electric current.
- To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

UNIT I MATRICES

UNIT II FUNCTIONS OF SEVERAL VARIABLES

UNIT III ANALYTIC FUNCTION
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
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

TOTAL: 45 PERIODS

TEXT BOOKS
REFERENCES

PTPH8151 ENGINEERING PHYSICS

OBJECTIVE
To introduce the basic physics concepts relevant to different branches of Engineering and Technology.

UNIT I PROPERTIES OF MATTER

UNIT II ACOUSTICS AND ULTRASONICS

UNIT III THERMAL PHYSICS

UNIT IV APPLIED OPTICS

UNIT V SOLID STATE PHYSICS
Nature of bonding - growth of single crystals (qualitative) - crystal systems - crystal planes and directions - expressions for interplanar distance - coordination number and packing factor for simple structures: SC, BCC, FCC and HCP - structure and significance of NaCl, ZnS, diamond and graphite - crystal imperfections: point defects, dislocations and stacking faults - unit cell, Bravais space lattices - miller indices.

TOTAL: 45 PERIODS
TEXT BOOKS

REFERENCES

PTCY8152 ENGINEERING CHEMISTRY L T P C
3 0 0 3

OBJECTIVES
- To understand about the chemical thermodynamics.
- To impart knowledge in the basics of polymer chemistry.
- To develop sound knowledge on kinetics and catalysis.
- To impart basic knowledge on photochemistry and spectroscopy.

UNIT I CHEMICAL THERMODYNAMICS 9
Second law: Entropy - entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions; Clausius inequality. Free energy and work function: Criteria of spontaneity; Helmholtz and Gibbs free energy functions; Gibbs-Helmholtz equation; Clausius-Clapeyron equation; Maxwell relations – Van’t Hoff isotherm and isochore. Chemical potential; Gibbs-Duhem equation – variation of chemical potential with temperature and pressure.

UNIT II POLYMER CHEMISTRY 9
Introduction: Classification of polymers – Natural and Synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerisation. Types and mechanism of polymerisation: Addition (Free Radical, cationic, anionic and living); condensation and copolymerisation. Properties of polymers: Tg, Tacticity, Molecular weight – weight average, number average and polydispersity index. Techniques of polymerisation: Bulk, emulsion, solution and suspension.

UNIT III KINETICS AND CATALYSIS 9

UNIT IV PHOTOCHEMISTRY AND SPECTROSCOPY 9
UNIT V  NANOCHEMISTRY  9

TOTAL : 45 PERIODS

TEXT BOOKS

REFERENCES

PTGE8151  COMPUTING TECHNIQUES  L T P C 3 0 0 3

UNIT I  INTRODUCTION  8

UNIT II  C PROGRAMMING BASICS  10

UNIT III  ARRAYS AND STRINGS  9

UNIT IV  FUNCTIONS AND POINTERS  9
UNIT V  STRUCTURES AND UNIONS

Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure - Union - Programs using structures and Unions – Storage classes, Pre-processor directives.

TOTAL : 45 PERIODS

TEXT BOOKS


REFERENCES


PTGE8152 ENGINEERING GRAPHICS L T P C

3 0 0 3

OBJECTIVES

• To develop in students, graphic skills for communication of concepts, ideas and design of engineering products
• To expose them to existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (Not for Examination)

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I  PLANE CURVES AND FREE HAND SKETCHING

Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects

UNIT II  PROJECTION OF POINTS, LINES AND PLANE SURFACES

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and trapezoidal method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.
UNIT III  PROJECTION OF SOLIDS  
Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method and auxiliary plane method.

UNIT IV  PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES  
Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes.

UNIT V  ISOMETRIC AND PERSPECTIVE PROJECTIONS  
Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems. Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method and vanishing point method.

COMPUTER AIDED DRAFTING (Demonstration Only)  
Introduction to drafting packages and demonstration of their use.

TOTAL : 45 PERIODS

TEXT BOOK  

REFERENCES  

Publication of Bureau of Indian Standards:  

Special points applicable to University Examinations on Engineering Graphics:  
1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only.
4. The students will be permitted to use appropriate scale to fit solution within A3 size.
5. The examination will be conducted in appropriate sessions on the same day.
OBJECTIVES

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

OUTCOMES

- 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

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

UNIT II  FOURIER TRANSFORM


UNIT III  PARTIAL DIFFERENTIAL EQUATIONS

Formation – Solutions of first order equations – Standard types and Equations reducible to standard types – Singular solutions – Lagrange’s Linear equation – Solution of homogenous linear equations of higher order with constant coefficients.

UNIT – IV  APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS

Method of separation of Variables – Solutions of one dimensional wave equation and one-dimensional heat equation – Steady state solution of two-dimensional heat equation.

UNIT – V  Z-TRANSFORM AND DIFFERENCE EQUATIONS


TOTAL: 45 PERIODS

BOOK FOR STUDY


REFERENCES

UNIT I  ATOMIC STRUCTURE AND ELECTRO MAGNETIC RADIATION  13
Study of Atomic Structure – Proton Neutron, and Electron; Radiation - photons and their wavelength energy relationship; The Dual nature of Particles and Radiation; The interaction of matter and radiation; The Crystal Lattice structure of matter; Tools to investigate structure - Electron generation – methods - their energy levels; X-ray generation – Composition – energy levels; Infra red radiation-molecular vibrations – mode and amplitude; Electromagnetic lenses – Magnification and focal length calculations.

UNIT II  THERMODYNAMICS  9
Properties of Gasses - Boyle’s Law, Charles Law. The combined Gas Law; The Laws of Thermodynamics; Properties of Water; Water in the Atmosphere – Humidity and Relative Humidity, Water Ballance between the atmosphere and hydrophilic materials

UNIT III  MECHANICAL PROPERTIES  6
Tensile Load and Deformation - stress and strain definitions - pressure. work and modulus of elasticity –; Bending Load and Deformation– bending rigidity - force couple study; Shear and Torsion – shear and torsional rigidity; studies – measurements of the above methods of loading.

UNIT IV  OPTICAL AND FRICTIONAL STUDIES  9

UNIT V  ELECTRICAL PROPERTIES  9
Theory of electrical conductance and resistance – measurement of – units of – study of different materials; static charges – formation – measurement techniques – study of different materials; Dielectrics – formation – measurements – control measures.

TOTAL : 45 PERIODS

TEXT BOOKS

REFERENCES
UNIT I  WATER  9

UNIT II  CHEMISTRY OF INTERFACES  9

UNIT III  OILS, FATS, SOAPS & LUBRICANTS  9
Chemical constitution, Chemical analysis of oils and fats – acid, saponification and iodine values, Definitions, determinations and significance. Definition, mechanism of lubrication, preparation of petrolubes, desirable characteristics – viscosity, viscosity index, carbon residue, oxidation stability, flash and fire points, cloud and pour points, aniline point. Semisolid lubricant – greases, preparation of sodium, lithium, calcium and axle greases and uses, consistency test and drop point test. Solid lubricants – graphite and molybdenum disulphide

UNIT IV  CHEMICALS AND AUXILIARIES  9

UNIT V  COLORANTS  9
Theory of color and constitution: chromophore and auxochrome, classification of dyes based on application. Chemistry and synthesis of, azo dye.

TOTAL : 45 PERIODS

REFERENCES
OBJECTIVE
To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering

UNIT I   BASICS AND STATICS OF PARTICLES

UNIT II   EQUILIBRIUM OF RIGID BODIES
Free body diagram – Types of supports –Action and reaction forces –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 – Single equivalent force -Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions

UNIT III   PROPERTIES OF SURFACES AND SOLIDS

UNIT IV   DYNAMICS OF PARTICLES

UNIT V   FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS
Friction force – Laws of sliding friction – equilibrium analysis of simple systems with sliding friction –wedge friction-. Rolling resistance -Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion of simple rigid bodies such as cylinder, disc/wheel and sphere.

TOTAL : 45 PERIODS

TEXT BOOKS

REFERENCES

PTEE8253 PRINCIPLES OF ELECTRICAL AND ELECTRONICS ENGINEERING  L T P C
3 0 0 3

UNIT I  ELECTRICAL CIRCUITS  9
Basic principles involved in power generation, transmission and use – Ohms Law Kirchoff’s Law – steady state solution of DC circuits – Theorem: Thevinin’s, Norton’s and Superposition Theorems.

UNIT II  AC CIRCUITS  9
Introduction to AC circuits – waveforms and RMS value – power and power factor, single phase and three-phase balanced circuits, housing wiring, industrial wiring, materials of wiring.

UNIT III  ELECTRICAL MACHINES  9

UNIT IV  ELECTRONIC DEVICES & CIRCUITS  9

UNIT V  MEASUREMENTS & INSTRUMENTATION  9
Introduction to transducers: pressure, temperature, position, electrical measurements - Classification of instruments – moving coil and moving iron ,Ammeter and Voltmeter – multimeters – dynamometer type Wattmeter – three-phase power measurements – energy meter – megger – instrument transformer (CT and PT )

TOTAL : 45 PERIODS

REFERENCES
OBJECTIVES
- To make the students acquire a sound knowledge in statistical techniques that model engineering problems.
- The Students will have a fundamental knowledge of the concepts of Probability.

UNIT I \hspace{1cm} RANDOM VARIABLES \hspace{1cm} 9
Discrete and Continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma, Weibull and Normal distributions - Functions of a random variable.

UNIT II \hspace{1cm} TWO-DIMENSIONAL RANDOM VARIABLES \hspace{1cm} 9
Joint distributions – Marginal and Conditional distributions – Covariance – Correlation and Linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

UNIT III \hspace{1cm} TESTS OF SIGNIFICANCE \hspace{1cm} 9

UNIT IV \hspace{1cm} DESIGN OF EXPERIMENTS \hspace{1cm} 9
Completely randomized design – Randomized block design – Latin square design - $2^2$ - factorial design - Taguchi’s robust parameter design.

UNIT V \hspace{1cm} STATISTICAL QUALITY CONTROL \hspace{1cm} 9
Control charts for measurements ($\overline{X}$ and $R$ charts) – Control charts for attributes (p, c and np charts) – Tolerance limits - Acceptance sampling.

TOTAL : 45 PERIODS

TEXT BOOKS

REFERENCES
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 – 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
UNIT V  HUMAN POPULATION AND THE ENVIRONMENT


TOTAL : 45 PERIODS

TEXT BOOKS

REFERENCE BOOKS

PTTT8301  CHARACTERISTICS OF TEXTILE FIBRES I

UNIT I  STRUCTURE OF FIBRES
Study of structures of natural and man-made fibers – physical, chemical and morphological structures. Molecular conformations – planar zig-zag, helical, lamellar, and spherulite conformations.

UNIT II  STRUCTURE INVESTIGATION TECHNIQUES
Transmission and Scanning electron microscopes-principle construction and working; X-ray diffraction techniques – X-ray analysis-estimation of crystallinity; Infrared radiation and dichroism.techniques – chemical element and group identification by transmittance and optical density methods. Molecular orientation estimation, Typical molecular structures of commercially important fibers.

UNIT III  MOISTURE ABSORPTION CHARACTERISTICS OF FIBRES

UNIT IV  TENSILE CHARACTERISTICS OF FIBRES
Tensile characteristics –Study of strength, elongation, work of rupture, initial modulus, work factor and yield point – determination of yield point. Stress-strain relations of natural and man-made fibres - influence of humidity and temperature on tensile characteristics .Time effects- Study of creep phenomena.
UNIT V  ELASTIC RECOVERY BEHAVIOUR OF FIBRES  9
Elastic recovery and its relation to stress and strain of fibres; mechanical conditioning of fibres and its influence on elastic recovery. Load cycling and extension cycling-their effect on elastic recovery.

REFERENCES

PTTT8302  TECHNOLOGY OF PRE SPINNING PROCESS  L T P C
3 0 0 3

UNIT I  INTRODUCTION  9
Sequence of spinning machinery for producing carded, combed and blended yarns in short staple and long staple spinning system; yarn numbering systems- direct, indirect and conversions; influence of characteristics of raw material – fibre fineness, length, strength, elongation, stiffness, fibre friction, cleanliness on spinning performance; spinnability

UNIT II  GINNING AND BLOWROOM MACHINERY  9
Description and working of different types of gins; selection of right type of gins; ginning performance on yarn quality; objects, principle and description of opening, cleaning and blending machines used in blowroom; chute feed; cleaning efficiency, production calculations.

UNIT III  CARDING MACHINE  9
Objects and principle of carding; detailed study of flat card; autolevelling; card clothing and its maintenance; drives and production calculation

UNIT III  COMBER  9
Objectives of comber preparatory; detailed study of sliver lap, ribbon lap and super lap formers; objects and principles of combing; sequence of combing operation; combing efficiency and production calculation.

UNIT IV  DRAWING MACHINE AND ROVING MACHINE  9
Tasks of drawing machine; drafting systems used in modern drawing machines; autolevelling; draft and production calculation; objectives of roving machine; working of roving machine; bobbin builder mechanism – mechanical and electro-mechanical; draft, twist and production calculations.

TOTAL : 45 PERIODS
REFERENCES
2. Klein W., "The Technology of Short-staple Spinning", The Textile Institute, Manchester, 1998
5. Lord P.R., "Yarn Production: Science, Technology and Economics", The Textile Institute, Manchester, 1999

PTTT8303 TECHNOLOGY OF PRE WEAVING PROCESS

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UNIT I BASICS OF WINDING
Objects of winding; principles of cheese and cone winding machines; uniform build of yarn package; types of drums – half accelerated and fully accelerated drums; control of balloons; Classification of yarn faults and its removal; concepts in yarn clearing – mechanical, optical and electronic clearers; knotters and splicers

UNIT II PROCESS CONTROL IN WINDING
Faults in wound packages, their causes and remedies; winding synthetic and blended yarns; weft winding; winding for colouration; quality of knots and splices; study of modern automatic winders. winding performance; productivity; maintenance; quality control; material handling.

UNIT III WARPING
Objectives of warping, material flow in beam warping and creels used in warping machines; sectional warping machines.
SIZING
Objectives of sizing; sizing materials and recipii used for different types of fibers; size preparation equipment; sizing machines; sizing filament yarns; concept of single end sizing, combined dyeing and sizing. Control concepts in modern sizing; energy conservation in sizing; Sizing defects and production calculations.

UNIT IV PROCESS CONTROL IN WARPING AND SIZING
Process control in warping (production calculation, machine and labor productivity, control of end breaks, quality and hard waste in warping); Control systems used in sizing machine.

UNIT V DRAWING-IN
Need for drawing-in operation; manual and automatic drawing- in, leasing, knotting and pinning machines; selection and care of reeds, healds and drop pins, control of cross ends and extra ends and calculations.

TOTAL : 45 PERIODS

REFERENCES
UNIT I  TORSIONAL CHARACTERISTICS

UNIT II  FLEXURAL CHARACTERISTICS
Flexural rigidity of fibres – measurement techniques - Flexural rigidity and its relation to other fibre properties - comparison of various fibres.

UNIT III  OPTICAL CHARACTERISTICS
Reflection and Lustre - objective and subjective methods of measurement - refractive index and its measurement - birefringence, factors influencing birefringence - Absorption and dichroism

UNIT IV  FRICTIONAL CHARACTERISTICS
Friction – static, limiting and kinetic friction, its measurement, comparison of fibres, directional friction in wool - frictional and surface characteristics of natural and synthetic fibres - friction and lubrication.

UNIT V  ELECTRICAL AND THERMAL CHARACTERISTICS
Electrical resistance of fibres – measurement, factors influencing electrical resistance; di-electric behaviour– factors influencing di-electric properties; static electricity– measurement, problems and elimination techniques; thermal conductivity, thermal expansion and contraction, melting.

TOTAL : 45 PERIODS

REFERENCES
UNIT I
Elementary weaves – plain and its derivatives, twill and its derivatives, satin, sateen and their derivatives – loom requirements

UNIT II
Ordinary and Brighten Honey Comb; Huck-a-Back and its modifications; Mock Leno; crepe weaves; colour theory – light and pigment theory; modification of colour; application of colours; colour and weave effects – loom requirements

UNIT III
Bedford cords - plain and twill faced, wadded; welts and piques, wadded piques; backed fabrics - warp and weft, reversible and non-reversible fabrics; extra warp and extra weft figuring - single and double colour – loom requirements

UNIT IV
Pile fabrics; warp pile - wire pile, terry pile, loose backed; weft pile – plain back and twill back velveteen, lashed pile, corduroy, weft plush – loom requirements

UNIT V
Double cloth, types of stitches; Damasks; Gauze and Leno principles – loom requirements, 3D fabrics.

REFERENCES

TOTAL : 45 PERIODS
UNIT II  
FUNDAMENTALS OF KNITTING  
9
General definitions and principles of knitting; Types of knitting needles – Bearded, Latch & Compound Needle. Elements of knitted loop structure.

UNIT III  
WEFT KNITTING  
9
Basic weft knitted structures and their production - plain, rib, interlock and purl; Fundamentals of formation of knit, tuck and float stitches; factors affecting the formation of loop; effect of loop length and shape on fabric properties; Analysis of various types of weft knitted structure. Weft knitted fabric geometry.

UNIT IV  
WEFT KNITTING MACHINES  
9
Construction, Characteristics and working of circular knitting machines used for the production of basic structures; production of derivatives of weft knitted structures; needle control in circular knitting machines; quality control in knitted fabric production; production calculation. Basic principles and elements of flat knitting machines; different types of flat knitting machines - manual, mechanical and computer controlled; production of various weft knitted structures using flat knitting machines.

UNIT V  
WARP KNITTING  
9
Basic principles; elements of warp knitted loop – open loop, closed loop; warp knitting elements-chain link, chain links for simple patterns, guide bar movement mechanism, Tricot and Rachel warp knitting machines. Principles of double needle bar patterning, Terry pile fabric production. Let off system; run in value based on the lapping diagram; take up system; theoretical concepts of warp knitted loop configuration.; Uses of warp knitted fabrics in technical applications.

REFERENCES
UNIT I  INTRODUCTION TO WEAVING  
Yarns quality requirements for high speed automatic shuttle looms and shuttle less loom; warp and weft preparation for high speed looms; Principle of weaving with hand and power looms, passage of material, motions in loom – primary, secondary and auxiliary motions, plain power loom driving, timing of motions.

UNIT II  SHEDDING MOTIONS  
Shed geometry and shedding requirement. Types of shed. Shedding mechanisms - positive and negative. Principles of tappet, dobbey and jacquard shedding mechanisms, reversing mechanisms- limitations of various shedding mechanisms; Conventional and modern dobbey and jacquard mechanism.

UNIT III  WEFT INSERTION AND BEAT UP  
Shuttle picking and checking mechanisms, shuttle flight and timing; Weft feeder – types, Principles of weft insertions in shuttle less looms; mechanism of weft insertion by projectile, rapier loom and jet – air and water. Multi-Phase weaving systems; Kinematics of sley, sley eccentricity; beat up mechanism in modern looms;

UNIT IV  SECONDARY AND AUXILIARY MOTIONS LOOMS  
Take up and let - off motions used in plain power looms; cloth formation, weaving condition - factors and control; warp protector and warp and weft stop motion; plain power loom accessories. Automatic weft replenishment in shuttle looms – pirn changing and shuttle changing looms; mechanisms involved in automatic pirn changing – feelers, cutters, design of shuttle, three try motions; multi shuttle looms- box changing principle, Automatic pirn changing in multi shuttle loom. Weft arrival control and automation in shuttle less looms; selvedges in shuttle less looms; quick style change;

UNIT V  PROCESS CONTROL & SPECIAL WEAVING PROCESS  
Techno economics of shuttle less loom weft insertion systems; loom monitoring and control Loom stoppages and efficiency; fabric defects and value loss; fabric shrinkage in the loom - causes and control; fabric engineering. Filament weaving – Silk & Texturised yarns. Principles and mechanisms in weaving Pile fabrics, tapes and triaxial fabrics

TOTAL : 45 PERIODS

REFERENCES
UNIT I  RING SPINNING
Principle of yarn formation in ring spinning machines; working of ring spinning machine; cop building; design features of important elements used in ring spinning machine; draft, twist and production calculations in ring spinning machine; end breakage rate – causes and remedies

UNIT II  CONDENSED YARN SPINNING
Condensed yarn spinning – principle, different methods, properties; comparison with ring spun yarn

UNIT III  YARN PLYING
Merits of plying of yarns; methods followed for plying – TFO, ring twisting; selection of twist level for plying; calculation of resultant count of plied yarns; types of fancy yarns, method of production

UNIT IV  ROTOR SPINNING
Principle of open end spinning; principle of yarn production by rotor spinning system; design features of important elements used in rotor spinning; properties of rotor yarn

UNIT V  OTHER SPINNING SYSTEMS
Friction and air-jet spinning methods – principle of yarn production, raw material used, structure, properties and applications; principle of yarn production by self-twist, core, wrap, integrated compound spinning systems.

TOTAL : 45 PERIODS

REFERENCES
2. Klein W., "The Technology of Short-staple Spinning", The Textile Institute, Manchester, 1998
5. Lord P.R., "Yarn Production: Science, Technology and Economics", The Textile Institute, Manchester, 1999
10. Study of circular and flat knitting machine
11. Securing and bleaching of cotton
12. Dyeing of cotton with different classes of dyes
13. Degumming and dyeing of silk
14. Dyeing of synthetic fibre
15. Printing of cotton fabrics
16. Colour measurement

TOTAL: 45 PERIODS

PTTT8501 CHEMICAL PROCESSING OF TEXTILE MATERIALS I L T P C
3 0 0 3

UNIT I
Chemical structure of fibres; action of chemicals on fibres; natural and added impurities in textiles; singeing and desizing of natural and synthetic fibres and its blends; heat setting.

UNIT II
Scouring, bleaching and mercerization of cotton, bioscouring of cotton; carbonization, scouring and bleaching of wool; degumming of silk

UNIT III
Loose stock machine; hank and package processing machines; yarn singeing machine; woven and knitted fabric singeing machines; stretching devices; shearing and raising machines; kiers; mangles; jigger; winch; jet and soft flow machines; yarn mercerizer, chain and chainless mercerizers; continuous scouring and bleaching machines; washing ranges, hydro extractors; detwisters; dryers; stenters.

UNIT IV
Calendering, crease proofing, shrink proofing and softening; wool finishing.

UNIT V
Water and oil repellant finishes; fire retardant finish; antibacterial finish; Application of nanotechnology in finishing; assessment of finishes

TOTAL : 45 PERIODS

REFERENCES
UNIT I  LEVELLING  9
Different levelling methods adopted in the spinning machines to achieve better uniformity of the products; influence of the uniformity of the intermediate products on the yarn quality; effect of machines and processing parameters on product uniformity; importance of fibre-mix homogeneity on yarn quality; types and levels of mixing in the preparatory processes; assessment of fibre-blend variations.

UNIT II  NEP AND HOOK REMOVAL  9
Causes of nep and hook formation in the fibre-opening processes; improving the removal of neps in the carding and combing machines; maximizing the fibre hook straightening during the preparatory operations; measurement of neps and hooks.

UNIT III  WASTE CONTROL  9
Control of waste in blowroom, card and combers; influence of machine and processing parameters on waste removal; controlling the lint content in waste; cleaning efficiency and cleaning intensity.

UNIT IV  PRODUCTION CONTROL  9
Factors affecting the production limits of the spinning machinery; achieving maximum production in the given machinery; new concepts in achieving higher production in the spinning machinery; role of machinery maintenance and humidity control on production efficiency; computation of the productivity indices.

UNIT V  YARN QUALITY ANALYSIS & MAN-MADE FIBRE PROCESSING  9
Analysis and control of within length and between length variations and spectrogram; yarn faults classifications; causes and remedies for yarn defects. Optimum processing conditions required for man-made-fibres like polyester, viscose in the spinning machinery.

TOTAL : 45 PERIODS

REFERENCES
2. Lord P.R., “Yarn Production; Science, Technology and Economics”, The Textile Institute, Manchester, 1999
5. Klein W., “Man-made Fibres and their Processing”, The Textile Institute, Manchester, 1994
UNIT I  INTRODUCTION  5
Definition of quality- importance of quality assessment- selection of samples for quality assessment – random and biased samples – squaring technique and zoning technique for fibre selection; yarn sampling - use of random numbers - sampling for various types of yarn tests.

UNIT II  FIBRE LENGTH AND STRENGTH ANALYSIS  9
Fibre testing, the fibre quality index and spinnability; Fibre length and length uniformity-measuring techniques. Strength Tensile Testing modes – CRT, CRE, CRL and ARL; Fibre strength, importance, relation to yarn strength; Measurement techniques.

UNIT III  FIBRE FINENESS, MATURITY AND TRASH ANALYSIS  9

UNIT IV  YARN COUNT, TWIST AND STRENGTH  9
Yarn numbering systems-Indirect and direct systems-count conversions; Count measuring systems. Twist in single and ply yarns –twist direction – twist factor – twist and yarn strength; twist measurement and breaking twist angle measurement. Single yarn strength; Lea count-strength product (CSP) and Corrected Count Strength Product (CCSP).

UNIT V  YARN MASS EVENNESS AND SURFACE QUALITY  9

TOTAL : 45 PERIODS

REFERENCES
UNIT I  FUNDAMENTALS OF BONDED FABRICS  5
Definitions and classification of bonded fabrics; fibres, fibre preparations and their characteristics for the production of bonded fabrics, uses; methods of bonded fabric production

UNIT II  WEB FORMATION WITH STAPLE FIBRES  9
Production of staple-fibre web by dry and wet methods; influence of web laying methods on fabric properties; quality control of web

UNIT III  MECHANICAL, CHEMICAL AND THERMAL BONDING  13
Bonded fabric production by mechanical bonding - needling, stitching, water jet consolidation; Thermal Bonding technologies; Chemical bonding – Binder polymers and bonding technologies

UNIT IV  POLYMER – LAID WEB AND FABRIC FORMATION  9
Manufacture of Spun bonded fabrics, fibre orientation in spun bonded fabrics and characterization of filament arrangement; Manufacture of Melt blown fabrics – fibre formation and its attenuation; Effect of processing parameters on fabric characteristics

UNIT V  FINISHING AND APPLICATION OF BONDED FABRICS  9
Dry and Wet finishing; Characterisation, structure - property relationship in bonded fabrics; End uses of bonded fabrics

TOTAL : 45 PERIODS

REFERENCES
UNIT III    SOLUTION SPINNING
Solution spinning- Polymer Selection and Preparation, equipments, properties and applications of acrylic, polyurethane and regenerated cellulose fibres.

UNIT IV    POST SPINNING OPERATIONS
Neck drawing, drawing systems, influence of drawing on structure and properties of fibres; Types of heat setting, influencing parameters on heat setting, influence of heat setting on fibre behavior; Spin finish application; texturising.

UNIT V    ADVANCES IN FIBER SPINNING
Liquid crystal spinning; Gel spinning; Profile fibres, hollow & porous fibres; Speciality fibres-polyglycolic acid, polylactic acid, chitosan fibres preparation properties and applications.

TOTAL : 45 PERIODS

REFERENCES

PTT8601    CHEMICAL PROCESSING OF TEXTILE MATERIALS II
L   T   P   C
3   0   0   3

UNIT I    COLOUR SCIENCE
Theories of colour measurement, Beer–Lambert’s law and Kubelka-Munk theory and their application in colour assessment and colour matching; whiteness and yellowness indices.

UNIT II    THEORY OF DYEING
Dyeing equilibrium; dye-fibre interaction; adsorption isotherm; dye affinity; heat of dyeing; half dyeing time.

UNIT III    DYEING
Basic characteristics of dyes and pigments; classification of dyes and principle of application of dyes; Chemistry and technology of application of direct, reactive, disperse, acid and basic dyes; processing of denims; determination of fastness properties.

UNIT IV    PRINTING
Methods and styles of printing; printing machines; constituents of printing paste; printing with direct, reactive, acid and disperse dyes; printing with pigments
UNIT V  KNITS AND GARMENTS
Dimensional stabilization of tubular and open width knits; garment dyeing and printing; garment washing

TOTAL : 45 PERIODS

REFERENCES

PTTT8602  FABRIC QUALITY EVALUATION  L T P C
30 0 3

UNIT I  CONSTRUCTION CHARECTERISTICS  9
Basic fabric particulars – Measurement of ends and picks per inch, count of warp and weft, determination of the type of weave, measurement of length, width, thickness and Area density (GSM); warp and weft crimp measurements for spun and filament yarn fabrics, the cover factor calculations; Fabric sampling techniques.

UNIT II  STRENGTH CHARACTERISTICS  9

UNIT III  COMFORT AND SURFACE CHARACTERISTICS  9
Fabric stiffness – principle of measurement of flexural rigidity; Drapeability – measurement of drape coefficient; Crease recovery measurement techniques. Wrinkle recovery assessment using standard grades; Principle and functioning of air permeability testers, water repellency, contact angle and fabric shrinkage testing; Fabric abrasion resistance – measuring technique; Fabric pilling resistance – methods of determination.

UNIT IV  SPECIAL CHARACTERISTICS  5
Fabric bending hysteresis testing; Shear hysteresis measurements; Fabric compression and decompression behaviour; Fabric surface roughness and friction measurements; Fabric tensile hysteresis measurements; Fabric flame resistance testing methods; Moisture and thermal characteristics.
UNIT V  FABRIC INSPECTION AND GARMENT QUALITY


TOTAL : 45 PERIODS

REFERENCES

PTTT8603  GARMENT MANUFACTURING TECHNOLOGY  L T P C
3 0 0 3

UNIT I  9
Anthropometry, mass-production, mass-customization; pattern making, grading, marker planning, spreading & cutting

UNIT II  9
Different types of seams and stitches; single needle lock stitch machine - mechanism and accessories; needle – functions, special needles, needle size, numbering, needlepoint; sewing thread-construction, material, thread size, packages.

UNIT III  9
Labels, linings, interlinings, wadding, lace, braid, elastic, hook and loop fastening, shoulder pads, eyelets and laces, zip fasteners, buttons

UNIT IV  9
Raw material, in process and final inspection; needle cutting; sewability of fabrics; strength properties of apparel; dimensional changes in apparel due to laundering, dry-cleaning, steaming and pressing; care labeling of apparel

UNIT V  9
Garment dyeing, printing and finishing; pressing categories and equipment, packing

TOTAL : 45 PERIODS

REFERENCES

PTTT8604 MECHANICS OF TEXTILE MACHINERY L T P C 3 0 0 3

UNIT I
Equations of forces, motion and energy; energy stored in rotating masses.

UNIT II
Clutches and brakes – types, application in textile machines; gears, gear trains; power transmission – different modes, advantages and limitations, applications

UNIT III
Differential and variable speed drives – principles, application in textile machines; design of cone drums – piano feed regulation, roving machine builder mechanism;

UNIT IV
Friction – calculations; bearings, design of drive transmitting shafts, balancing of rotating masses

UNIT V
Design of winder drums; kinematics of shedding; design of tappets; beat up force, sley eccentricity; power for picking

TOTAL : 45 PERIODS

REFERENCES

PTTT8611 QUALITY ASSURANCE LABORATORY L T P C 0 0 3 2

LIST OF EXPERIMENTS
1. Determination of fibre fineness, length and maturity
2. Determination of single and bundle yarn strength and count
3. Determination of yarn twist
4. Determination of yarn crimp
5. Determination of evenness of sliver roving and yarn
6. Determination of seam strength  
7. Determination of fabric tensile strength  
8. Determination of air permeability  
9. Determination of fabric bursting strength  
10. Determination of fabric drape  
11. Determination of fabric crease recovery and wrinkle recovery  
12. Determination of fabric abrasion resistance and pilling  
13. Determination of fabric colour fastness (light, rubbing, washing and perspiration)  
15. Assessment of garment faults

TOTAL : 45 PERIODS

PTTT8701  CLOTHING COMFORT  L T P C  3 0 0 3

UNIT I
Comfort – types and definition; human clothing system, comfort perception and preferences 9

UNIT II
Thermo physiological comfort – thermoregulatory Mechanisms of the Human Body, role of clothing on thermal regulations 9

UNIT III
Heat and moisture transfer – moisture exchange, wearer’s temperature regulations, effect of physical properties of fibres, behavior of different types of fabrics 9

UNIT IV
Psychological comfort; neuro physiological comfort - basis of Sensory Perceptions, measurement techniques - Mechanical Stimuli and thermal stimuli. 9

UNIT V
Fabric tactile and mechanical properties - fabric prickliness, itchiness, stiffness, softness, smoothness, roughness, and scratchiness. Predictability of clothing comfort performance 9

TOTAL : 45 PERIODS

REFERENCES
UNIT I
Scope of operation research, applications, limitations; linear programming problems – construction, solutions by graphical method, simplex method, Big M method; sensitivity analysis; application of LP technique for mixing optimization in spinning mill

UNIT II
Transportation problem – construction, initial basic feasible solution – North West Corner rule, lowest cost entry method, Vogel’s Approximation Method; optimality test - MODI method, stepping stone method; replacement analysis

UNIT III
Assignment problem – construction, solution by Hungarian method, application in textile industry; sequencing problems; integer programming – construction, solving by cutting plane method

UNIT IV
Game theory- two person zero sum games, solving by matrix method, graphical method; Decisions theory - decisions under assumed certainty, decision under risk, decision under uncertainty, illustrations from textile industry; inventory control - EOQ models-deterministic models –probabilistic models

UNIT V
Project planning and control models: CPM, PERT – network representation, determining critical path, project duration; crashing of project duration; resource leveling

TOTAL : 45 PERIODS

REFERENCES
UNIT I  HUMAN VALUES  10

UNIT II  ENGINEERING ETHICS  9

UNIT III  ENGINEERING AS SOCIAL EXPERIMENTATION  9
Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law – The Challenger Case Study

UNIT IV  SAFETY, RESPONSIBILITIES AND RIGHTS  9

UNIT V  GLOBAL ISSUES  8

TOTAL: 45 PERIODS

TEXTBOOK

REFERENCES

WEB SOURCES
1. www.onlineethics.org
2. www.nspe.org
3. www.globalethics.org
4. www.ethics.org
UNIT I
Garment components and trimmings – labels and motifs, linings, interlining wadding, lace, braid and elastic, seam binding and tape, shoulder pads, eyelets and laces, zip fasteners, buttons – tack buttons, snap fastener and rivets; buckles, frag closures, belts, ribbons, fringe, emblems and sequins, decorative and functional trimmings; performance properties of components and trims.

UNIT II
Hook and loop fastening (Velcro), Zippers – anatomy of zipper, types, function of zipper, position of slider, standards on zipper, selection of zipper, application of zipper, shortening of zipper; evaluation of quality of accessories.

UNIT III
Embroideries - basic embroidery stitches – chain stitch, button hole stitch, herringbone stitch, feather stitch, lazy daisy, double knot stitch, interlacing stitch, stem stitch, French knot stitch, types of embroidery machines, limitations of hand embroidery; kaustic embroidery; kasida, kathiwar; Sind; chickankari; zardosai; tribal embroideries.

UNIT IV
Fashion accessories – footwear, handbags, gloves, hats, scarves, hosiery, jewelry, watches; testing of zippers, elastic waist band testing, fusible interlinings; safety issues for different accessories in children garment.

UNIT V
Printing – introduction; different methods – block printing, roller, screen, discharge, resist and pigment; styles of printing - batik, tie and dye, patch work, appliqué work, bead work.

TOTAL : 45 PERIODS

REFERENCES

PTTT8002
APPAREL MARKETING AND MERCHANDISING
UNIT I
INTRODUCTION TO APPAREL BUSINESS
9
International apparel business pattern, basic business concepts in Indian apparel export house, business operations in China and other south Asian countries. Business patterns for Indian apparel retail and home textiles. Understanding from concept board to finished product and its sequence.

UNIT II
MARKETING FOR APPAREL AND TEXTILE PRODUCTS
9
Defining marketing, marketing mix the objectives of marketing department, market research, different types of markets, marketing strategies with respect to a product/brand, Indian apparel houses international marketing strategies and domestic marketing strategies, marketing models, B to B marketing, B to C marketing, direct marketing, digital marketing.
UNIT III  MERCHANDISING  
Concepts of merchandising, concepts and apparel product lines, dimensions of product change, determination and development of product line and product range. Creative and technical design in garments and accessories, new product development and seasons of sale, costing, coordination and communication with the production house and export house.

UNIT IV  SOURCING  
Understanding the basics of sourcing, sourcing strategy and best sourcing practice in apparel and textile businesses, supply chain and demand chain understanding, sourcing negotiations, global co-ordination in sourcing, materials management and quality in sourcing, quick response and supplier partnership in sourcing, JIT technology.

UNIT V  EXPORT DOCUMENTATION AND POLICIES.  

TOTAL : 45 PERIODS

REFERENCES

PTTT8003  APPAREL PRODUCTION MACHINERY  

UNIT I  FABRIC INSPECTION AND SPREADING MACHINES  

UNIT II  CUTTING MACHINES  
Mechanism of straight knife cutting machines, rotary cutting machines, band knife cutting machines, die cutting, laser cutting, plasma cutting, water jet cutting and ultra sonic cutting; Notches, drills and thread markers; Computer interfaced cutting machines.

UNIT III  SEWING MACHINES  
Sewing machines – primary and secondary components; Working principle, stitch formation and timing diagram - lock stitch and chain stitch; single needle and double needle lock stitch mechanism: needle bar, hook – rotary and feed mechanism; Needles – geometry, types and selection

UNIT IV  SPECIAL SEWING MACHINES  
Over lock, Flatlock, Feed off arm, button fixing and button holing; Embroidery machines – mechanism and stitch formation; Sewing machines feed mechanisms; sewing machine attachments
UNIT V FINISHING MACHINES
Molding machineries; Shrinking machineries – London shrinking, hot-water shrinking, steam
sharking and compaction shrinkage; Pressing machineries – buck pressing, iron pressing, block
or die pressing, form pressing, steamers and advanced pressing machineries; Pleating –
principles and mechanics machineries

REFERENCES
   Sciences, 1996
2. Jacob Solinger., ” Apparel Manufacturing Handbook “, VanNostrand Reinhold CompaNY,
   1980
   Prentice Hall, 2005

PTTT8004 CHARACTERISATION OF POLYMERS L T P C
3 0 0 3

UNIT I MOLECULAR WEIGHT
Polymer solution thermo dynamics; molecular weight and molecular dimensions by end group
analysis, osmometry, light scattering, viscometry, gel permeation chromatography, high
performance liquid chromatography

UNIT II MOLECULAR STRUCTURE CHARACTERISATION
Infrared, NMR, UV – visible, raman spectroscopy, mass spectroscopy

UNIT III THERMAL PROPERTIES
Thermal properties by differential scanning calorimetry, differential thermal analysis, thermo
gravimetry, thermo-mechanical analyzer, dynamic mechanical and di-electric analysis

UNIT IV CHROMATOGRAPHIC TECHNIQUES
Chromatographic techniques – adsorption chromatography – TLC, GC, LC – HPLC, GPC –
hyphenated techniques

UNIT V OTHERS
Optical and electron microscopy; SEM, TEM, X-ray scattering from polymers, birefringence,
crystallinity by density measurements,

REFERENCES
   New York, 1969
UNIT I  

UNIT II  
Rheological Behavior of Fluids- Rheology of Plastisols-Hydrodynamic Analysis of Coating, Clothing Comfort- Impermeable Coating-Breathable Fabrics

UNIT III  

UNIT IV  

UNIT V  
Test methods for coated fabric evaluation; environmental norms for the chemicals used in coating industry.

REFERENCES

TOTAL: 45 PERIODS

UNIT I   LIGHT-MATTER INTERACTION  
The electromagnetic spectrum – the optical region, interaction of light with matter a) Transparent case – Beer’s Law and Lambert’s Law b) Opaque case – reflection absorption and scattering, the concept of “Radiative Transfer Theory” and its simplification into the Kubelka – Munk model.

UNIT II  HUMAN COLOUR VISION  
Colour Sensation – physiological and psychological mechanism of color vision, color vision theories, defects in color vision, color vision tests, additive and subtractive color mixing, confusion in color perception.
UNIT III  

COLOUR ORDER SYSTEMS  

Description of color, various color order systems, CIE numerical system for colour definition and its components – illuminants, the versions of the standard observer, the colour scales, chromaticity diagram.

UNIT IV  

NUMERICAL COLOUR MATCHING  

Reflectance and K/S value, relationship between dye concentrations and a) reflectance values and b) K/S values, reflectance and K/S curves of dyed samples, the CIE model for computer color matching and the calculation of colour recipes, non CIE models for colour matching, limitations of computer color matching

UNIT V  

METAMERISM AND COLOUR DIFFERENCE ASSESSMENT  

Metamerism – types and its assessment, metamerism in textile materials; colour differences – visual assessment, standard conditions, methods and problems, assessment of colour difference, the non linearity of subjective perception of colour, the need for specific colour difference systems, setting up of objective pass/fail standards.

REFERENCES  


PTTT8007  

FINANCIAL MANAGEMENT FOR TEXTILE AND APPAREL INDUSTRIES  

L T P C  

3 0 0 3

UNIT I  

Costing - concepts; classification of costs; preparation of cost sheet; costing of yarn, fabric and garment; cost profit volume analysis, breakeven analysis

UNIT II  

Depreciation – method of computing depreciation; techniques of investment analysis - payback period method, accounting rate of return, Discounted Cash Flow methods - IRR, NPV, PI

UNIT III  

Capital structure; Sources and cost of capital; working capital management

UNIT IV  

Tools for financial analysis and control- profit and loss account, balance sheet; financial ratio analysis - illustrations from textile unit

TOTAL : 45 PERIODS
REFERENCES
2. Bhave P.V. and Srinivasan V., “Costing Accounting to Textile Mills”, ATIRA, Ahmadabad, 1976

PTTT8008 HIGH PERFORMANCE FIBERS

UNIT I LINEAR POLYMER FIBRES
Aramid fibres - Polymer preparation, Spinning, Structure and properties and applications. Polyethylene fibres – Manufacture, Fibre characteristics, Properties, Yarn and fabric processing and applications.

UNIT II CARBON FIBRE
Manufacture of PAN-based, Pitch-based carbon fibres; physical properties and applications.

UNIT III GLASS AND CERAMIC FIBRES
Glass fibres - Fibre manufacture; fibre properties; glass-fibre composites and other applications. Manufacture of ceramic fibres; Silicon carbide-based fibres, other non-oxide fibres, Alumina-based fibres, other polycrystalline oxide fibres, Single-crystal oxide fibres

UNIT IV CHEMICAL AND THERMAL RESISTANCE FIBRES
Chlorinated fibres, fluorinated fibres, Polyetheretherketones, Polyphenylenesulphide, Polyetherimide, properties and applications. Tthermo plastic and thermoset polymers, aromatic polyamides and polyaramids, semicarbon fibres, Polybenzimidazole.

UNIT V SPECIALITY FIBRES
Speciality fibres - Hollow and profile fibres; blended and bi-component fibres; super absorbent fibres; film fibres

TOTAL : 45 PERIODS

REFERENCES
UNIT I
Human resource development systems - The Indian society in transition, understanding the concepts of HRD past, present and future, strategies adopted, structure, objectives and working of the HRD system in India and abroad, role of HR managers in textile and apparel industries.

UNIT II
Human resource planning – objectives of planning on the macro level, demand forecasting of HR planning, MIS in HR planning, future skill mapping, human resource outsourcing, recruitment and processes involved in textile and apparel industries, induction; training objectives, methods, carrier planning, performance and potential appraisal.

UNIT III
Job - analysis, description, evaluation, enrichment; Performance measurement: objectives, methods, multi-skill development, motivation. Organised labour, understanding groups, development, cohesion, alienation, group work behaviour & managing international work force.

UNIT IV
Compensation, wage policy, industrial pay-structure, types, components, laws and methods of payment; methods of wage fixation in a textile mill and apparel units; laws governing employee benefits and welfare, incentives, overtime, bonus, cost to the company.

UNIT V
Different Acts governing labour welfare and employment; employee discipline- disciplinary actions, procedures, suspension, dismissal and retrenchment, role of trade unions, collective bargaining, industrial democracy and workers participation in management, related case studies.

TOTAL : 45 PERIODS

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

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

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

TOTAL : 45 PERIODS

REFERENCES
UNIT I
Polymers and Textile-based techniques used for medical applications, Cell-Polymer interaction.

UNIT II

UNIT III
Extra-corporeal materials: Scaffolds for Tissue engineering, Rapid prototyping, Cartilages, Liver, Blood Vessel, Kidney, Urinary bladder, Tendons, Ligaments, Cornea,

UNIT IV
Healthcare and hygiene products: Surgical Gowns, masks, wipes, Antibacterial Textiles, Super absorbent polymers.

UNIT V
Safety, Legal and ethical issues involved in the medical textile materials

TOTAL : 45 PERIODS

REFERENCES
UNIT III
Ticket number in sewing threads; testing of sewing threads – physical and chemical properties; sewing performance – control of missing stitches and seam puckering, factors affecting seam strength.

UNIT IV
Selection of sewing thread for different end uses

TOTAL : 45 PERIODS

REFERENCES

PTTT8013 PRODUCTION AND OPERATIONS MANAGEMENT FOR TEXTILE INDUSTRY

UNIT I
Factors of production; environmental and social concerns of operations; design of production system; forecasting in production and operation management – various qualitative and quantitative techniques

UNIT II
Capacity planning; facility planning – objectives; different types of layouts, developing process layout, product layout; job design techniques

UNIT III
Aggregate production planning – procedure, importance; scheduling in operation management – mass production system, batch and job shop

UNIT IV
Material management – material planning, purchase, stores, material handling and disposal; inventory models; MRP- objectives, elements of MRP, MRP computation, implementation

UNIT V
Concepts - Total Productive Maintenance, Just In Time, Total Quality Management; Automated Technology, CIM, CAD, FMS, GT, CAM, CAPP

TOTAL : 45 PERIODS

REFERENCES
PROTECTIVE GARMENTS

UNIT I  FIBRES, YARNS AND FABRICS FOR PROTECTIVE GARMENTS  9
Characteristic requirements of fiber, yarn and fabric for flame proof, heat resistant, ballistic resistance, electrical conduction, bacterial protection, radiation protection and radiation contamination protection

UNIT II  CHEMICAL FINISHES FOR PROTECTIVE FABRICS  9
Mechanism, Chemistry, Materials and methods - Flame retardant, Liquid repellent, Antistatic, Antibacterial, UV protection and mite protection finishes

UNIT III  PROTECTIVE FABRICS IN DIFFERENT APPLICATIONS  9
Protective fabrics used in the medical field and in hygiene; military combat clothing; protective fabrics against biological and chemical warfare; textiles for high visibility

UNIT IV  PROTECTIVE GARMENT CONSTRUCTION  9
Garment construction - method of construction of garments according to various protective end uses; use of accessories for protective garment

UNIT V  EVALUATION OF PROTECTIVE GARMENTS  9
Standards and test method for protective fabric performance - Flame retardant finishes, Liquid repellent finishes, Antistatic, Liquid repellent, antibacterial, UV protection, mite protection; Materials and methods. Manikins – Thermal manikins, segmented thermal manikins, evaporative resistance measurement- moisture permeability index, skin model, Concept of dynamic manikins; Permeation resistance test – index of penetration and index of repellency; Liquid tight integrity and gas tight integrity; Ergonomics of protective clothing

TOTAL : 45 PERIODS

REFERENCES

PTTT8015 SMART GARMENTS L T P C
3 0 0 3

UNIT I
An overview on smart textiles, electrically active polymers materials- application of non ionic polymer gel and elastomers for artificial muscles. Heat storage and thermo regulated textiles and clothing, Thermally sensitive materials, Cross – linked polymers of fiber substrates as multifunctional and multi use intelligent material . Mechanical properties of fiber bragg gratings, optical responses of FBG ( Fiber Bragg grating ) sensors under deformation. Smart textile composites integrated with optic sensors.

UNIT II
Adaptive and responsive textile structures, bioprocessing for smart textiles and clothing, Tailor made intelligent polymers for biomedical application

UNIT III
Smart fabrics – passive, active, very smart – classification of smart materials, concept of wearable computing, basic structure of fabric used for integrating different electronic sensors

UNIT IV
Smart Interactive garments for combat training, for hospital and patient care, smart garments in sports and fitness activities, smart garments for children, smart home textiles.

TOTAL : 45 PERIODS

REFERENCES
1. Edited by Sanjay Gupta, “Smart Textiles their Production and Marketing Strategies”, NIFT, New Delhi, 2000

PTTT8016 STRUCTURAL MECHANICS OF FABRICS L T P C
3 0 0 3

UNIT I
GEOMETRY OF CLOTH STRUCTURE 10
Geometry of Plain and Non-Plain weaves; Peirce and Olofsson models; crimp ratio and thread spacing; Jamming of threads; Crimp interchange; Balance of crimp.

UNIT II
FABRIC DEFORMATION 15
Fabric deformation under tensile stress; prediction of modulus; tensile properties in bias direction; other fabric deformation – compression, shear, bending and buckling; fabric handle; Spirality and skewness formation and its control.
UNIT III  KNITTED FABRIC STRUCTURES  10
Geometry of weft and warp knitted structures, influence of friction on knit geometry; load-extension of warp knit fabrics; biaxial stress behavior of plain-knit fabrics

UNIT IV  NONWOVEN STRUCTURES  10
Structure of felts; mechanical behavior of needle felts; structure of stitch bonded fabrics

TOTAL : 30 PERIODS

REFERENCES

TOTAL : 45 PERIODS

REFERENCES
UNIT I
Basic principles of supply chain management and logistics, supply chain models, supply chain for volatile market; supply chain drivers and metrics in apparel industries; roll of supply chain in the textile and apparel industries' financial stability.

UNIT II
Planning supply and demand in apparel production house, managing economies of scale, supply cycle and inventory levels; managing uncertainty in supply chain, safety pricing and inventory; make Vs buy decision, make Vs hire decision; geographical identification of suppliers, supplier evaluation, supplier selection, contract negotiations and finalisation.

UNIT III
Distribution network and design for global textile and apparel products, models of distribution – facility location and allocation of capacity, uncertainty on design and network optimisation; the role of transportation in supply chain, modes of transportation, characteristics of transportation, transport design options for global textile and apparel network, trade-off in transport design, risk management in transportation, transport decision in practice for textile and apparel industries.

UNIT IV
Coordination in supply chain- the bullwhip effect, forecasting, obstacles to coordination in supply chain; supply chain management for apparel retail stores, high fashion fad; supply chain in e-business and b2b practices

UNIT V
Import - Export management, documentation, insurance, packing and foreign exchange; methods of payments – domestic, international, commercial terms; dispute handling modes and channels; supply chain and Information system; Customer relationship management

TOTAL : 45 PERIODS

REFERENCES

UNIT I
Design and characteristics required in textiles for transport applications; applications of textile reinforced composites in transport sector; quality requirement of yarns used in fishing industry like nets, ropes; conveyor belts, power transmission belts.

UNIT II
Design and characteristics required in textiles for medical and hygiene applications – antimicrobial, disposable and reusable products; Textiles in sports wear
UNIT III 13
Design and characteristics of home textiles; Garment design and choice of materials in protection from hazards due to mechanical, extreme climate, nuclear, biological, chemical and flame

UNIT IV 14
Use of geo textiles in filtration, drainage, separation and reinforcement application in construction; Type of fibre and fabric to be used in such applications; evaluation of geo textiles; use of textile materials in permanent and temporary civil construction - tents, awnings, sound and thermal insulation

TOTAL : 45 PERIODS

REFERENCES

PTTT8020 TEXTILE AND APPAREL EXIM MANAGEMENT L T P C
3 0 0 3

UNIT I 5
International markets for yarns, woven fabrics; international market for cotton, silk, jute, wool and other fibres; export and import of textiles by India – current status, promotional activities

UNIT II 5
International markets for carpets and home textiles – product types, market potential and statistics, India - current status and promotional activities, role of export promotional councils

UNIT III 9
International markets for woven piece goods, knitted garments, leather garments; statistics of international apparel market and trade; export incentives, role of AEPC, CII, FIEO, Textile Committee
UNIT IV
Marketing – strategies, global brand building; logistics & SCM; role of export finances & EXIM banking, ECGC, Indian council of arbitration, FERA; impact of foreign trade on Indian economy

UNIT V
Exim policy - customs act, acts relating to export/import of textile and apparel; Indian customs formalities - export documentation for excisable goods, import documentation, clearance of import goods; concepts - 100% export oriented units, export processing zones, special economic zones; duty drawback procedure; import/export incentives; licenses; case study

REFERENCES
REFERENCES

PTTT8022 TEXTILE REINFORCED COMPOSITES L T P C

UNIT I INTRODUCTION 9
Fiber reinforced polymers materials, properties; Resins - Thermoset and Thermo plastics / additives release agents; Composite material classification and its properties: Reinforcement – matrix interface wetability.

UNIT II PREPREGS AND PREFORMS 9

UNIT III TECHNIQUES FOR MANUFACTURE OF COMPOSITES 13

UNIT IV MECHANICAL PROPERTIES OF TEXTILE COMPOSITES 9

UNIT V APPLICATION OF POLYMER COMPOSITES 5
Composites application in aerospace, construction industry, and sports products. electrical, Polymer composite for biomedical and vibration damping.

TOTAL : 45 PERIODS

REFERENCES
UNIT I INTRODUCTION


UNIT II TQM PRINCIPLES


UNIT III TQM TOOLS & TECHNIQUES I

The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to spinning, weaving, chemical processing and garment industries – Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types

UNIT IV TQM TOOLS & TECHNIQUES II


UNIT V QUALITY SYSTEMS


REFERENCE BOOKS


TOTAL : 45 PERIODS

OBJECTIVES:

- To provide students an exposure to disasters, their significance and types.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
- To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
- To enhance awareness of institutional processes in the country and
To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

UNIT I  INTRODUCTION TO DISASTERS  9
Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don’ts during various types of Disasters.

UNIT II  APPROACHES TO DISASTER RISK REDUCTION (DRR)  9
Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stakeholders- Institutional Processess and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III  INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT  9
Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV  DISASTER RISK MANAGEMENT IN INDIA  9
Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V  DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS  9
Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS

OUTCOMES:
The students will be able to
- Differentiate the types of disasters, causes and their impact on environment and society
- Assess vulnerability and various methods of risk reduction measures as well as mitigation.
- Draw the hazard and vulnerability profile of India, Scenarios in the Indian context,
- Disaster damage assessment and management.

TEXTBOOKS:
REFERENCES
1. Govt. of India: Disaster Management Act, Government of India, New Delhi, 2005

REFERENCES