B.TECH TEXTILE TECHNOLOGY

SEMESTER - 1

19T101 CALCULUS AND GEOMETRY

3 1 0 4

THREE-DIMENSIONAL ANALYTICAL GEOMETRY: Direction cosines and ratio's, angle between two lines, equation of a plane, equation of a straight line, shortest distance between two lines. Equation of a sphere, plane section of a sphere. (9 + 3)

DIFFERENTIAL CALCULUS: Functions of two variables, limits and continuity, partial derivatives, the chain rule, extreme values and saddle points, Taylor's formula for two variables. (9 + 3)

INTEGRAL CALCULUS: Double integrals, double and iterated integrals over rectangles, double integrals over general regions, Fubini's theorem, area and volume by double integration, reversing the order of integration. (9 + 3)

ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER : Basic concepts, separable differential equations, exact differential equations, integrating factors, linear differential equations, modeling - mixing problems, decay and growth problems, Newton's law of cooling. (9 + 3)

LINEAR DIFFERENTIAL EQUATIONS OF SECOND ORDER: Homogeneous linear equations of second order, homogeneous linear ODEs with constant coefficients, finding a basis if one solution is known, Euler — Cauchy equation, solution by variation of parameters. (9 + 3)

Total L: 45 +T: 15 = 60

TEXT BOOKS:

1. Joel Hass, Christopher Heil, Maurice D. Weir "Thomas' Calculus", Pearson Education., New Delhi, 2018
2. Erwin Kreyszig "Advanced Engineering Mathematics", Wiley India Pvt Ltd., New Delhi, 2015

REFERENCES:

1. Howard Anton, Irl Bivens, Stephen Davis "Calculus", John Wiley &Sons, INC., USA, 2016
2. Wylie C R and Barrett L C "Advanced Engineering Mathematics", Tata McGraw-Hill., New Delhi, 2019
3. Vittal. P.R "Analytical Geometry 2D and 3D", Pearson Education., Chennai, 2013
4. Gilbert Strang "Calculus", Wellesley Cambridge Press., USA, 2017

19T102 PHYSICS

3 0 0 3

MECHANICAL PROPERTIES : Review of vector quantities. Newton's third law and Free Body diagrams. Rigid body dynamics: Centre of mass. Moment of inertia. Torque, angular momentum and angular acceleration. Work power and energy. Conservation of momentum. Friction and wear-Static and dynamic friction, limiting friction, Rolling friction. Coefficient of static friction, coefficient of dynamic friction. Lubrication and lubricants. Surface wear due to friction. Role of friction in textiles. Surface treatments for reducing friction. Surface treatments for increasing friction. (9)

PROPERTIES OF FLUIDS : Surface tension: molecular forces-intermolecular range. Excess pressure, capillarity.Viscosity - viscous force-coefficient of viscosity. Equation of continuity. Adhesion, cohesion, wettability. Fluid Motion- Newtonian and non newtonian fluids - Kinematics of Moving Fluids: Poiseuille's Equation for flow of a Liquid through a capillary tube. Properties of absorbent textiles for industrial applications (9)

GEOMETRICAL OPTICS : Image formation using lenses and mirrors. Spherical and chromatic aberration. Methods of reducing aberrations. Aspherical components, aperture control, multiple elements. Adaptive optics. Definition of depth of field. Optical instruments for imaging and inspection of textiles and fibres. Factors affecting magnification and image quality (8)

PHYSICAL OPTICS : Principle of Interferometry. Interferometric techniques for measurement of small thicknesses. Applications to measurement of fibre thickness and uniformity. Polarised light - appearance of transparent materials in polarised light- fibre colour due to birefringence. Polarised light microscopes for inspection of textiles and fibres. Use of Bertrand lens and conoscopy. Spectral distribution: emission, transmission reflection and absorption spectra. Textile colour, colour changing fabrics. (10)

THERMAL PHYSICS : Review of thermal properties: Specific heat capacity, thermal capacity and coefficient of linear thermal expansion. Methods of measurement of thermal expansion. Differential equation of one-dimensional heat flow. Searle's apparatus and Lee's disc apparatus for determination of thermal conductivity. Thermal Insulation. Convection and radiation. Heat dissipation. Properties of woven and non-woven textiles for thermal functions. (9)

Total L: 45

TEXT BOOKS:
1. Richard Wolfson "Essential university Physics", Pearson Education, Singapore.,2011
2. D Halliday and R. Resnick "Fundamentals of Physics", John Wiley and Sons., 2015

REFERENCES:
1. Gaur R K and Gupta S L "Engineering Physics", Dhanpat Rai and Sons, India.,2013
2. Hitendra K Malik, Ajay Kumar Singh "Engineering Physics", Tata McGraw-Hill Publishing Co. Ltd, India., 2017 , 2nd
3. Mathur D. S "Elements of Properties of Matter", S Chand and Co., 2013
4. Raymond A Serway, John W. Jewett "Physics for Scientists and Engineers", Cengage Learning., 2010

19T103 CHEMISTRY

3 0 0 3

CHEMICAL BONDING : Types of chemical bonds –bond polarity, dipole moments and partial ionic character of covalent bonds. Metallic bonding –free electron theory a n d band theory. Hydrogen bonding –types and their consequences. van der Waals forces –origin and significance. Significant organic functional groups in textiles. Properties of textiles related to structure and bonding - stretchability, dyeability, absorbency, crystallinity and strength- cotton wool, silk and polyester. (9)

KINETICS AND SURFACE CHEMISTRY : Review of Integrated rate laws-temperature dependence o f reaction rate, homogenous and heterogenous catalysis, kinetics of enzyme catalysis–Michaelis-Menton equation. Adsorption - Freundlich and Langmuir isotherms. Surface active agents -types, orientation of surfactants o n s olid and liquid interfaces, adsorbed m ono layers, Critical micelle concentration. Applications o f adsorption –detergency, water repellency, wetting -contact angle, foaming, emulsifiers-zeta potential, hydrophile- lipophile balance, deemulsification, defoamers and water conservation. (9)

WATER CHEMISTRY : Water quality parameters-determination of hardness (EDTA method), alkalinity, TDS, BOD, COD, chloride, sulphate, estimation of iron by colorimetry. Boiler troubles and remedies –internal conditioning. Water treatment methods –zeolite, demineralization, electrodialysis and reverse osmosis. Solution chemistry -solubility product, common ion effect-influence on ionization of weak electrolytes and pH of solutions. (9)

OILS, FATS, SOAPS AND LUBRICANTS : Oil and fats -chemical constitution, general chemical characteristics - drying, rancidification, hydrolysis, hydrogenation, hydrogenolysis. Chemical analysis –acid, saponification, iodine, R M values – determination a n d their significance. Soaps and detergents-types and preparation. Lubricants - Mechanism of lubrication, properties of lubricating oil -viscosity, viscosity index, flash and fire points, oiliness, cloud and pour points, aniline point, steam emulsion number, oxidation stability. Additives for lubricants. Greases –types and uses. Solid lubricants. (9)

DYES : Theory of colour and constitution–chromophore and auxochromes. Optical brightening agents. Nomenclature of dyes -commercial naming, colour index. Classification of dyes based on chemical structure and application. Chemistry of dye Intermediates - nitration,halogenation, sulphonation, Friedel- Crafts reaction, hydrolysis, oxidation, reduction and diazotization. Intermediates from benzene, naphthalene and anthracene. Synthesis of metanil yellow, congo red, malachite green, alizarin and indigo. (9)

Total L: 45

TEXT BOOKS :
1. Puri B. R, Sharma L. R, Pathania M. S "Principles of Physical Chemistry", Vishal Publishing & Company., New Delhi, 2010. , 1st ed
2. Jain P. C, Monica Jain "Engineering Chemistry", Dhanpat Rai Publishing Company., New Delhi, 2013. , 1st ed

REFERENCES :
1. Peter Atkins, Julio de Paula "Elements of Physical Chemistry", Oxford University Press., UK, 2013. , 6th ed
2. Chatwal G. R "Synthetic Organic Chemistry", Himalaya Publishing House., Mumbai, 2001., 1st ed
3. Shashi Chawla "A Text book of Engineering Chemistry", Dhanpat Rai & Company., New Delhi, 2005. , 1st ed
4. Shaw D. J "Introduction to Colloids and Surface Chemistry", Butterworth -Heinemann Ltd., Jordan, 1998. , 1st

19T104 BASICS OF TEXTILE ENGINEERING

3 0 0 3

TEXTILES: Apparels, Home Textiles and Technical textiles. Materials, Structure and properties based on end uses. Fabric type –Woven, Knitted and Nonwovens. Process flow chart. (9)

YARN: Classification of yarns — staple spun, continuous filament, textured yarn, fancy, composite, hybrid and plied. Structure and properties based on end uses. Process flow chart. Yarn Numbering systems. (9)

FIBRES: Classification of textile fibers. Extraction, structure, properties and end uses of natural fibers — Cotton, Wool, Silk, Jute, Flax, Hemp Coir, Sisal and Banana. (9)

MANUFACTURED FIBRES: Classification. Raw material, spinning process, process flow chart, structure , properties and end uses of Viscose, Polyester, Nylon, Acrylic, Polypropylene. Identification of textile fibres – Feeling Test, Burning test, Microscopic test, Staining Test. Chemical test and Density measurement. (13)

CURRENT TRENDS: Research and development of textile machineries and products. Selfstudy topics. (5)

Total L: 45

TEXT BOOKS:

1. Mathews Kolanjikombil "The Substrates - Fibres, Yarn and Fabric", Woodhead publishing India., India, 2018.
2. Sreenivasamurthy H. V. "Introduction to Textile Fibres", The Textile Association India., Mumbai, India, 1998.

REFERENCES :

1. Bernard P. Corbman "Textiles : Fibre to Fabric", McGraw Hill Book Co., Singapore, 1983.
2. Mishra S. P "A Text Book of Fibre Science and Technology", New Age International (P) Ltd., New Delhi, India, 2000.
3. Marjory L. Joseph "Essentials of Textiles", CBS College Publishing., New York, 1984.
4. Oxtoby E "Spun Yarn Technology", Butterworths., London, 2002.

19G105 ENGLISH LANGUAGE PROFICIENCY

2 1 0 3

LEARNING LANGUAGE THROUGH STANDARD LITERARY AND GENERAL TEXTS : Integrated tasks focusing on language skills ; Training based on Text based vocabulary, tone, register and Syntax features (12+0)

GRAMMAR IN CONTEXT : Word Order ; Subject Verb Concord ; Style features - Tenses, Conditionals, Prepositions, Active and Passive Voice, Modals, Cloze and Spotting Error exercises (10 + 0)

GUIDELINES FOR WRITTEN COMMUNICATION : Principles of clear writing, Paragraph writing, Essay writing, Emphasis Techniques, Summarizing and Paraphrasing, Analytical writing (8 + 0)

FOCUS ON SPOKEN ENGLISH : Task — based activities: Graded levels of difficulty and with focus on language functions - Level 1: Self — expression — Greetings in Conversation, Hobbies, Special interests, Daily routine - Level 2: General Awareness — Expression of Concepts, Opinions, Social Issues, Description of a process / picture/chart, news presentation / review - Level 3: Advanced Skills — Making Short Speeches and Participating in Role Plays (0 + 10)

LISTENING ACTIVITY : Task based activities using Language Laboratory (0 + 5)

Total L: 30 +T: 15 = 45

TEXT BOOKS:

1. Faculty In-charge "Course Material on "English Language Proficiency", PSG College of Technology., Coimbatore, 2019

REFERENCES:

1. Jill Singleton "Writers at Work: The Paragraph", Cambridge University Press., New York, 2012
2. Simon Haines, Mark Nettle and Martin Hewings "Advanced Grammar In Use", Cambridge University Press., New Delhi, 2008
3. Anne Laws "Writing Skills", Orient Black Swan., Hyderabad, 2011
4. Sinha DK "Specimens of English Prose", Orient Black Swan., Hyderabad, 2012

19T110 ENGINEERING PRACTICES

0 0 2 1

1. Welding - Metal arc welding tools and equipment, exercises on arc welding and MIG welding processes.
2. Fitting - Tools, operations, exercises on “T”-Joint and “L” Joint, types of joints.
3. Carpentry - Tools, carpentry process, exercises on types of joints.
4. Plumbing - Exercises on external thread cutting and joining.
5. Sheet metal work and Soldering - Tools, operations, exercise on rectangular tray using galvanized iron sheet.

Total P: 30

19T111 BASIC SCIENCES LABORATORY

0 0 4 2

PHYSICS LABORATORY (ANY EIGHT EXPERIMENTS) :

1. Determination of Young’s Modulus of a wooden bar — Cantilever method
2. Determination of rigidity modulus of a given material using Torsion pendulum
3. Determination of coefficient of viscosity of water — Poiseuille’s method
4. Determination of surface tension of water — Capillary rise method
5. Determination of Surface tension — Drop weight method
6. Determination of thermal conductivity of bad conductor using Lee’s Disc method
7. Determination of Specific Heat of solids — Calorimeter
8. Determination of fibre thickness — air wedge method
9. Determination of wavelength of mercury spectrum using transmission grating
10. Determination of lattice constant using X-ray powder photograph

(30)

CHEMISTRY (ANY EIGHT EXPERIMENTS) :

1. Estimation of hardness of water by EDTA method.
2. Determination of pH, alkalinity and COD of water sample.
3. Study of viscosity of lubricating oil using Redwood viscometer.
4. Determination of Flash and Fire points & Cloud and Pour points of a lubricating oil.
5. Determination of acid value, saponification value and iodine value of a vegetable oil.
6. Determination of CMC of a surfactant by conductometry.
7. Estimation of strength of commercial acid and purity of washing soda.
8. Estimation of strength of hydrogen peroxide solution.
9. Estimation of available chlorine in the hypochlorite solution.
10. Removal of dye from textile effluent using adsorbents. (30)

Total P: 60

REFERENCES:

1. Department of Chemistry "Chemistry Laboratory Manual", ., 2019
2. Department of Physics "Physics Practicals", ., 2019
3. Wilson J. D. and Hernandez C. A. "Physics Laboratory Experiments", Houghton Miffin Company, New York., 2009

19T112 C PROGRAMMING LABORATORY

0 0 4 2

1. Working with RAPTOR Tool — Flowchart Interpreter
2. Simple programs to understand Operators and expressions.
3. Decision making Statements :simple if, if..else, nested if .. else,elseifladder, switch case
4. Loops : while , do..while, for
5. Implementation of one dimensional array
6. Implementation of two dimensional array
7. Working with Strings
8. Functions
9. Recursive functions
10. Structures: Arrays and Structures,Nested Structures
11. Structures and functions
12. Implementation of pointer and pointer arithmetic
13. Types of pointer:const pointer, pointer to a constant, void pointer, null pointer

Total P: 60

REFERENCES:

1. Deitel H. M. and Deitel P. J "C: How To Program", Prentice Hall of India., New Delhi, 2015
2. Ajay Mittal "Programming in C - A Practical approach", Pearson., New Delhi, 2010
3. Gottfried B "Programming with C", McGraw Hill Education., New Delhi, 2018
4. Herbert Schildt "C: The Complete Reference", McGraw Hill., New Delhi, 2017

19IP15 INDUCTION PROGRAMME

0 0 0 0

As per AICTE guidelines

SEMESTER - 2

19T201 LINEAR ALGEBRA AND TRANSFORMS

3 1 0 4

LINEAR EQUATIONS : Systems of linear equations, solving a linear system, existence and uniqueness of solutions, solutions of homogeneous and non homogeneous linear systems, applications of linear systems in economics and network flow, linear independence. (9 + 3)

EIGENVALUES AND EIGENVECTORS : Eigenvalues and eigenvectors of a real matrix — characteristic equation, properties of eigenvalues and eigenvectors, diagonalization, quadratic forms, reduction to canonical form by orthogonal reduction, applications of eigenvalues in population models and a predator-prey system. (9 + 3)

Z TRANSFORMS : Z transform, inverse transform, shifting theorem, convolution, initial and final value theorem, application of Z transform to solve difference equations. (9 + 3)

LAPLACE TRANSFORMS : Laplace transform, linearity, first shifting theorem, transforms of derivatives and integrals, ODEs, unit step function, second shifting theorem, Dirac's delta function, periodic functions. (9 + 3)

FOURIER TRANSFORMS : Fourier transform, Fourier cosine and sine transforms, discrete Fourier transform, Fast Fouriertransform—DITalgorithm. (9 + 3)

Total L: 45 +T: 15 = 60

TEXT BOOKS:

1. Erwin Kreyszig "Advanced Engineering Mathematics", John Wiley &Sons., New Delhi, 2015
2. David C. Lay "Linear Algebra and its Applications", Pearson Education, Inc., Chennai, 2016

REFERENCES:

1. Wylie C R and Barrett L C "Advanced Engineering Mathematics", Tata McGraw-Hill., New Delhi, 2019
2. Jain. R. K., Iyenger, S. R. K. "Advanced Engineering Mathematics", Narosa Publishing House., New Delhi, 2018
3. Alexander D. Poularikas "Transforms and Applications Primer for Engineers with Examples and MATLAB®", CRC Press., 2010
4. Howard Anton and Chris Rorres "Elementary Linear Algebra", John Wiley and Sons., New Delhi, 2018

19T202 MATERIALS SCIENCE

2 0 0 2

CRYSTAL STRUCTURE : Solids :- Amorphous and Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis — Unit Cell. Reciprocal Lattice. . Types of Bonds. Ionic Bond. Covalent Bond. Van der Waals Bond. Diffraction of X-rays by Crystals. Bragg's Law. Powder diffraction patterns Determination of crystallinity in textile fibres- Principle of rotating crystal method. Structure-function relationships (7)

PHYSICAL PROPERTIES OF TEXTILE MATERIALS : Physical properties, chemical composition and molecular arrangement of textile fabrics. Absorbant and repellent textiles. Properties and applications. Static electricity and textiles for anti-static applications (5)

MECHANICAL PROPERTIES AND VISOELASTIC BEHAVIOUR OF MATERIALS : Concepts of stress and strain, Hooke's law, three moduli of elasticity and relation among them, Poison's ratio, bending of beams, bending moment, theory of thin cantilever,determination of young's modulus by cantilever method, twisting of a cylinder,determination of rigidity modulus by torsional pendulum. Elastic and plastic deformation (6)

TEXTILE MATERIALS FOR INDUSTRIAL APPLICATIONS : Sabine's formula for reverberation time. Reverberation time and auditory comfort. Absorption coefficient, Open Window Units. measurement of absorption coefficients- Impedance tube method, Anechoic chamber method. Materials for modifying surface absorption. Effect of porosity and sound energy dissipation (6)

SMART TEXTILE AND ADVANCED MATERIALS : Definition - function of matrix and reinforcement in composites - classification of composites based on reinforcement-types of composite materials - . Law of mixtures. Applications Dielectric and semiconducting properties of fibres. smart textiles. Bio-mimetic materials. Nanomaterials. (6)

Total L: 30

TEXT BOOKS:

1. William D Callister Jr "Materials Science and Engineering - An Introduction", John Wiley and Sons Inc , New York., 2007
2. Raghavan "Materials Science and Engineering", Prentice Hall of India,New Delhi.,2005.

REFERENCES:

1. Morton W E Hearle, J W S "Physical Properties Of Textile Fibres", CRC Press, Taylor & Francis, USA,., 2008
2. D.S.Kumar "Mechanical Measurements and Control", S.Chand &Co, New Delhi., 1991
3. Holman J P "Experimental Methods of Engineering", McGraw Hill, New Delhi., 2001
4. Gaur R K, Gupta S L "Engineering Physics", Dhanpat Rai publications., 2013

19T203 POLYMER AND FIBRE CHEMISTRY

3 0 0 3

INTRODUCTION TO POLYMERS: Classification, functionality of monomers, degree of polymerization, mechanism of polymerization — chain, condensation and ring opening. Molecular weight of polymers — polydispersity, number average and weight average molecular weights. Molecular weight distribution. Determination of molecular weight by gel permeation chromatography and viscometry. (9)

POLYMERISATION METHODS: Addition polymerisation -bulk, solution, suspension and emulsion techniques. Condensation polymerisation -melt, solution and interfacial techniques. Compounding of polymers, Processing techniques - calendaring,compression, injection,extrusion, blow moulding, foaming, fibre spinning-melt, dry and wet spinning. (9)

PROPERTIES OF POLYMER : Amorphous and crystalline states–degree of crystallinity –factors affecting crystallizability. Influence of chemical structure on properties — electrical, solubility, mechanical, thermal - Glass transition temperature — factors affecting Tg, determination of Tg by DSC and thermal stability by TGA, Requisite for polymers to form fibres, elastomers and plastics. Polymer reactions -hydrolysis, acidolysis, aminolysis, hydrogenation. cyclization, crosslinking, grafting. Degradations – chemical, thermal, mechanical and photo degradations. (9)

NATURAL AND REGENERATED FIBRES : Chemical composition, structure and properties of cotton, jute, silk and wool. Regenerated Fibres - principle steps involved –polymer solution preparation. processing –regeneration, concept of reuse of chemicals. Manufacture of viscose rayon, cellulose acetate and lyocell fibres. (9)

SYNTHETIC POLYMERS : PET, nylon 6, nylon 66, acrylic, polypropylene, polyethylene. Structure dependant properties of these fibres. High Performance Fibres- Aramids, UHMWPE, segmented polyurethane and carbon fibres. (9)

Total L: 45

TEXT BOOKS:

1. Gowarikar V. R, Viswanathan N. V, Jayadev Sreedhar "Polymer Science", New Age International (P) Ltd., New Delhi, 2011. , 3rded
2. Mishra S.P "A Textbook of Fibre Science and Technology", New Age International (P) Ltd., New Delhi, 2005., 1st ed

REFERENCES:

1. Joel R. Fried "Polymer Science and Technology", Prentice Hall of India Pvt. Ltd., India, 2003. , 1st ed
2. J. M. G. Cowie, Valeria Arrighi "" Polymers: Chemistry and Physics of modern Materials", CRC Press., USA, 2007. , 1st ed
3. Robert R Mather, Roger H. Wardman "The Chemistry of Textile Fibres", RSC., UK, 2015. , 2nd ed

19T204 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

3 0 0 3

ELECTRIC CIRCUITS : Ohm's law, Kirchhoff's Laws, solving simple DC Circuits-single phase AC circuit fundamentals-Power, Power factor-solving simple AC circuits- Introduction to three-phase AC circuits (8)

ELECTRICAL MACHINES : DC MOTORS: Principle of Operation-types-torque equation - speed-torque characteristics-losses and efficiency- speed control of DC motors-Electric Braking AC MACHINES: Single phase Transformers - Construction and working principle, 3 phase Induction Motor-construction–Principle of operation- types-torque equation-speed -torque characteristics-1 phase Induction Motor-Principle of operation-types Industrial Applications. (12)

ELECTRONIC DEVICES : Operation of PN junction diodes, VI characteristics, zener diode, BJT, types-CB, CE, CC configurations, input and output characteristics, JFET - working principle and characteristics - Comparison of BJT and FET. MOSFET-types, principle of operation and characteristics, Opto Electronic Devices - Introduction, types, photo conductive cells, photo diode, phototransistor, Light emitting diode-Principles and Applications. (8)

ELECTRONIC CIRCUITS : (Qualitative analysis only) Half wave and full wave rectifier, capacitive filters, zener voltage regulator, RC- coupled amplifier, frequency response, RC phase shift oscillator. LINEAR INTEGRATED CIRCUITS: Operational amplifier, Ideal op-amp characteristics, Inverting and Non-inverting amplifier, Op-amp applications : Adder-Subtractor, integrator, differentiator, zero crossing detector. (10)

DIGITAL ELECTRONICS : Number systems-representation of signed numbers: 1's complement and 2's complement, logic gates, Half, full adder/subtractor, Flip flops, RS,JK,JK Master slave, D and T type, counters and shift registers. (7)

Total L: 45

TEXT BOOKS:

1. Mehta V K and Rohit Mehta "Principles of Electrical Engineering and Electronics", S.Chand and Co.., New Delhi, 2014 , 3rd edition
2. Muthusubramanian R, and Salivahanan S "Basic Electrical, Electronics and Computer Engineering", Tata McGraw Hill., 2012

REFERENCES:

1. 1. Bhattacharya S K "Basic Electrical and Electronics Engineering", Pearson., 2012.
2. Rajput R K "Basic Electrical and Electronics Engineering", University Science Press., 2012, 2nd Edition.
3. Gupta B R and Singhal Vandana "Electrical and Electronics Engineering", S. Chand and Co., 2010.
4. Theraja B L "Fundamentals of Electrical and Electronics Engineering", S. Chand and Co., 2006.

19T205 APPLIED MECHANICS

2 1 0 3

STATICS OF PARTICLES AND RIGID BODIES IN TWO DIMENSIONS : Forces — systems of forces - concurrent forces in plane - resultant - problems involving the equilibrium of a particle. Rigid bodies - two dimensional structure - moment of force about an axis - moment of a couple - equivalent systems of coplanar forces - rigid body in equilibrium - problems - types of supports - reactions of beams. (8 + 3)

CENTROID AND MOMENT OF INERTIA : Centroids of areas, composite areas, determination of moment of inertia of plane figures, polar moment of inertia - radius of gyration. (5 + 3)

AXIAL STRESSES AND STRAINS : Stress and strain due to axial force - elastic limit - Hooke's law - factor of safety - stepped bars - stresses in composite bar due to axial force (5 + 3)

SHEAR FORCE & BENDING MOMENT DIAGRAMS : Bending moment and shear force diagrams in simply supported, overhanging and cantilever beams subjected to concentrated loads and UDL. Flexure equation - section modulus - normal stresses due to flexure. (7 + 3)

TORSION : Concept of torsion and torsional shear stress — torsion formula - design of circular shaft — Power transmitted by a shaft. (5 + 3)

Total L: 30 +T: 15 = 45

TEXT BOOKS:

1. Rajasekaran S, Sankarasubramanian G "Engineering Mechanics - Statics and Dynamics", Vikas Publishing House Pvt. Ltd.,., New Delhi, 2011
2. Punmia B C, Jain A K "Strength of Materials and Theory of Structures" Vol.1", Laxmi Publications., New Delhi, 2006

REFERENCES:

1. Beer F P, Johnson E R "Vector Mechanics for Engineers, Statics & Dynamics", Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2011
2. Bhavikatti S S "A Text book of Engineering Mechanics", New Age International (P) Ltd., New Delhi, 2012
3. Hibbeler R C "Mechanics of Materials", Pearson Education., New Delhi, 2005
4. Beer F P, Johnson E R "Mechanics of Materials", Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2010

19T211 ENGINEERING GRAPHICS

0 0 4 2

INTRODUCTION :

1. Lettering practice
2. Geometric constructions
3. Dimensioning practice (as per BIS) (12)

THEORY OF PROJECTION :

1. Projection of points and lines
2. Projection of planes
3. Projection of solids (12)

SECTIONS OF SOLIDS :

1. Sections of regular solids as per BIS conventions
2. Types of sections - sectional views of simple engineering components
3. Constructing sectional views (12)

DEVELOPMENT OF SURFACES :

1. Development of lateral surfaces of regular solids
2. Projection of truncated solids and simple engineering sheet metal components (12)

ORTHOGRAPHIC PROJECTIONS :

1. Orthographic projection of simple engineering components – missing view exercises
2. Orthographic projections of textile machinery parts
3. Modeling of simple engineering components using CAD software (12)

Total P: 60

TEXT BOOKS:

1. Venugopal K, Prabhu Raja V "Engineering Graphics", New Age International Publishers., New Delhi, 2018 , Fifteenth Multi color edition
2. P.I Varghese "Engineering Graphics", McGraw Hill Education India Pvt. Ltd., New Delhi, 2013

REFERENCES:

1. K C John "Engineering Graphics for Degree", PHI Publishers India Pvt. Ltd., 2009
2. Natarajan K. V "Engineering Drawing and Graphics", M/s Dhanalakshmi N., Chennai, 2007

19T212 FIBRE ANALYSIS LABORATORY

0 0 2 1

1. Identification of fibres by microscopic view
2. Identification of fibres by burning behavior
3. Identification of fibres by solubility
4. Fibre Blend Analysis
5. Determination of density of various fibres by density gradient column
6. Determination of denier of synthetic fibres by gravimetricmethod
7. Determination of Moisture Regain and Moisture content of fibres
8. Analysis of UDY, POY, FDY
9. Study on wet spinning of fibres
10. Degradation study offibres
11. Prediction of Fibres by Feel and Confirmation Test
12. Demonstration of TGA, DSC, XRD, FTIR techniques and analysis of graphs

Total P: 30

19T213 INTERNSHIP I

0 0 0 2

S.NO	TYPE OF ACTIVITY	AREA
1	Industry Visit	Spinning
2	Industry Visit	Weaving
3	Industry Visit	Textile Chemical Processing
4	Industry Visit	Garment

Internship — I provides opportunities for students to get exposure in various industrial practices and to understand textile supply chain management from fibre to garment designing. At the end of the course, students will make a presentation to department internal committee based on their industry visit. A final report is to be submitted according to the prescribed template after the completing the course.

SEMESTER - 3

19T301 NUMERICAL METHODS

2 1 0 3

SYSTEM OF LINEAR EQUATIONS, EIGENVALUES AND EIGENVECTORS: Errors - approximations and round-off errors - truncation errors. system of linear equations, Gauss elimination method, Crout's method, Gauss – Seidel method, eigenvalues and eigenvectors - power method. (6 + 3)

NONLINEAR EQUATIONS: False- position method, Newton-Raphson method, Graeffe's root squaring method. (6 + 3)

INTERPOLATION AND CURVE FITTING: Newton's forward and backward interpolating polynomials, Newton's divided-difference interpolating polynomials, Lagrange interpolating polynomials. Straight line fitting using least squares method. (6 + 3)

DIFFERENTIATION AND INTEGRATION: Numerical differentiation - equally spaced and unequally spaced data. Numerical integration - Newton-Cotes formulae, Trapezoidal rule, Simpson's 1/3 rule. Gaussian quadratures. (6 + 3)

NUMERICAL SOLUTION TO ORDINARY DIFFERENTIAL EQUATIONS: Taylor-series method, Euler method, modified Euler method, 4th order Runge-Kutta method, multi-step method — Milne's method. (6 + 3)

Total L: 30 +T: 15 = 45

TEXT BOOKS:
1. Steven C Chapra and Raymond P Canale , "Numerical Methods for Engineers", Tata McGraw Hill, New Delhi, 2017.
2. Curtis F Gerald and Patrick O Wheatly , "Applied Numerical Analysis", Pearson, New Delhi, 2017.

REFERENCES:
1. Richard L Burden and Douglas J Faires , "Numerical Analysis", Thomas Learning, New York, 2017.
2. G. Miller , "Numerical Analysis for Engineers and Scientists", Cambridge University Press, UK, 2014.
3. Amos Gilat and Vish Subramaniam , "Numerical Methods for Engineers and Scientists", Wiley India, New Delhi, 2014.
4. Uri M Ascher and Chen Greif , "A first course in numerical methods", Prentice Hall,, New Delhi, 2013.

19T302 THEORY OF MACHINES

3 1 0 4

BASICS OF MECHANISMS AND ITS KINEMATICS : Definitions and basic concepts of link, pair, chain, mechanism, Machine and structure — degrees of freedom, inversions, applications of mechanisms, Velocity and acceleration analysis for four bar and slider crank mechanisms, KLEIN"S constructions for single slider crank mechanism. (9 + 3)

FRICTION: Pivot and collar friction — Uniform pressure, wear assumptions, torque power loss. Theory of lubrication Types of bearings and selection of bearings. (8 + 3)

STATIC AND DYNAMIC FORCE ANALYSIS: Static force analysis in simple mechanisms. Inertia force and D"Alemberts principle, Dynamic force analysis and determination of torque in four bar and single slider crank mechanisms using

graphical approach, Calculation of torque required at crank shaft in a loom. (10 + 3)

FLYWHEEL: Torque Vs crank angle diagram — excess energy to be stored in a flywheel, fluctuation of speed within a cycle. Co-efficient of fluctuations of speed, flywheel weight required for a loom. (9 + 3)

BALANCING : Principle of balancing — balancing of rotating and reciprocating masses in the same plane and several planes, dynamic balancing of carding cylinder, spindles, tin roller and split pulleys. Vibration: Basics of vibration – measurements, reduction techniques. (9 + 3)

Total L: 45 +T: 15 = 60

TEXT BOOKS:

1. Shigley J. E. , Uicker J. J. , "Theory of Machines and Mechanisms", Mc Graw Hill, 2005.
2. Ratan S S , "Theory of Machines", 4th Edition, Tata McGraw -Hill Publishers, New Delhi, 2017.

REFERENCES:

1. Robert L. Norton , "Kinematics and Dynamics of Machinery (SI Units)", 1st Edition, Mc Graw Hill Publisher, New Delhi, 2008.
2. David H Myszka , "Machines and Mechanism", 4th Edition, Pearson Hall PTR, 2011.
3. Thomas Bevan , "Theory of Machines", CBS Publishers, 2000.
4. Kenneth J. Waldron, Gary L. Kinzel, Sunil K. Agrawa , "Kinematics, Dynamics, and Design of Machinery", 3rd Edition, Wiley, 2016.

19T303 MEASUREMENTS AND INSTRUMENTATION

3 0 0 3

INSTRUMENTATION PRINCIPLES: Generalized configuration and functional elements of measuring system - Null and deflection methods-Static characteristics: error, accuracy, precision, resolution, calibration, Hysteresis,modeling and error reduction. (8)

TRANSDUCERS AND MEASUREMENT OF NON ELECTRICAL VARIABLES: Transducer-Classifications, Principle of operation of Resistance potentiometer, strain gauge, Linear Variable Differential transformer - Inductive Transducer - Capacitance and Piezo-electric transducers, Measurement of thickness, temperature measurement using resistance thermometers, thermocouples and thermistors. (10)

ELECTRONIC AND TEXTILE INSTRUMENTS: Digital voltmeter-Digital multimeter- Digital storage oscilloscope. Digital data acquisition systems - Magnetic tape recorders, High volume fibre tester- Evenness tester - Single yarn strength tester, hairiness meter. (10)

CONTROL SYSTEM COMPONENTS: Basics of control system — Control system examples - Principle of operation of Stepper motors - Hydraulic valves - Pneumatic switches, proximity switches and flapper valves - Hydraulic and Pneumatic automation in textile machines. (9)

PROGRAMMABLE LOGIC CONTROLLERS (PLC): Block diagram — programming methods — programs — applications - material handling system. Data acquisition system for spinning preparatory, ring spinning - weaving. (8)

Total L: 45

TEXT BOOKS:

1. Sawhney A K , "A course in Electrical and Electronics Measurements and Instrumentation", Dhanpat Rai and Sons, New Delhi, 2015.
2. Doebelin E O , "Measurement System : Application and Design", Mc.Graw Hill, New York, 2017.

REFERENCES:

1. Rangan C S, Sharma G R, Mani V S , "Instrumentation Devices and Systems", Tata McGraw Hill, New Delhi, 2001.
2. U.A.Bakshi S.C.Goyal , "Principle of control systems", 7th Edition, Technical Publication, Pune, 2008.
3. Frank D.petruzella , "Programmable Logic Controllers", 4th Edition, McGraw-Hill, New York, 2011.
4. Berkstresser G A. Grady P and Buchanan.D R , "Automation in the Textile Industry from Fibres to Apparel", Textile Institute, Manchester, 1995.

19T304 FIBRE PHYSICS

3 0 0 3

FIBRE STRUCTURE : Requirements of fibre forming polymers, Analysis of fibre structure models — fringed micelle, fringed fibrillar and lamellar. Characterization of fibres structure. Crystallinity and orientation . Morphological and chemical structure - Cotton, wool, silk, viscose rayon, acetate rayon, polyamides (nylon 6, nylon 6 6), polyester, acrylic fibres. Elucidation of fibre structure. (8)

MOISTURE PROPERTIES: Humidity, moisture regain and content. Equilibrium absorption of moisture- Hygroscopic nature and moisture absorption behavior of textile fibres. Effect of temperature, hydrophilic groups, crystalline and non-crystalline regions on moisture regain. Heats of sorption. - integral and differential.Conditioning of Fibres. (8)

THERMAL PROPERTIES AND THERMO-MECHANICAL RESPONSES: Theories of thermoplastic and non- thermoplastic fibres, First order transition, second-order transition, Specific heat - thermal conductivity. Analysis of DSC and TGA. Heat-setting of fibres. (8)

OPTICAL AND ELECTRICAL PROPERTIES: Refractive index and birefringence - absorption, dichroism, reflection and lustre of fibres. Electrical Properties: Factors influencing electrical properties of fibres , applications. Static Electricity Problems and elimination in textile processes. (8)

MECHANICAL PROPERTIES : Tensile strength, Load-Elongation and Stress-Strain Curves. Modulus, Elongation, Elastic Recovery, Work of Rupture, Work Factor. Effect of parameters on mechanical properties, Mechanical conditioning, Torsional and flexural rigidity of fibres. Creep and stress relaxation. Frictional Properties: General theory and its applications to fibres, Directional Frictional Effect (DFE)of wool. (13)

Total L: 45

TEXT BOOKS:

1. Morton W E., and Hearle J W S. , "Physical Properties of Textile Fibres", 4th Edition, Wood head Publishing Limited, Manchester, UK, 2008.
2. Gupta V.B and Kothari, V.K , "Manufactured Fibre Technology", Springer science, Netherlands, 1997.

REFERENCES:

1. Marcel Dekar.H B. , "Handbook of Fibre Science & Technology", Textile Institute, Manchester, UK, 1998.
2. Mukhopadhyay , "Advances in Fibre Science", Textile Institute, Manchester, UK, 2000.

19T305 SPUN YARN TECHNOLOGY I

3 0 0 3

GINNING AND BLOWROOM : Classification of spinning –short and long staple. Objectives, Machines, ginning defects. Fibre characteristics for yarn production. Blowroom-Objectives, Principles of opening, cleaning, mixing and blending of fibres. Blow room machinery and operating elements. Influence of process parameters on opening and cleaning. Automatic Waste Evacuation systems (AWES), auxillary blow room machines. Effectiveness of opening and cleaning systems. Automation and recent development. Calculations. (9)

CARDING : Principles of carding. revolving flat card, roller and clearer card, card clothing. Machine elements and operations in card. Sliver formation, carding theory. Automation and recent developments. Calculations. (9)

DRAWFRAME : Objectives, principles and methods of roller drafting. Machine elements and operations. Autolevellers. Automation and recent developments. Calculations. (9)

COMBER : Preparation for combing, lap formers. Comber - Objectives, Machine elements and operations, Factors influencing noil extraction. Automation and recent developments. Calculations. (9)

SPEEDFRAME : Objectives, Machine elements and operations, principle and mechanism of builder motion in speed frame. Automation and recent developments. Calculations. (9)

Total L: 45

TEXT BOOKS:

1. Werner Klein , "The Rieter Manual of Spinning, Volume.2 — Bloow room& Carding", Rieter Machine Works Limited, Switzerland, 2008.
2. Werner Klein , "The Rieter Manual of Spinning, Volume.3 — Spinning Preparation", Rieter Machine Works Limited, Switzerland, 2008.

REFERENCES:

1. Werner Klein , "The Rieter Manual of Spinning, Volume.1 — Technology of Short staple Spinning", Rieter Machine Works Limited, Switzerland, 2008.
2. Lawrence C.A , "Fundamental of spun yarn technology", CRC Press, New York, 2002.
3. Oxtoby E , "Spun Yarn Technology", Butterworths, London, 2002.
4. Peter R Lord , "Hand book of Yarn Production Technology Science and economics"", Wood head publishing Ltd, New York, 2003.

19O306 ECONOMICS FOR ENGINEERS

3 0 0 3

INTRODUCTION : Definition — Nature and Scope — Central Problems of an Economy — Positive and Normative Economics– Micro Economics and Macro Economics, Significance of Economics, Economic Assumptions. (9)

THEORY OF CONSUMER BEHAVIOR : Utility — Indifference Curve Analysis - Properties, Consumer's Budget Line

Demand Analysis: Demand Function and Law of Demand, Elasticity of Demand. Demand forecasting using Econometric Techniques. Supply — Factors Affecting Supply, Market Equilibrium Price, Consumer Surplus. (9)

PRODUCTION, COST AND REVENUE : Production Function, Total Product, Average Product and Marginal Product, Returns to Scale. Costs, Nature of Costs, Short-run and Long-run Cost Curves, Revenue concepts. (9)

MARKET STRUCTURE : Types of Markets - Perfect Competition — Characteristics — Imperfect Competition: Monopoly – Monopolistic Competition – Oligopoly and Duopoly - Price Discrimination and Product Differentiation under Different Markets — Price and Output Determination in Short run and Long run and profit maximization. (9)

PERFORMANCE OF AN ECONOMY (MACRO ECONOMICS) : Demand and Supply of Money – Quantity Theory of Money, Banking — Functions of Commercial Banks and Central Bank — Inflation — Causes — Control Measures — National Income — Concepts — Methods of Calculating National Income — Problems in Calculating National Income. (9)

Total L: 45

TEXT BOOKS:
1. Varian H.R. , "Intermediate Microeconomics", East– West Press, New Delhi, 2014.
2. Dewett.K.K, Navalur. M.H. , "Modern Economic Theory", S. Chand, New Delhi, 2015.

REFERENCES:
1. William A, Mc Eachern, Simrit Kaur , "Micro ECON", Cengage Learning, Noida, 2013.
2. William A, Mc Eachern, Indira A. , "Macro ECON", Cengage Learning, Noida, 2014.
3. Deepashree , "Principles of Economics", Ane Books Pvt Ltd, New Delhi, 2010.
4. Dwivedi , "Essentials of Business Economics", Vikas Publishing House Pvt Ltd, New Delhi, 2010.

19T310 ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY

0 0 4 2

1. Verification of Ohm's law and Kirchoff's laws.
2. Mechanical Characteristics of DC Shunt and Compound Motor
3. Load test on Three phase Induction Motor
4. Study of Halfwave and Fullwave rectifiers with and without filters
5. Applications of Operational Amplifier: Adder, Subtractor, Integrator and Differentiator
6. Study of logic gates and implementation of binary adder/subtractor
7. Characteristics of temperature sensors (thermocouple/ thermistor)
8. Study of optoelectronic devices (LDR, photodiode, phototransistor)
9. Study of PLC and Basic programming methods
10. Measurement of linear displacement using LVDT and measurement of strain using strain gauge

Total P: 60

REFERENCE:
1. EEE Department , "Electrical and Electronics Engineering Laboratory Manual", EEE Department, PSGCT, Coimbatore, 2019.

19T311 SPUN YARN TECHNOLOGY LABORATORY I

0 0 4 2

1. Determination of Beater speed and understanding the working mechanism of any one cleaning machine.
2. Determination of the intensity of beating of bladed beater and fibre rupture and study their influence on the quality of yarn.
3. Determination of the cleaning efficiency and openness of tufts and study their influence on the quality of yarn.
4. Determination of speed of the various rotating elements and understanding its working mechanism & functions of blending machines
5. Running of carding machine and Determination of speed of the various rotating elements and understanding its functions
6. Analysis of various setting points in carding machine and its effect on sliver quality
7. Measurement of PPSI of different clothing profiles and study on the types of card wire clothing
8. Determination of transfer coefficient and cleaning efficiency of a card and its influence on the production and quality
9. Running of draw frame machine and study on drafting waves.
10. Determination of total draft and its distribution in draw frame drafting system.
11. Determination of CV% of input and output sliver with respect to law of doubling and drafting
12. Carry out the analysis of roller setting, measurement of top roller pressure and roller eccentricity in draw frame

Total P: 60

REFERENCES:
1. Spun Yarn Technology Laboratory Manual prepared by Department of Textile Technology, 2019.

19K312 ENVIRONMENTAL SCIENCE

2 0 0 0

INTRODUCTION TO ENVIRONMENT : Environment - Definition, scope and importance. Types and composition of atmosphere — particles, ions and radicals. Ozone layer- significance, formation and depletion. Ecosystems- Structure and functions, components, energy flow, food chains, food web, Biodiversity-levels, values and threats — India as a mega-diversity nation — hotspots of biodiversity — endangered and endemic species of India — conservation of biodiversity. (6)

ENERGY RESOURCES : Introduction — National and International status- exploitation - sustainable strategies- Fossil fuels- classification, composition, physico-chemical characteristics and energy content of coal, petroleum and natural gas; solar energy - introduction, harnessing strategies. Wind energy - availability, wind power plants, wind energy conversion systems, site characteristics, and types of wind turbines. Supporting renewable energy resources - tidal –geothermal - hydroelectric. (6)

ENVIRONMENTAL POLLUTION : Definition — Sources, causes, impacts 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 (h) RF hazards - Role of an individual in prevention of pollution. DISASTER MANAGEMENT: Floods, earthquake, cyclone and landslides — Case studies, consequences and rescue measures (6)

WASTE MANAGEMENT : Wastewater - Characteristics of domestic and industrial wastewater - COD and BOD — Various stages of treatment — primary, secondary, tertiary treatment- Biological and advanced oxidation processes. Solid waste management — Characteristics of municipal solid waste(MSW), biomedical, automobile and e-wastes and their management – landfills, incineration, pyrolysis, gasification and composting. (6)

SOCIAL ISSUES AND THE ENVIRONMENT : Environmentally Sustainable work practices- Rain water harvesting — Role of non-governmental organizations. Human ethics and rights- impact on environment and human health — role of information technology on environment and human kind. Green IT policies, Process of EIA - ISO 14000. Legislation- Environment protection act — Air (Prevention and Control of Pollution) act — Water (Prevention and control of Pollution) act—Wildlife protection act—Forest conservation act. (6)

Total L: 30

TEXT BOOKS:

1. Gilbert M.Masters , "Introduction to Environmental Engineering and Science", Pearson Education, New Delhi, 2004.
2. De A K , "Environmental Chemistry", New Age International P Ltd, New Delhi, 2006.

REFERENCES:

1. Benny Joseph , "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2006.
2. KoteswaraRao MVR , "Energy Resources: Conventional & Non-Conventional", BSP Publications, New Delhi, 2006.
3. Deswal S and Deswal A , "A Basic Course in Environmental Studies", Dhanpat Rai and Co, New Delhi, 2004.

SEMESTER - 4

19T401 PROBABILITY AND STATISTICS

2 1 0 3

PROBABILITY AND DISCRETE RANDOM VARIABLES : Probability, axiomatic approach to probability, Baye's theorem, discrete random variables, probability distributions and probability mass functions, cumulative distribution functions, mean and variance, binomial, Poisson and geometric distributions. (6 + 3)

CONTINUOUS RANDOM VARIABLES : Continuous random variables, probability distributions and probability density functions, cumulative distribution functions, mean and variance, uniform, exponential and normal distributions. (6 + 3)

STATISTICAL INFERENCE : Point estimation — interval estimation — testing of hypothesis for means - , large, small sample and matched pairs tests - testing of hypothesis for proportions, chi square test for goodness of fit and independence of attributes. (6 + 3)

VARIANCE TESTS AND ANALYSIS OF VARIANCE : Testing of hypothesis for variances - analysis of variance - completely randomized design, randomized block design. (6 + 3)

TIME SERIES ANALYSIS : Introduction, components of time series, the trend, seasonal variation, cyclical variation, irregular variation. (6 + 3)

Total L: 30 +T: 15 = 45

TEXT BOOKS:

1. Douglas C. Montgomery and George C. Runger , "Applied Statistics and Probability for Engineers", Wiley India,

New Delhi, 2018.
2. Richard I Levin and David. S. Rubin , "Statistics for Management", Pearson, New Delhi, 2011.

REFERENCES:

1. Richard A. Johnson , "Miller & Freund's, Probability and Statistics for Engineers", Prentice Hall, New Delhi, 2017.
2. Jay L. Devore , ", Probability and Statistics for Engineering and the Sciences", Brooks/Cole, USA, 2015.
3. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying Ye , "Probability & Statistics for Engineers & Scientists", Pearson, New Delhi, 2016.
4. Robert V Hogg, Elliot Tanis and Dale Zimmerman , "Probability and Statistical Inference", Pearson Education, USA, 2014.

19T402 TECHNOLOGY OF MANUFACTURED FIBERS

2 0 0 2

POLYMER PRODUCTION: Polymer Rheology, PET through TPA and DMT route, Nylon 66 and Nylon 6 - Acrylic — Polypropylene. (5)

MELT SPINNING: Requirements, Force and momentum balance in spinline. Equipments-Melting device, Grid and extruder, Static mixer, Pre-filtration, Manifold, Spin pack, Spinneret, Quenching chamber, Spin finish application, Take-up winding. Stress induced crystallization. (6)

SOLUTION SPINNING: Requirements, Kinetic and thermodynamic effects in solution spinning. Preparation of dope, extrusion and fibre formation. Comparison of wet and dry spinning processes. Dry-jet-wet spinning, Gel spinning. (6)

POST SPINNING OPERATIONS: Drawing, Heat setting, Texturisation, Spin finish applications, Staple fibre line production details. (5)

MODIFIED SYNTHETIC FIBRES: Differentially dyeable fibres, Antistatic and Flame retardant fibres, Micro and Nanofibres, Bicomponent fibres, Hollow fibres. Quality Control-Molecular weight measurements, Melt Flow Index, Thermal characteristic measurements. Measurement of fine structure, morphology and Fibre Denier and Strength. (8)

Total L: 30

TEXT BOOKS:

1. Gupta V B and Kothari V K , "Manufactured fibre Technology", Chapman & Hall Pubilication, UK, 1997.
2. Mclntyre J E , "Synthetic Fibres", Woodhead Publishing Limited, University of Leeds, UK, 2004.

REFERENCES:

1. Vaidya A A , "Production of Synthetic fibres", Prentice-Hall of India Pvt. Limited, New Delhi, 1988.
2. Mishra S P , "A Text Book of Fibre Science and Technology", New Age International (P) Limited, New Delhi, 2000.
3. Hearle J W S, Hollick L and Wilson D , "Yarn Texturing Technology", Wood head Publishing, India, 2001.

19T403 SPUN YARN TECHNOLOGY II

2 1 0 3

RING SPINNING I: Objectives, principle of yarn formation, machine elements and operations in ring spinning. Design aspects of various elements in ring frame. Builder motion. (7 + 3)

RING SPINNING II: Condensed spinning- Principle, methods of yarn production and comparison of yarn properties with ring spun yarn. Spinning Geometry. Calculations. Automation and developments. (6 + 3)

OPEN-END SPINNING: Principle - Rotor Spinning –mechanism of yarn formation, raw material selection, design eatures of important elements and yarn quality. Automation and developments. Calculations. Friction spinning — mechanism of yarn formation, raw material selection and process parameters. Developments. (7 + 5)

OTHER SPINNING SYSTEMS: Air-jet and vortex spinning: Principle of yarn production, raw material selection, process parameters and yarn properties. Principles of Self twist, Wrap, Core and Twist less spinning. Comparison of yarn structure and yarn properties of different spinning systems. (5+ 3)

YARN PLYING: Objectives and principles of plying of yarns; methods for plying - ring doubling, two for-one and three for one twisting. Selection of twist level for plying. Calculations. Fancy Yarns- Types and production methods. Applications. (5 + 1)

Total L: 30 +T: 15 = 45

TEXT BOOKS:

1. Lawrence C.A , "Advances in yarn spinning technology", Woodhead Publishing Limited, U.K, 2010.
2. Herbert Stalder , "The Rieter Manual of Spinning, Vol 4, 5 & 6", Rieter Machine Works Limited, Switzerland, 2014.

REFERENCES:

1. Oxtoby E , "Spun Yarn Technology", Butterworth Publications, London, 1987.
2. Mahendra Gowda R.V , "New Spinning systems", NCUTE, New Delhi, 2004.

3. Lawrence, C.A , "Fundamentals of spun yarn technology", CRC Press, UK, 2003.
4. Peter R. Lord , "Handbook of Yarn Production: Technology, Science and Economics", Wood head Publishing, UK, 2003.

19T404 WEAVING TECHNOLOGY I

3 0 0 3

WINDING : Winding - objectives, random and precision winders, elements and functions - unwinding accelerator, tension device, yarn clearer, splicer, waxing, anti-patterning, drum type, link coner, automation. Package types, faults - causes and remedies, Calculations. Winding synthetic and blended yarns, winding for coloration. Pirn winding–objectives, elements and functions (9)

WARPING, SIZING AND DRAWING-IN : Warping - objectives, direct and section warping, elements and functions — creel, stop motion, tension device, warper reed, automation. Section warping — section building and traverse, leasing. Sizing - objectives, size recipe, elements and functions — creel, sow box, drying zone, yarn splitting, automation. Single end sizing, Calculations. Sizing of filament yarns, energy conservation in sizing. Beam gaiting, tyeing-in. (9)

PROCESS CONTROL IN WARPING AND SIZING : Controls — temperature, level, moisture, stretch. Size pick up and end breaks. process control in warping and sizing — control of end breaks, hard waste and beam defects, combined dyeing and sizing, dead loss in sizing. (5)

PRIMARY MOTIONS IN SHUTTLE WEAVING : Loom types, timing diagram. Shedding — tappet, dobby and jacquard. Shed geometry, shed types, reversing motions. Picking — overpick and underpick, shuttle flight and timing, shuttle checking. Beat-up – sley kinematics and eccentricity. (13)

SECONDARY AND AUXILLARY MOTIONS : Take up, let off, warp stop, weft stop, warp protector, weft feelers and pirn change motions, drop box motion. Production and efficiency calculations. (9)

Total L: 45

TEXT BOOKS:

1. Talukdar M.K., Sriramulu P.K. and Ajgaonkar D.B , "Weaving: Machines, Mechanisms, Management", Mahajan Publishers, Ahmedabad, 1998.
2. Marks R. and Robinson 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, New Delhi, 1992.
2. Booth J.E , "Textile Mathematics - Volume 3", The Textile Institute, Manchester, 1977.
3. Mukesh Kumar Singh , "Industrial Practices in Weaving Preparatory", WPI Publishers, UK, 2014.
4. Abhijit Majumdar , "Principles of Woven Fabric Manufacturing", 1st Edition, CRC Press, 2016.

19T405 TECHNOLOGY OF NONWOVEN FABRICS

3 0 0 3

RAW MATERIAL AND WEB FORMATION : Nonwoven process, raw materials — web formation — web bonding. Classification. Raw materials preparation for the production of nonwovens, binders-requirements, properties. Web formation - Classification, Dry lay process, Wet lay method. Extrusion nonwovens - spun bond and meltblown. Web drafting. (9)

WEB BONDING : Mechanical bonding - Needle punching, Stitch bonding, Spun lacing. Chemical bonding. Thermal bonding. Process variables and their effect on nonwoven properties. (9)

FINISHING OF NONWOVENS : Mechanical finishing — shrinking, compacting and creping, calendering, pressing, perforating, slitting, breaking, splitting, suede finishing, shearing, raising, singeing and sewing. Chemical finishing-washing, dyeing, printing, finishing, softening, special effects, coating, laminating, flocking. (9)

TESTING AND CHARACTERISTICS OF NONWOVENS : Testing of raw materials for nonwovens, testing of nonwovens, test processes related to end-use. Identification of nonwovens. Nonwoven fabric structure-property relations of onwoven. (9)

APPLICATIONS OF NONWOVENS : Hygiene products, cleaning and household products, home textiles, apparels, technical applications. (9)

Total L: 45

TEXT BOOKS:

1. Wilhelm Albrecht , "Nonwoven Fabrics", Wiley— VCH, Verlag Gmbh and Company, Germany, 2003.
2. Russel.S , "Handbook of Nonwovens", Textile Institute Publication, UK, 2004.

REFERENCES:

1. Krcma R , "Manual of Nonwovens", Textile Trade Press, USA,1993.
2. Irsak O , "Nonwoven Textiles", Textile Institute,, UK, 1999.

3. Mrstina V and Feigl F , "Needle Punching Technology", Elsevier Science Publishers,, India, 1990.

19T406 KNITTING TECHNOLOGY

3 0 0 3

BASICS OF WEFT KNITTING : Comparison of woven, knitted and bonded fabrics. Reasons for the growth of the knitting industry. Uses of weft knitted fabrics. Yarn quality requirements for knitting. Knitting classification- Weft knit and warp knit. General definitions and elements of knitted loop structure. Types of knitting needles- Bearded, Latch and Compound Needle (9)

WEFT KNIT MACHINES AND FABRIC STRUCTURES : Basic weft knitted structures and their production - plain, rib, interlock and purl. Mechanical elements and operations. Fundamentals of formation of knit, tuck and float stitches. Notations. Double knit structures and specialty structures. Flat Knitting: Types, Mechanical elements and operations, Weft knit structures using flat bed. (10)

WEFT KNITTED FABRIC GEOMETRY : Faults in circular knitting, their causes — avoidance. Production calculation in weft knitting, weft knitted fabric geometry: Loop length, stitch density, tightness fabric, areal density and optimum knitting conditions. Advancements in weft knitting: Auto stripper, roving to knitting, jacquard knitting, loop transfer, Racking (8)

WARP KNITTING AND STRUCTURAL ELEMENTS : Basic principles and loop elements- open loop, closed loop. Mechanical elements and operations of Tricot, raschel, simplex and 2 needle bar raschel machines. Knitting cycle, lapping diagrams and notations. Guide bars movement, chain links and threading. Double needle bar patterning. (9)

GEOMETRY AND APPLICATIONS OF WARP KNITTED FABRICS : Specialty structures of warp knitting, Production calculation. Warp knit fabric geometry. Applications of warp knit fabrics: Medical textiles, filtration, protective textiles and other areas of technical textiles. (9)

Total L: 45

TEXT BOOKS:

1. Spencer D J , "Knitting Technology", Third Edition, Textile Institute Publication, Manchester, 2001.
2. Anbumani N , "Knitting-Fundamentals, Machines, Structures and Developments", New Age International (P) Ltd, New Delhi, 2007.

REFERENCES:

1. Raz E , "Warp Knitting Technology", Coloumbine Press, Buxton, 1992.
2. Brackenbury.T , "Knitted Clothing Technology", Blackwell Science, London, 1992.
3. Wilkens C , "Warp knit machine elements", Blackwell Science, London, 1997.
4. Aigaonkar D B , "Knitting Technology", Universal Publication Corpn, Bombay, 1998.

19T410 SPUN YARN TECHNOLOGY LABORATORY II

0 0 4 2

1. Running of comber machine, understanding its working mechanism & functions of different combing elements and determination of draft and production
2. Determination of the Fractionating efficiency of comber and estimation of noil extraction (between head and overall) in a comber machine.
3. Construction details of nipper assembly and detaching roller drives and determination of timings of various components with respect to index wheel.
4. Sample development in speed frame machine, understanding its working mechanism & functions of drafting elements and determination of draft and production
5. Study of flyers in speed frame &speed frame builder motion and determination of false twist, flyer speed & bobbin speed.
6. Study of material flow in ring frame, arrangement of ring frame drafting System & functions of various drafting elements and determination of draft and production and analyze the effect of twist on the yarn strength.
7. Examination of construction and working of a ring frame builder motion and determination of winding: binding coil ratio.
8. Analysis of spinning geometry in existing ring frame and determination of winding angle variation during winding of ring cop.
9. Sample development in rotor spinning machine, understanding its working mechanism & functions of various spinning elements and determination of draft and production
10. Sample development in TFO and Fancy doubler machine, understanding its working mechanism & analysis of TPI and fancy yarn structure.

Total P: 60

REFERENCE:

1. Spun Yarn Technology Laboratory Manual prepared by Department of Textile Technology, 2019.

19T411 WEAVING TECHNOLOGY LABORATORY

0 0 4 2

1. Determination of Winding parameters in Random / Precision Winding Machine
2. Determination of Shed Depth in Tappet Shedding Motion
3. Creation of Dobby design and fabric production in Dobby loom
4. Creation of Jacquard design and preparation of Punched Card
5. Determination of Picking angle, Picking Velocity, Picking force and Power in Underpick loom
6. Determination of Sley Eccentricity in shuttle loom
7. Dismantling and assembly of Take-up Motion and calculation of loom dividend
8. Determination of Rate of Let-off at various Beam Diameters in positive and negative let-off systems
9. Study of Weft feelers, Weft and Warp Stop Motions
10. Preparation of Pattern Card in Drop box loom
11. Preparation of Special fabrics in handloom
12. Understanding of Loom requirements from the given Fabric Sample

Total P: 60

REFERENCE:

1. Weaving Technology Laboratory Manual prepared by Department of Textile Technology, 2019.

19O412 INDIAN CONSTITUTION

2 0 0 0

INTRODUCTION : Evolution of Indian Constitution; Significance of Constitution; Composition; Preamble and its Philosophy.(4)

RIGHTS, DUTIES AND DIRECTIVE PRINCIPLES : Fundamental Rights- Writs and Duties, Directive Principles of State Policy. (6)

COMPOSITION OF PARLIAMENT AND FEDERALISM : : Union Government, President and Vice President, Houses of he Parliament and their functions; Composition of State Legislature; Powers, Functions and Position of Governor, unction of Chief Ministers, Council of Ministers; The Indian Federal System, Administrative Relationship between Union and States. (8)

BILLS AND CONSTITUTION AMENDMENT PROCEDURE : Types of Bills, Stages of passing of Bill into an Act, Veto Power, Constitution Amendment Procedure, Various Amendments made and their significance for India. (6)

JUDICIARY : Supreme Court and High Court; Functions and powers, Judicial Review. (6)

Total L: 30

TEXT BOOKS:

1. Subash C. Kashyap , "Our Constitution", 5th Edition, NBT, India, New Delhi, 2015.
2. Basu D D , "Indroduction to the Constution of India", 20th Edition, Prentice Hall of India, New Delhi, 2011.

REFERENCES:

1. Briji Kishore Sharma , "Intrdouction to the Consitution of India", 8th Edition, Prentice Hall of India, New Delhi, 2017.
2. Hoshiar Singh , "Indian Adminstration", 1st Edition, Pearson Education, New Delhi, 2011.
3. Jain M C , "The Consitution of India", 5th Edition, State Mutual Book & Periodical Service, Limited, New Delhi, 1988.
4. Shukla V N , "Consitution of India", 13th Edition, Eastern Book Company Limited, New Delhi, 2017.

19Q413 SOFT SKILLS DEVELOPMENT

0 0 2 1

SOFT SKILLS DEVELOPMENT :

1. Body Language and Professionalism
2. Interpersonal skills
3. Goal setting
4. Impression Management
5. Team Building
6. Time Management
7. Stress Management
8. Convincing Skills
9. Motivation

10. Change Management
11. Communication Confidence
12. Group discussion basics
13. Personal Interview basics
14. Resume writing

Total P: 30

REFERENCES:

1. Jeff Butterfield , "Soft Skills for Everyone", 6th Edition, Cengage Learning, Delhi, 2015.
2. Rao M S , "Soft Skills - Enhancing Empolyability", LK International Publishing House, New Delhi, 2011.

SEMESTER - 5

19T501 WEAVING TECHNOLOGY II

2 1 0 3

FEATURES OF SHUTTLELESS LOOMS : Shedding, Beat-Up, Take-Up, Let-Off, Selvedge motion, yarn feeders and accumulators, Batching Motion. Production and efficiency Calculations (5 + 3)

PROJECTILE WEAVING : Projectile loom - Weft insertion sequence. Torsion bar picking mechanism, Projectile Circulation, Projectile Types and Dimensions, Projectile Guides, Projectile Brake (5 + 3)

RAPIER WEAVING : Technological Developments, Classification, principles of Rapier — Rigid / Flexible, Single / Double. Tip / Loop transfer principles, weft insertion sequence, rapier drives (5 + 3)

JET WEAVING : Principles of Airjet weft insertion. Air and yarn quality requirements. Waterjet Looms: Technological Developments, Principles, characteristic features of water-jet looms. Comparison of various weft insertion systems. (5 + 3)

MULTIPHASE WEAVING & BRAIDING : Circular and flat multiphase looms. Shed formation, filling insertion, beat- up. 3D Weaving - multi-layer weaving, loom requirements. Narrow weaving, Braiding — types, classification of braids, braid geometry, applications. (10 + 3)

Total L: 30 +T: 15 = 45

TEXT BOOKS:

1. Prabir Kumar Banerjee , "Principles of Fabric Formation", CRC Press, New Delhi, 2014.
2. Talukdar M.K., Sriramulu P.K. and Ajgaonkar D.B. , "Weaving: Machines, Mechanisms, Management", Mahajan Publishers, Ahmedabad, 1998.

REFERENCES:

1. Sabit Adanur , "Handbook of Weaving", Technomic Publishing Co. Inc, New Delhi, 2001.
2. Marks R. and Robinson T.C , "Principles of Weaving", The Textile Institute, Manchester, 1989.
3. Valeriy V. Choogin, Palitha Bandara and Elena V. Chepelyuk , "Mechanisms of Flat Weaving Technology", Wood Head Publishing, UK, 2013.

19T502 FABRIC STRUCTURE AND DESIGN

3 0 0 3

ELEMENTARY WEAVES : Weave representations: linear and point paper. Weave plan components: Design, draft and peg plan. Elementary weaves — Plain, Twill, Satin, Sateen and their derivatives — constructional details and loom requirements. (9)

COLOUR THEORY AND MISCELLANEOUS ELEMENTARY WEAVES : Color theory: Light, pigment, Tint, Tone, Shade, Color Wheel, Harmonious and contrast colors. Colour and weave effects. Honey comb, Huck-a-back and Crepe weaves - constructional details and loom requirements. (9)

SPECIALITY WEAVES : Backed fabrics, Bed Ford Cords (BFC), Welts and Piques. Leno and Mock Leno. Jacquard designs - Extra warp and Extra weft figuring, Spot figuring - constructional details and loom requirements. (9)

WARP PILE AND WEFT PILE : Warp pile- wire pile, terry pile, loose backed. Weft Pile: plain back, twill back velveteen, Corduroy, Weft plush – constructional details and loom requirements. (9)

DOUBLE CLOTH AND COMMERCIAL FABRIC VISUALIZATION : Classification and types of stitches - self stitched, centre stitched double cloth — constructional details and loom requirements. Overview of Indian traditional textile design. Commercial Fabric types — poplin, voile, sheeting, drill, denim, gabardine, damask, crepe, brocades, etc., and their specifications. (9)

Total L: 45

TEXT BOOKS:

1. Grosicki Z J , "Watson's Textile Design and Colour: Elementary Weaves and Figured Fabrics", 7th Edition, Woodhead Publishing Limited, England, 2004.
2. Groscik Z J , "Watson's Advanced Textile Design: Compound Woven Structure", 4th Edition Woodhead Publishing Limited, England, 2004.

REFERENCES:

1. Hayavadana J , "Woven Fabric Structure Design and Product Planning", 1st Edition, Woodhead Publishing India Pvt Ltd, India, 2015.
2. Wilson J , "Handbook of Textile Design", 1st Edition, Woodhead Publishing Limited, England, 2001.
3. Gokarneshan N , "Fabric structure and design", 1st Edition, New age international P. Ltd, New Delhi, 2011.
4. Horne C E , "Geometric Symmetry in Patterns and Tilings", 1st Edition, Textile Institute, Manchester, 2000.

19T503 PREPARATION AND DYEING

3 0 0 3

SINGEING AND DESIZING : Objectives and methods. 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. (8)

SCOURING, BLEACHING AND MERCERISATION : Objectives, methods and machines. Scouring, bleaching and mercerization of cotton, Continuous and batchwise process. bioscouring of cotton; carbonization, scouring and bleaching of wool; degumming of silk. Quality assessments. (8)

DYEING : Basic characteristics and classification of dyes and pigments. Theory of dyeing. Affinity and Substantivity of dyes. Chemistry and technology of application of direct, reactive, vat, disperse, acid and basic dyes (12)

DYEING PROCESSES : Continuous and batch processes. Dyeing machines for fibre, yarn, woven and knitted fabrics. Post treatment processes - Washing and Drying. (8)

COLOUR ASSESSMENT : Theories of colour measurement. Spectroscopic Reflectance measurement, KubelkaMunk theory and their application in colour assessment and colour matching, whiteness and yellowness indices. Colour fastness. (9)

Total L: 45

TEXT BOOKS:

1. Clark M , "Handbook of textile and industrial dyeing: Principles, processes and types of dyes (Volume 1 and 2)", Woodhead Publishing, Cambridge, 2011.
2. N N Mahapatra , "Textile Dyes", Woodhead Publishing India Pvt Ltd, Newdelhi, 2016.

REFERENCES:

1. Chakraborty J N , "Fundamentals and practices in colouration of textiles", Woodhead Publishing, United Kingdom, 2009.
2. Mohammad Shahid, Guoqiang Chen, Ren-Cheng Tang , "Handbook of TextileColoration and Finishing", STUDIUM PRESS LLC, 2018.
3. Asim Kumar Roy Choudhury , "Textile preparation and dyeing", Science Publishers, 2006.
4. Trotman E R , "Dyeing and Chemical Technology of Textile Fibres", Charles Griffin and Co Ltd, London, 1990.

19T504 MECHANICS OF TEXTILE MACHINERY

2 1 0 3

POWER TRANSMISSION : Selection of drives. Belts - types, analysis of belt tension, applications in textile machinery; Gear trains — types, nomenclature. Differential and variable speed drives — principles, application in textile machines (6 + 3)

DESIGN OF CONE DRUMS : Design of cone drums — piano feed regulation, roving machine builder mechanism Servo Drives (4 + 3)

MOTION, FORCE, ENERGY AND POWER : Linear and circular motion, force, energy, power. Energy stored in rotating masses, balancing of rotating masses in textile machinery. (6 + 3)

CAMS AND DRIVE SHAFTS : Design of shedding tappets and ring frame builder motion cams. Drive shafts - material properties, safety factor, stresses - tensile, compressive, bending and torsion. (4 + 3)

FRICTION : Clutches and brakes — types, features, application in textile machines; friction, bearings - type, features, application in textile machinery. Design of winder drums. (10 + 3)

Total L: 30 +T: 15 = 45

TEXT BOOKS:

1. Slater K , "Textile Mechanics, Vol I", 1st Edition, Textile Institute, Manchester, 1975.
2. Slater K , "Textile Mechanics, Vol II", 1st Edition, Textile Institute, Manchester, 1987.

REFERENCES:

1. Booth J E , "Textile Mathematics, Vol I", Textile Institute, Manchester, 1975.
2. Booth J E , "Textile Mathematics, Vol II", Textile Institute, Manchester, 1975.
3. Rengasamy R S , "Mechanics of Spinning Machines", NCUTE, New Delhi, 2002.
4. Ganapathy Nagarajan , "Textile Mechanism in Spinning and Weaving Machines", 1st Edition, Woodhead Publishing India, 2014.

19T505 FINANCIAL MANAGEMENT IN TEXTILE INDUSTRY

2 1 0 3

COSTING BASICS : Concepts, classification of costs, preparation of cost sheet, cost apportionment, - cost-volume profit analysis, break-even analysis, methods of costing. (6 + 3)

COSTING IN TEXTILE : Costing of yarn and fabric. Garment costing - fabric requirement, cost of garment. (6 + 3)

DEPRECIATION AND INVESTMENT ANALYSIS : Depreciation — method of computing depreciation; techniques of investment analysis — payback period method, accounting rate of return, Discounted Cash Flow methods - IRR, NPV, PI (6 + 3)

FINANCE AND WORKING CAPITAL MANAGEMENT : Capital structure; Sources and cost of capital; working capital Management (6 + 3)

TOOLS FOR FINANCIAL ANALYSIS AND CONTROL : Profit and loss account, balance sheet; ratio analysis - illustrations from textile unit (6 + 3)

Total L: 30 +T: 15 = 45

TEXT BOOKS:

1. Pandey I M , "Financial Management", 8th Edition, Vikas Publishing House Pvt. Ltd, New Delhi, 1999.
2. Thukaram Rao M E , "Cost and Management Accounting", New Age International, Bangalore, 2004.

REFERENCES:

1. Narayanaswamy , "Accounting — A Managerial Perspective", 5th Edition, Prentice Hall of India, New Delhi, 2015.
2. Varma H K , "Costing in Textile Industry", 1st Edition, Dhanpat Rai publications, New Delhi, 1965.
3. Gupta, Ambrish , "Financial Accounting for Management - An Analytical Perspective", 4th Edition, Pearson Education, New Delhi, 2012.
4. Khan and Jain , "Basic Financial Management and Practice", 5th Edition, Tata McGraw Hill, New Delhi, 2001.

19T510 WEAVING AND KNITTING TECHNOLOGY LABORATORY

0 0 4 2

1. Production of toweling fabrics in Terry Loom
2. Design and development of sample in Electronic Jacquard
3. Design and development of Sample in Electronic Dobby
4. Observation of various operations in function panel and running of Rapier Loom
5. Observation of various operations in function panel and running of Airjet loom
6. Production of Tapes in Narrow width loom and study of Braiding machine
7. Working of Single Jersey knitting machine and development of Sample by varying the process parameters
8. Working of Double Jersey knitting machine and development of Sample by varying the process parameters
9. Working of flat knitting machine and development of Sample by varying the process parameters
10. Working of Socks knitting machine and development of Sample by varying the process parameters
11. Development of Sample in Test knitting machine and analysis of fabric parameters
12. Preparation of report on Maintenance and Troubleshooting activities in Rapier & Air jet looms

Total P: 60

REFERENCE:

1. Weaving and Knitting Technology Laboratory Manual prepared by Department of Textile Technology, 2019.

19T511 PREPARATION AND DYEING LABORATORY

0 0 4 2

1. Desizing of grey cotton fabric and evaluation of desizing efficiency
2. Scouring of cotton material using alkali and determination of absorbency and yellowness index
3. Bleaching of cotton material using Sodium hypochlorite and Hydrogen peroxide and evaluation of Whiteness Index
4. Mercerisation of cotton yarn and evaluation of BAN on the fabric.
5. Dyeing of cotton material with direct dyes with and without salt
6. Dyeing of cotton material with reactive dyes using space dyeing technique
7. Dyeing of cotton material with Vat dyes
8. Dyeing of Wool and Silk with acid dyes
9. Dyeing of acrylic with cationic dyes
10. Dyeing of Polyester fabric with disperse dyes
11. Determination of Colour parameters (K/S, L*, a*, b*, Chroma and Hue) of any two of the above Dyed Textiles
12. Evaluation of Fastness properties (Washing, Light, Rubbing and Perspiration) of any two of the above Dyed Textiles

Total P: 60

REFERENCE:

1. Preparation and Dyeing laboratory Manual prepared by Department of Textile Technology, 2019.

19Q513 BUSINESS AND MANAGERIAL COMMUNICATIONS

0 0 2 1

BUSINESS AND MANAGERIAL COMMUNICATIONS:

1. Advanced Group discussion
2. Advanced Resume writing
3. Mock Group discussion
4. Advanced Personal Interview
5. Mock Personal Interview
6. Cracking special Interviews
7. Essential Grammar for Placements
8. Vocabulary for Placements
9. Email writing
10. Paragraph writing
11. Essay writing

Total P: 30

REFERENCES:

1. Priyadarshi Patnaik , "Group Discussion and Interview Skills", Cambridge, New Delhi, 2011.
2. Hari Mohan Prasad, Rajnish Mohan , "How to Prepare for Group Discussion and Interview", 2nd Edition, Tata McGrawhill, New Delhi, 2009.

SEMESTER - 6

19T601 PRINTING AND FINISHING

3 0 0 3

PRINTING : Manual, Automatic and digital methods of printing. Styles of Printing, specialty prints. Pre- treatment of fabrics. Printing with direct, reactive, vat and pigments. (10)

PRINT PASTE PREPARATION : Constituents of printing paste. Viscosity and rheology. Methods of fixation of prints. Printed fabric defects. (8)

MECHANICAL FINISHING : Classification. Calendering. Shrink proofing fabrics. Raising. Shearing. Dimensional stabilization of knitted goods. Properties and assessment of finished fabrics. (7)

CHEMICAL FINISHING : Easy care and Durable finishing of cellulosics. Starching and softening. Water and Oil repellent, Soil release and Flame retardant finishes. Coating chemicals, coating & laminating techniques. Finished fabric realization and Quality Evaluation. (8)

APPAREL AND DENIM PROCESSSING : Preparatory processes. Apparel dyeing, printing and finishing processes. .Apparel dyeing machines. Denim Processing- Dyeing, Fading, Finishing and washing. EFFLUENT TREATMENT: Characteristics and treatment of Textile processing effluents. Zero liquid discharge processing. Marine discharge (12)

Total L: 45

TEXT BOOKS:

1. Parramon , "Textile Printing", B.E.S. Publishing, 2012.
2. Asim Kumar Roy Choudhury , "Principles of Textile Finishing", Woodhead Publishing, 2017.

REFERENCES:

1. Parmar M S Satsangi S S and Jai Prakash , "Denim — A Fabric for All", Northern India Textile Research Association, Ghaziabad, 1996.
2. H. Ujiie , "Digital Printing of Textiles", Woodhead Publishing Limited, 2006.
3. Himanshu Patel and R.T. Vashi , "Characterization and Treatment of Textile Wastewater", Elsevier Inc., 2015.
4. W D Schindler, P J Hauser , "Chemical Finishing of Textiles", Woodhead Publishing, 2004.

19T602 GARMENT MANUFACTURING TECHNOLOGY

3 0 0 3

INTRODUCTION : Overview of garment industry, classification of garments, fibre and fabric selection for garment manufacturing. Process sequence. Pattern making: Body anatomy, Body measurement -measurement chart. Pattern Making –pattern making terminologies, types of patterns, principles of pattern drafting, pattern making tools basic patterns.Pattern draping, Flat pattern technique. Pattern grading. Total digital pattern system. (9)

SPREADING & CUTTING : Marker making — marker planning methods, types of markers, duplication of markers, marker efficiency. Spreading - types of spreading, basic requirements for spreading, spreading machines and equipments. Cutting –requirements of cutting, manual, semi-operated and computerized cutting machines. Preparation for sewing - Sorting, Bundling and Labeling. (9)

SEWING : Stitches and seams classifications. Classification of sewing machines — based on application, based on bed type. Basic stitching machine - principle parts and their functions. Mechanism of stitch formation in lock stitch machine. Sewing machine feed mechanisms, Sewing machine attachments, Seam and stitch defects — causes and remedial measures. Seam engineering. (9)

APPAREL ACCESSORIES, PRESSING, PACKAGING AND FOLDING : Needle — types and selection. Sewing thread– types and applications. Supporting materials & closures. Pressing - Need for pressing, influence of pressing, pressing equipments, conditions and types of pressing. Criteria for packaging, packing and folding, specifications and standards for packaging, materials, and equipments used for packaging, considerations for packaging and folding. (9)

INSPECTION : Fabric inspection — requirements, various fabric inspection systems. Final Inspection of garments — 100% inspection, AQL, spot checking, arbitrary sampling, statistical sampling. MERCHANDISING: Roles and responsibilities of Merchandiser, Activities of Buying House and Buying Agencies. (9)

Total L: 45

TEXT BOOKS:

1. David J Tyler , "Carr & Latham's Technology of Clothing Manufacture", Fourth Edition, Blackwell Science, Oxford, 2008.
2. Solinger Jacob , "Apparel Manufacturing Analysis", Columbia Boblin Media, USA, 2000.

REFERENCES:

1. Peggal.H , "Introduction to Dress Making", Marshal Caverdish, London, 2001.
2. JelkaGersak , "Design of clothing manufacturing process", Woodhead publishing Limited, Oxford, 2013.
3. Pradip V Mehta , "An Introduction to Quality Control for the Apparel Industry", CRC Press, Newyork,USA, 1992.
4. Ruth E Glock, Grace I Kunz , "Apparel manufacturing — sewn product analysis", Pearson, New Delhi, 2009.

19T603 TEXTILE QUALITY EVALUATION

3 0 0 3

SAMPLING AND CONDITIONING, MOISTURE, FIBRE LENGTH AND TRASH : Need for textile testing and sampling. Random and biased sample. Elements of statistics. Standard RH and temperature. MOISTURE: Significance and measurement. FIBRE LENGTH: Length characteristics, Importance and measurement. FIBRE TRASH: Importance and measurement. (9)

FIBRE FINENESS AND STRENGTH : Importance and methods for measuring fineness. Maturity- importance, methods for measuring maturity. Strength - Importance, principles of measurement, bundle and single fibre strength testers. High Volume Instrument (HVI) and Advance Fibre Information System (AFIS). (9)

YARN QUALITY : Yarn Numbering systems and measurements. Yarn twist –Importance and measurements, twist and strength. Yarn Strength: Principles of measurement - CRT, CRL and CRE. Single yarn strength testers, lea strength tester, Impact strength. Yarn Evenness: Definition - classification of variation, methods of measuring evenness and analysis of spectrogram diagram and V-L curve. Yarn hairiness and measurement. Yarn appearance. (9)

FABRIC SERVICEABILITY AND CONSTRUCTION PARAMETERS : Fabric-Thickness, EPI, PPI, Areal density, yarn Crimp-Measurement. Fabric — tensile, tear, bursting strength, abrasion and pilling resistance, flammability- Importance and measurement. (9)

AESTHETIC AND COMFORT CHARACTERISTICS : Drape, stiffness, crease recovery, permeability (air and water)- importance and measurement. Subjective and Objective evaluation of fabric handle, measurement of fabric handle KES-F, FAST. (9)

Total L: 45

TEXT BOOKS:

1. Booth J E , "Principles of textile testing", 3rd Edition, CBS Publishers & Distributors, New Delhi, 1996.
2. Saville B P , "Physical testing of Textiles", 1st Edition, Woodhead Publishing Limited, Cambridge, UK, 1999.

REFERENCES:

1. Kothari V K , "Progress in Textiles-Volume 1: Testing and Quality Management", 1st Edition, IAFL Publication, New Delhi, 1999.
2. Harisson P W , "Physical Testing and Quality control", Vol.23 No.1/213, Textile progress ,Textile Institute, UK, 1993.
3. Cassidy C, Bishop. D , "Characteristics and evaluation of Sensory and Mechanical properties of fabrics", Vol.26 No.4, Textile progress , Textile Institute, UK, 1995.
4. Furter R , "Strength and elongation testing of single and ply yarns: experience with USTER tensile testing installations Manual of textile technology: Quality control and assessment series", 1st Edition, Textile Institute, Manchester UK, 1985.

19T604 PROCESS AND QUALITY CONTROL IN SPINNING

2 1 0 3

RAWMATERIAL SELECTION AND CONTROL : Quality — definition, tools of quality control. Quality management in spinning industry. Fibre selection — Application of High volume instrument & Spinning consistency Index on fibre selection. Bale management techniques. (5 + 2)

CONTROL OF WASTE, NEPS AND FIBRE RUPTURE : Yarn realization — Factors influencing the yarn realization. Control of waste in blow room, card and comber - Influence of machine and process parameters on waste removal. Assessment of intensity of opening and cleaning. Control of Nep generation and fibre rupture in blow room. Improving the nep removal in carding and combing machines. (6 + 3)

YARN QUALITY ANALYSIS AND CONTROL : Control of count, strength and its variation. Control of yarn hairiness. Control yarn evenness and imperfections. Principle of autolevellers and their influence on yarn count variation, evenness. Interpretation and analysis of diagram, spectrogram and V-L curve. Case Studies (8 + 4)

PROCESS CONTROL IN SPINNING OF SYNTHETIC FIBRES AND BLENDS : Synthetic fibre characteristics, blend proportion and their influence on yarn quality. Blending of synthetic fibres and blends — selection of fibres, methods of blending. Assessment of homogeneity of fibre blends and its influence on yarn quality. Process parameters and setting for processing of synthetic fibres and blends in cotton spinning system. Spinning of dyed fibres. Norms for man-made fibre and blended yarns. (6 + 5)

PRODUCTIVITY ANALYSIS : Productivity indices. Factors affecting the production limits of the spinning machinery. Effect of R.H, Temperature and condition of machines on productivity. Control of end breaks in ring spinning. Balancing of spinning machinery. Yarn defects, yarn faults and package faults- classification, assessment, causes and remedies. (5 + 1)

Total L: 30 +T: 15 = 45

TEXT BOOKS:

1. Thilagavathi G & Karthik T , "Process control and yarn quality in spinning", Woodhead Publishing India, New Delhi, 2015.
2. Garde A R and Subramanian T A , "Process Control in Spinning", ATIRA, Ahmedabad, 1989.

REFERENCES:

1. Majumdar, Das, Alagirusamy, Kothari , "Process control in textile manufacturing", Woodhead Publishing, UK, 2012.
2. Ratnam T V. and Chellamani. K. P. , "Quality Control in Spinning", SITRA, Coimbatore, 1999.
3. K.R.Salhotra , "Spinning of manmade fibres and blends on cotton system", 3rd Edition, TAI PUBLICATIONS, Mumbai, India, 2004.
4. Senthilkumar R , "Process Management in Spinning", CRC Press, UK,2019.

19T610 PRINTING AND FINISHING LABORATORY

0 0 2 1

1. Direct style printing of cotton fabric
2. Resist style printing of cotton fabric

3. Discharge style printing and flock printing of cotton fabric
4. Identification of dyes
5. Calendaring and sanforization of fabrics
6. Crease resistant finishing of cotton fabric
7. Flame retardant finishing of cotton fabric
8. Water repellent and proof finishing of cottonfabric
9. Soil release finishing on polyester fabric
10. Biopolishing of cotton fabric
11. Analysis of performance of finished fabrics
12. Analysis of textile processing effluents

Total P: 30

REFERENCE:

1. Textile Chemical Processing Laboratory Manual prepared by Department of Textile Technology, 2019.

19T611 TEXTILE QUALITY EVALUATION LABORATORY

0 0 4 2

1. Determination of Fibre Length and Bundle Fibre Strength
2. Determination of Fibre Fineness and Maturity
3. Determination of Linear Density of Sliver, Roving, Yarn and Yarn from fabric
4. Determination of Single & ply yarn twist and Yarn appearance board assessment
5. Determination of Single yarn strength & Lea strength
6. Determination of Fabric Thickness, Stiffness and Crease Recovery
7. Determination of Fabric Tensile Strength & Bursting Strength
8. Determination of Fabric Tear Strength and Fabric Drape
9. Determination of Fabric Abrasion Resistance and Pilling
10. Determination of Air and Water Permeability
11. Determination of Seam Strength, Seam Slippage and Button Pull Strength Tester
12. Demonstration of High Volume Instrument(HVI), Yarn Evenness Tester and Moisture Management Tester

Total P: 60

REFERENCES:

1. Textile Testing Laboratory Manual prepared by Department of Textile Technology, 2019.
2. ASTM ,"Annual Book of ASTM Standards Volumes 7.01 and 7.02", ASTM International, U.S., 2019.

19Q613 QUANTITATIVE AND REASONING SKILLS

0 0 2 1

QUANTITATIVE AND REASONING SKILLS :

1. Number System, Time and Work
2. Percentages , Simple and Compound Interests
3. Time, Speed and Distance
4. Permutation, Combination and Probability
5. Ratio and Proportion
6. Profit, Loss and Partnership
7. Logarithms, Progressions, Geometry and Quadratic Equations
8. Coding and Decoding
9. Series, Analogy and Odd Man Out
10. Visual Reasoning
11. Data Arrangements
12. Blood Relations
13. Clocks, Calendars and Direction Sense
14. Cubes, Logical Connectives and Syllogisms
15. Venn Diagrams, Interpretations and solving

Total P: 30

REFERENCES:

1. Aggarwal R S , "Quantitative Aptitude for Competitive Examinations", 3rd Edition, S Chand Publishing, New Delhi, 2017.
2. ETHNUS , "Aptimithra", 1st Edition, McGraw-Hill Education Pvt Ltd, 2013.
3. FACE , "Aptipedia Aptitude Encyclopedia", 1st Edition, Wiley Publications, Delhi, 2016.

19T620 INNOVATION PRACTICES

0 0 4 2

1. Understanding of the concepts of innovation, creativity, patenting and Intellectual Property Rights (IPR).
2. Reengineering, development and analysis of yarn, fabric samples and selected textile products using DST- FIST Textile product development centre, COE Indutech and Textile CAD Laboratory.
3. Preparing a project report and a report highlighting the specifications of the product and standards.
4. Comparison with commercial products
5. Consolidated project report preparation

Total P: 60

SEMESTER - 7

19T701 TECHNICAL TEXTILES

3 0 0 3

INDUSTRIAL TEXTILES : Market growth and potential of technical textiles and classifications, Industrial textiles: Ropes, Braids, Narrow fabrics, Abrasive fabrics. FILTRATION TEXTILES: Fiber, fabric, design requirements, Mechanism of filtration. Filter properties, Cigarette filters, Case studies (9)

AUTOMOTIVE AND SPORTS TEXTILES : Requirement and design for Pneumatic tyres, Air bags, seatbelts, Headliner, Battery separator, Radiator hoses. Thermal and sound insulation. SPORTS TEXTILES: Textiles in sportswear, Design of sports clothing (9)

MEDICAL AND PROTECTIVE TEXTILES : Classification of medical textiles. Fibre selection and fabric characteristics required for healthcare and hygiene applications. PROTECTIVE TEXTILES: Fibre selection. Mechanism and material requirements for ballistic textiles, cold protective clothing, UV Protection, clean room garments. Functional apparels: welding and splash proof fabrics (9)

GEO AND AGROTEXTILES : Functions of geotextiles. Types and application of geosynthetics. Fibres and fabric selection criteria for geotextile applications. AGROTEXTILES: Material, method of production and areas of application of (9)

OTHER TECHNICALTEXTILES : Textiles in temporary and permanent civil construction- Tents, Awnings, Scaffolding Nets. Fibres and Fabrics used for packaging. Textiles used in home textiles. Environmental protection textiles. (9)

Total L: 45

TEXT BOOKS:

1. Sabit Adanur , "Wellington Sears Handbook of Industrial Textiles", Technomic publishing company Inc., USA, 1995.
2. Horrocks A R, Anand S C , "Handbook of Technical Textiles", Woodhead Publishing and Textile Institute, USA, 2000.

REFERENCES:

1. Jarmila S , " Industrial Textiles", Elsevier Science Publishing, Newyork, USA, 1990.
2. David B W , "The Application of Textiles in Rubber", Rapra TechnologyLimited, UK, 2001.
3. Harrison P W , "The Design of Textiles for Industrial Applications", Textile Institute, Manchester, 1998.", Textile Institute, Manchester, 1998.
4. Pushpa B, Sengupta A K , "Industrial Application of Textiles for Filtration and Coated fabrics", Textile progress, UK, 1992.

19T710 GARMENT MANUFACTURING LABORATORY

0 0 4 2

1. Pattern making for round neckT-shirt for given measurement
2. Pattern making for skirt for given measurement
3. Pattern making for Trouser for given measurement
4. Computerized Pattern Making and Marker planning for Round neck T-shirt for given measurement
5. Computerized Pattern Making and Marker planning for Skirt for given measurement
6. Computerized Pattern Making and Marker planning for Trouser for given measurement
7. Working of basic sewing machines
8. Stitching of Basic Shapes for practice
9. Assembling and construction of T-shirt for the constructed pattern
10. Assembling and construction of Skirt for the constructed pattern
11. Assembling and construction of Trouser for the constructed pattern
12. Testing of sewing thread quality attributes (Strength, friction, imperfections and faults

Total P: 60

REFERENCE:
1. Apparel Manufacturing Laboratory Manual prepared by Department of Textile Technology, 2019.

19T711 FABRIC STRUCTURE AND PRODUCT DEVELOPMENT LABORATORY

0 0 4 2

1. Analysis of the given Plain and twill derivative samples for fabric design and parameters
2. Analysis of the given Satin / Sateen Weave samples for fabric design and parameters
3. Analysis of the given Huck-a-back fabric for fabric design and parameters
4. Analysis of the given Honeycomb fabric for fabric design and parameters
5. Analysis of the given terry fabric for fabric design and parameters
6. Analysis of the given corduroy fabric for fabric design and parameters
7. Analysis of Knitted fabric samples for fabric design and parameters
8. Development of art work for Dobby / Jacquard design, stripe and check designs using CAD
9. Development and characterization of electro active fabric for specific applications
10. Fabrication and characterization of textile composite for specific applications
11. Development of nonwoven based products
12. Development and characterization of braided fabric for specific applications

Total P: 60

REFERENCE:
1. Fabric Structure and Product Development Laboratory Manual prepared by Department of Textile Technology, 2019.

19T712 QUANTITATIVE TECHNIQUES LABORATORY

0 0 2 1

1. Mean Deviation, z-test and t-test for analysis of quality of textile materials
2. ANOVA, chi square and F test for analysis of quality of textile materials
3. Construction of control charts
4. Balancing of Machinery for yarnproduction
5. Balancing of Machinery for fabricproduction
6. Calculation of Yarn Realisation and Costing of Yarn
7. Costing of fabrics
8. Costing of Apparels
9. Preparation of Operational bulletin for a style of garment
10. Standard Allowed Minutes value (SAM) value using time study
11. Line Balancing in a sewing Line
12. Efficiency and Production Calculation in Textiles

Total P: 30

REFERENCE:
1. Quantitative Techniques Laboratory Manual prepared by Department of Textile Technology, 2019.

19T713 INTERNSHIP II

0 0 2 1

INDUSTRIAL VISIT
Study tour/Industry visit will be arranged for students. Reports are to represent the observations of the students after the visits with their personal comments/suggestions.

INDUSTRIAL LECTURE
Faculty will arrange for lecture by industry experts to highlight the recent technical and soft skill trends.

Total P:30

REFERENCE:
1. Industry visit manual prepared by Department of Textile Technology, 2019.

19T720 PROJECT WORK I

0 0 4 2

Identification of a real life problem in thrust areas
Developing a mathematical model for solving the above problem Finalisation of system requirements and specification
Proposing different solutions for the problem based on literature survey Future trends in providing alternate solutions
Consolidated report preparation of the above

Total P:60

SEMESTER - 8

19T820 PROJECT WORK II

0 0 8 4

THE PROJECT INVOLVES THE FOLLOWING:

PREPARING A PROJECT - BRIEF PROPOSAL INCLUDING
Problem Identification
A statement of system / process specifications proposed to be developed (Block Diagram / Concept tree) List of possible solutions including alternatives and constraints
Cost benefit analysis Time Line of activities

A REPORT HIGHLIGHTING THE DESIGN FINALIZATION [BASED ON FUNCTIONAL REQUIREMENTS & STANDARDS (IF ANY)]

A PRESENTATION INCLUDING THE FOLLOWING:
Implementation Phase (Hardware / Software / both) Testing & Validation of the developed system Learning in the Project

CONSOLIDATED REPORT PREPARATION

Total P:120

PROFESSIONAL ELECTIVES

19T001 HIGH PERFORMANCE FIBRES

3 0 0 3

CLASSIFICATION AND MANUFACTURING TECHNIQUES : Classification, Structure-Property Comparison of High Performance Fibres and Regular Fibres, Applications, Manufacturing Techniques and Characterization. (8)

HIGH STRENGTH HIGH MODULUS FIBRES : Aramids, Aromatic Polyester, Carbon, UHMWPE: Fibres formation — Fibre & structure properties, performance and applications. (8)

THERMAL AND CHEMICAL RESISTANT FIBERS : Properties, Applications, Brief note on synthesis of POLYBENZIMIDAZOLE, PBI, Polybenzoxazoles, PBO, PANOX, Melamine, Novolac, Kynol, Aromatic Polymers, Chlorinated Fibres: PVDC, Fluorinated Fibres: PTFE, PVF, PVDF and FEP, Poly(phenylene sulphide), PPS, Poly(ether imides), PEI, PEEK. (8)

INORGANIC FIBERS : Glass fibers- Types and Composition, Manufacturing Processes, Fibre structures and Properties, Applications, optical fibres. Ceramic Fibers- Classification and fibre formation, composition, structure and properties. Applications of ceramic fibers, metallic fibres. (8)

OTHER PERFORMANCE FIBERS : Elastomeric fibers- Manufacturing Processes, Fibre Properties, Application and future trends, Lyocell fibers, absorbent fibers . Smart / functional specialty fibers- Stimuli responsive and smart textiles, noncircular/ hollow fibres, bi-component and other specialty fibres, electro spun nanofibers. (13)

Total L: 45

TEXT BOOKS:

1. Mukhopadhyay S K , "High Performance fibres", -, Textile Progress Vol.25, Textile Institute, UK, 1993.
2. Hearle JWS , "High Performance Fibers", -, Textile Institute, CRC Press, London, 2001.

REFERENCES:

1. Menachan Lewis & Jack Preston , "High Technology Fibres", -, Part A,B, C& D, Merceb Dekkar Inc, New York, 1993.
2. Nakajima T , "Advanced fiber spinning Technology", -, Woodhead Publishing, UK, 1996.
3. Robert R Mather, Roger H Wardman , "The Chemistry of Textile Fibres", Second, Royal Society of Chemistry, UK, 2015.
4. Mishra S P , "A Text Book of Fibre Science and Technology", -, New Age International (P) Ltd, New Delhi, 2000.

19T002 ADVANCES IN MANUFACTURED FIBRES

3 0 0 3

STRUCTURE FORMATION IN HIGH SPEED SPINNING : High speed spinning operations - applications of HSS – High Speed Solution spinning- Spinning Technology of Acrylic Filaments - Bemberg rayon- spandex fibres. (8)

SPINNING OF ANISOTROPIC POLYMERS : Anisotropic - Lyotropic - thermotropic polymers - spinning technique - Spinning of liquid crystal polymers - heat treatment - fibre formation and structure (8)

SPINNING OF POLYBLEND FIBRES : Compatibility - formation of polyblend fibres-properties and application - Spinning of bio degradable polymers - water soluble and water insoluble polymers - manufacture and application. (8)

SPINNING OF ULTRAFINE FIBRES : Product and processes - continuous filament type and random type spinning - Gel spinning - ultra high strength polyethylene fibre- other flexible polymers - Spinning of optical fibres- Structure and material - spinning and manufacturing technique- other manufacturing processes. (8)

NANOFIBRE PRODUCTION : Principle of electrospinning. Electrospinning of nanofibres - conditions - structure formation - properties - effect of process parameters upon fibre formation. Methods to produce continuous filaments. Electrospinning of polyamides and polyesters. (13)

Total L: 45

TEXT BOOKS:

1. Nakajima T and Kajiwara , "Advanced Fibre Spinning Technology", Woodhead Publishing Ltd, UK, 1999.
2. Saymor and Poster , "Man Made Fibres- their Origin and Development", Elsevier Science Publishing Ltd, London, 1993.

REFERENCES:

1. Menachem Lewin , Jack Preston , "High Technology Fibres", Parts A, 1993.
2. Ziabicki , Kawai , "High Speed Fibre Spinning — Science and Engineering Aspects", John Wiley & Sons Publication, 1995.
3. Robert R Mather, Roger H Wardman , "The Chemistry of Textile Fibres", Royal Society of Chemistry, 2011.

19T003 ANALYTICAL CHARACTERIZATION OF TEXTILES

3 0 0 3

MOLECULAR CHARACTERIZATION : Molecular weight averages - Determination of molecular weight: primary methods - end group analysis - osmometry - light scattering. Secondary methods - viscometry - gel permeation chromatography. (9)

FINE STRUCTURE ANALYSIS : Orientation techniques - optical birefringence - dialectic anisotropy - dichroism - X- ray diffraction - density gradient measurement - Small angle x-ray scattering. (9)

MORPHOLOGY CHARACTERIZATION : Microscopy analysis - Scanning electron microscopy - Transmission electron microscopy - Atomic Force Microscopy and Scanning Tunneling Microscope. (9)

SPECTROSCOPY ANALYSIS : Infrared - NMR - UV-visible - mass and Raman Spectroscopy techniques. (9)

THERMAL CHARACTERIZATION : Characterization of glass transition - crystallization - melting and decomposition temperatures. Themoanalytical techniques: Differential scanning calorimeter - Differential thermal analysis Thermogravimetry - Thermo-mechanical analysis - Dynamic mechanical tests. PHYSICAL CHARACTERIZATION: Fibre fineness - friction - crimp - spin finish content - viscosity - dye uniformity - bulkiness measurements. (9)

Total L: 45

TEXT BOOKS:

1. Raheel M , "Modern Textile Characterization Methods", Marcel Dekker Inc, 1996.
2. Kothari V K, Gupta V B , "Manufactured Fibre Technology", Chapman & Hall Pub., 1997.

REFERENCES:

1. Mukhopadhyay S K , "Advances in Fibre Science", The Textile Institute, 1992.
2. Billmeyer F W , "Textbook of Polymer Science", Wiley Inter Science, 2002.
3. Raheel M , "Modern Textile Characterization Methods", Marcel Dekker Inc, New York, 1996.

19T004 LONG STAPLE SPINNING

3 0 0 3

LONG STAPLE FIBRES : Introduction - varieties - fibre extraction - grading. Physical and Chemical properties. Processing. (9)

WOOL : Woollen and Worsted spinning. Objectives - Preparation - Blending - Opening machineries - Carding - Drawing - Combing - Spnning - Doubling - Twisting - Yarn packing. (9)

OTHER HAIR FIBRES : Camel hair - Llama hair - Alpaca hair - Angoara - Mohair - Cashmere wool - Goat hair - minor hair fibres. Properties. Production processes. (9)

BAST FIBRES : Jute - Flax - Hemp and Banana fibres - Preparation - Batching - Carding - Drawing - Roving- Spinning - Reeling - Bundling. (9)

LEAF FIBRES AND FRUIT FIBRES : Sis al - Pineapple - Fibre exraction- Preparation - Spinning - Bundling. Applications - Coir - Fibre exraction- Preparation - Spinning - Bundling.Applications (9)

Total L: 45

TEXT BOOKS:

1. Sykes A B, Richards R T D , " Woollen Yarn Manufacture", The Textile Institute, UK, 1994.
2. Chernysheva N , "Wool Spinning", Mir Publishers, 1983.

REFERENCES:

1. Stout H P , "Fibre and Yarn Quality in Jute Spinning", The Textile Institute, UK, 1988.
2. Sharp P , "Flax, Tow and Jute Spinning", Abhishek Publications, New Delhi, 1998.
3. Ahirwar R S, Navin Chand, Ramakrishnan N, Nandan M J , "Sisal Fibre Technologies", Allied Publishers Pvt Ltd, New Delhi, 2008.

19T005 STRUCTURAL MECHANICS OF TEXTILE MATERIALS

3 0 0 3

GEOMETRY OF TWISTED YARNS : Idealized helical yarn structure; yarn count and twist factor - twist contraction; Limits of twist. Idealized packing; measurement of packing density and radial packing density of yarn; Packing in actual yarns; Specific volume ofyarns; measurement of yarn diameter. (9)

FIBRE MIGRATION : Ideal migration - tracer fibre technique - characterization of migration behavior - migration in spun yarns - mechanisms of migration - effect of various parameters on migration behavior. (9)

MECHANICS OF CONTINUOUS FILAMENT YARNS : Analysis of tensile behaviour; Extension and breakage of continuous filament yarns; Theoretical analysis of tensile behavior. (9)

GEOMETRY OF CLOTH STRUCTURE : Geometry of plain and non-plain weaves; Peirce - Kemp and Olofsson models; crimp ratio and thread spacing; jamming of threads; crimp interchange; balance of crimp (9)

WOVEN FABRIC MECHANICS : 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. KNITTED FABRICS AND NONWOVEN STRUCTURES: Load-extension of warp knit fabrics; biaxial stress behaviour of plain-knit fabrics; structure of felts; mechanical behaviour structure of needle felts. (9)

Total L: 45

TEXT BOOKS:

1. Goswami B C, Martindale J G, Scardino , "Textile Yarns: Technology, structure and Application", Wiley Interscience, New York, 1977.
2. Hearle J W S, Grosberg P, Backer S , "Structural Mechanics of Fibers, Yarns and Fabrics", Wiley Interscience, New York, 1969.

REFERENCES:

1. Goswami B C, Martindale J G , Scardino , "Textile Yarns: Technology, structure and Application", Wiley Interscience, 1977.
2. Hearle J W S , "Structural Mechanics of Fibers, Yarns and Fabrics", Wiley Interscience, 1969.

19T006 ADVANCED FABRIC STRUCTURE AND DESIGN

3 0 0 3

STRIPE AND CHECK WEAVES : Considerations in combining weaves, Motif designs. Compound colour and weave effects — stripe colour, check colour and figured colour weave effects. Figuring with extra threads — extra warp and extra weft figuring. (9)

DOUBLE CLOTH AND FIGURED PILES : Figured double cloth structure — use of similar colours in warp and weft — Use of different colours in warp and weft - Figured terry piles — Figured warp backed cloth — Figured weft backed cloth. (9)

DAMASKS AND BROCADES : Damask — Salient features - Designing and simplified enlargement techniques.

Brocades - Warp rib - Weft rib - Multi weft brocades. (9)

TAPESTRY STRUCTURE : Tapestry - Traditional and modern tapestries- Simple weft faced tapestries; two colored weft faced reversible structures; three colored weft faced and four colored weft faced reversible and non - reversible structures - Combined warp and weft faced tapestries. (9)

GAUZE AND LENO : Salient features. Open, Crossed and Plain sheds in leno weaving Bottom douping and Top douping - Easer and Shaker device. String doups with Bottom douping and Top douping for Leno weaving –thread interlacing diagram of leno structures. Narrow Fabrics: Construction of ribbons and tapes - Zip fastener tapes. (9)

Total L: 45

TEXT BOOKS:

1. Grosicki Z J , "Watson's Textile Design and Colour: Elementary Weaves and Figured Fabrics", 7th Edition, Woodhead Publishing Limited, England, 2004.
2. Grosicki Z J , "Watson's Advanced Textile Design: Compound Woven Structure", 4th Edition, Woodhead Publishing Limited, England, 2004.

REFERENCES:

1. Hayavadana J , "Woven Fabric Structure Design and Product Planning", 1st Edition, Woodhead Publishing India Pvt Ltd, India, 2015.
2. Wilson J , "Handbook of Textile Design", 1st Edition, Woodhead Publishing Limited, England, 2001.
3. Gokarneshan N , "Fabric structure and design", 1st Edition, New age international P. Ltd, New Delhi, 2011.
4. Horne C E , "Geometric Symmetry in Patterns and Tilings", 1st Edition, Textile Institute, Manchester, 2000.

19T007 SPECIALTY TEXTILES

3 0 0 3

NARROW FABRICS : Introduction –fibre and yarn types, fabrics. Preparation for narrow fabric production - winding, warping, sizing, looming. Narrow fabric production: Woven narrow fabrics and their constructions — structure of narrow fabrics woven on shuttleless looms. Conventional shuttle looms, unconventional shuttle looms and shuttleless looms for narrow fabrics production. (9)

INDUSTRIAL TAPES : Slide fastener tapes - Insulating tapes — Book binder's tapes - Labeling Tapes — Border Tapes — Elastic- Pleated lingerie ribbing. Industrial braids: Classification of braids — Trimmed braids — Flat braids Circular Braids - Hollow braids. Production techniques. Properties and applications. (9)

INDUSTRIAL WEBBINGS : Manufacture of spindle drive webbing — Print webbings — Webbings for automobile safety belts. Industrial nets: Knotted netting — applications. Spacer fabrics and 3D fabrics. (9)

CARPETS : Non-pile carpet weaves and their looms. Pile surfaced carpet weaves and their looms. Needle felt floor coverings. (9)

HOME TEXTILE PRODUCTS : Definition - requirements. Kitchen linen, Bedlinen, Furnishing, Floor coverings, Wall coverings, Decoration fabrics. (9)

Total L: 45

TEXT BOOKS:

1. Turner J P , " The production and properties of narrow fabrics", Vol.8 No.4, Textile Progress , The Textile Institute, Manchester, 2002.
2. Sabit Adanur , "Wellington Sears Handbook of Industrial Textiles", 5th Edition, Technomic publishing company Inc., USA, 2012.

REFERENCES:

1. Jarmila Svedova , " Industrial Textiles", Elsevier Science Publishing Co in, New York, 1990.
2. Alexander N G , " Desighing Interior Environment", Mas court Brace Covanorich Inc, New York, 1996.
3. Arahamsen H, Crew A H , "Carpets: Back to Front", Vol.19 No.3, Textile Progress, The Textile Institute, Manchester, 1987.

19T008 TEXTILE COMPOSITES

3 0 0 3

BASIC CONSTITUENTS : Definition of composites, Matrix and reinforcements, classification of textile reinforced structures based on axis and dimension: non-axial, mono-axial, biaxial, triaxial and multiaxial structures, 3D structures, Non-crimp fabrics, Stitched fabrics. Fibre matrix Interface mechanism, textile reinforced concretes. (10)

TEXTILE STRUCTURED PREFORMS AND PREPREGS : Objectives of preforms and property requirements, Classification — Weaving, Knitting, and other forms. Geometrical aspects. Fibre orientation. Prepregs: property requirements, manufacturing techniques, applications. (6)

COMPOSITE MANUFACTURING : Selection criterion, Hand layup, vacuum bag molding, compression molding, resin transfer molding, filament winding, pultrusion, Injection molding. Self-reinforced composites. Composites from recyclable textile waste, polymers and mineral fillers. (8)

MECHANICS OF UNIDIRECTIONAL FIBRE COMPOSITES : Lamina and Laminate: Definition, angle of orientation, density and ply thickness, Fibre volume fraction, Void. Rule of mixtures, Critical fibre length, Evaluation of elastic modulus, Quality evaluation — Destructive and nondestructive methods. Failure and fracture mode in UD fibre composites. (12)

APPLICATION OF TEXTILE COMPOSITES : Automotive applications, Civil and military load bearing applications, Rail road applications, Marine applications: Boats, large power yachts, sail boats, pressure hulls, bridge decks. Industrial applications, other applications. (9)

Total L: 45

TEXT BOOKS:

1. Peters S T , "Handbook of Composites", Chapman & Hall, London, UK, 1998.
2. Mallick P K , "Fibre Reinforced composites, Materials, Manufacturing and Design", CRC Press, Newyork, USA, 2008.

REFERENCES:

1. Jang-Kyo Kim, Yiu-Wing Mai , "Engineered Interfaces in Fiber Reinforced Composites", Elsevier, UK, 1998.
2. Tong L, Mouritz A P, Bannister M , "3D Fibre Reinforced Polymer Composites", Elsevier, UK, 2002.
3. Autar K Kaw , "Mechanics of Composite Materials", CRC Press, USA, 1997.
4. Long A C , "Design and Manufacture of Textile Composites", Woodhead publishing Ltd, London, UK, 2005.

19T009 SPECIALTY KNITS

3 0 0 3

SPECIALITY FABRICS AND MACHINES : The range of specialty fabrics, The production of fleecy on sinker-top machines, Fleecy interlock, Plush, The bearded needle sinker wheel machine, Sinker plush knitted on single- jersey latch needle machines, Full–density patterned plush, Cut loop ,Double sided plush, Silver in high-pile knitting and Wrap patterning. (9)

SPECIALITY KNIT CONSTRUCTIONS / PATTERNS : 1/2 Cardigan ,Blister, Cable ,Float Jacquard (face) / Float Jacquard (back) ,Full Cardigan ,Full Fashion ,Intarsia (face) / Intarsia (back) ,Ladder-back Jacquard (face) / Ladder-back Jacquard (back) ,Links and Links ,Plaited Fabric ,Pointelle Jersey, Pointelle Rib ,Rack Stitch ,Rib Jacquard (face) /Rib Jacquard (back) ,Selective Transfer ,Tuck Stitch and Welts. (9)

CAMOUFLAGE KNITS AND SEAMLESS KNITTING : Kids and babies, pants and sweater for men, tops for ladies, scarves, caps blankets and accessories. Applications of seamless knitting: Apparel, upholstery, automotives and medical textiles. Evaluation of knitting process from cut and sewn method to seamless garments production. Seamless garments production - V-Bed knitting machine, other Seamless knitting machines. (9)

ADVANCED KNITTED PRODUCTS : Women's apparel, Functional requirements of knitted underwear, Performance evaluation of knitted underwear, Engineering of knitted underwear fabrics, Recent developments in knitted underwear fabrics and Properties of commercial knitted underwear fabrics. (9)

KNITTED STRUCTURES FOR SOUND ABSORPTION : Acoustic textiles in vehicles, Sound absorption by plain knitted structures, Engineering advanced knitted fabrics for sound absorption, Thick spacer structures, Dense spacer structures. (9)

Total L: 45

TEXT BOOKS:

1. Spencer D J , "Knitting technology", Woodhead Publishing Series, India, 2011.
2. Raz S , "Knitting Technology", Woodhead Publishing Limited, UK, 1991.

REFERENCES:

1. F Au K , "Advances in knitting technology", Woodhead Publishing, Hong Kong, 2001.

19T010 COATED TEXTILES

3 0 0 3

INTRODUCTION : Basic principles of coating and laminating processes. Coated Products - Protective clothing - sports and industrial - automotive application - Marine applications Buildings and architecture - Household goods Medical uses and Military uses. (7)

POLYMERIC MATERIALS FOR COATING : Natural & Synthetic Rubbers - Polychloroprene Rubbers - Polyisobutylene Rubbers - Styrene-butadiene Rubbers - Nitril Rubbers. Synthetic Polymers: Polyurethanes - Poly (Vinyl Chloride) (PVC) - Polyacrylate Elastomers - Silicone Elastomers - Poly (Tetrafluoroethylene) (PTFE) - Polyethylene - Chlorinated and Chlorosulponated Polyethylenes - Other Functional Polymers. Additives and Formulation of Coating Recipe. (9)

PREPARATION & COATING METHODS : Fibres - Yarn and Fabrics. Knife - Roll - Dip - Transfer Coatings and Gravure Coating. Calendering. Hot-Melt Coating - Foam coating - Lamination by Adhesives. (8)

PREPARATION OF COATED FABRICS FOR CERTAIN APPLICATIONS : Waterproof Breathable Fabrics – Synthetic Leather - Architectural Textiles - Fluid Containers - Tarpaulins - Automotive Applications - Carpet Backing. (8)

COATING WITH FUNCTIONAL MATERIALS : Temperature sensitive coatings - High visibility Garments - Conductive coatings - Shape memory coatings - Nanocoatings. - Properties of Coated Textiles and Test Methods: Mass per unit area, Breaking strength and elongation at break, Tear strength, Coating adhesion strength, Temperature performance, Resistance to flexing, Resistance to ageing, Resistance to water, air and water vapor permeability, Flammability Test. (13)

Total L: 45

TEXT BOOKS:

1. Walter Fung , "Coated and laminated textiles", Woodhead Publishing, UK, 2002.
2. Smith W C , "Smart textile coatings and laminates", Woodhead Publishing, UK, 2010.

REFERENCES:

1. Stevens K, Brown P , "Nanofibers and nanotechnology in textiles'', CRC Press, New York, Washington, 2007.", CRC Press, New York, Washington, 2007.
2. Ashish Kumar Sen , "Coated Textiles: Principles and Applications", Technomic Publishing Co., USA, 2008.
3. Carr CM , "Chemistry of the Textile Industry", Blackie Academic & Professional, New York, 1995.

19T011 AUTOMOTIVE TEXTILES

3 0 0 3

AUTOMOTIVE TEXTILE INDUSTRY HISTORY AND DEVELOPMENT : Automotive textile industry history and development. Automotive textiles: Products, market overview and growth projections of automotive textiles. (6)

TEXTILE STRUCTURES IN AUTOMOTIVES : fibers - yarns - knitted - woven - and nonwoven - structural requirements and properties. Applications of 3D knitting - woven and nonwoven materials in automotive industry. (8)

INTERIOR AND EXTERIOR TRIMS FOR ROAD TRANSPORTATION : Requirement and design for Seat fabric - floor coverings - Headliners - door casings and parcel shelves - truck and car covers - Seat belt - Airbags - carpets - filters (air and oil) - battery separators - tyre cords - hoses and belts. Methods of production and properties of textiles used in these applications. (10)

TEXTILES IN OTHER TRANSPORTATION : Requirement and properties of textiles used in railway applications - marine applications - aircraft - application of composites in transportations. (7)

AUTOMOTIVE TEXTILE AND THE ENVIRONMENT : Environmental impact, manufacturing concerns, sustainable development, recycling of materials and components. QUALITY ANALYSIS AND TESTING- Test methods, standards (ASTM, DIN), norms for raw materials and products. Product specified tests. (14)

Total L: 45

TEXT BOOKS:

1. Mike Hardcastle, Walter Fung , "Textiles in automotive Engineering", , Technomic Publishing Co, Woodhead publishing Ltd, UK, 2001.
2. Shishoo R , "Textile advances in the automotive industry", Wood head publishing Ltd, UK, 2008.

REFERENCES:

1. Horne .L , "New Product Development in Textiles", Woodhead publishing Ltd, UK, 2012.
2. Sabit Adanur , "Wellington Sears Handbook of Industrial Textiles", Technomic Publishing Co, USA, 1995.

19T012 PROTECTIVE TEXTILES

3 0 0 3

INTRODUCTION : Definition - classifications - Market potential. Design of protective clothing. Selection of protective clothing material. Surface treatment for protective textiles. (9)

THERMAL PROTECTION : Fire science - Flame retardant - fibers and textile - inherently flame retardant synthetic fibers. Heat and fire resistant fibers - aramid and family - polybenzazole group - semi carbon. Design issues. (9)

BALLISTIC PROTECTION : soft body armor - hard body armor - high performance ballistic fibers - fabric structures for body armors - working mechanism - design of ballistic body armors. Design of ballistic helmets. (9)

CHEMICAL PROTECTION : Chemical hazards - Toxic chemical - interaction between chemical and protective extiles. Different types chemical protective materials - Fabric design - structures - finishing and their performance. THER PROTECTIVE TEXTILES: Protection against extreme climate - UV protection - high visibility textiles - protection gainst radiation - respiratory protection - Biological protection - materials - design requirements and properties. (9)

TESTING AND QUALITY ANALYSIS : Standards and testing of ballistic textiles- armor testing - limit testing - residual elocity testing - ballistic resistance testing - Standards and testing - flame retardant textile - chemical and biological protective textiles. Testing of comfort properties - protection and comfort. Reflection and retro reflection testing for high visibility textiles. (9)

Total L: 45

TEXT BOOKS:
1. Richard A. Scott , "Textiles for protection", Woodhead publishing Ltd, UK, 2005.
2. Eugene Wilusz , "Military textiles", Woodhead publishing Ltd, UK, 2008.

REFERENCES:
1. Sabit Adanur , "Wellington Sears Handbook of Industrial Textiles", Technomic Publishing Co, USA, 1995.
2. Horrocks A R and Anand S C , "Handbook of Technical Textiles", The Textile Institute, CRC Press, Woodhead publishing Ltd, Cambridge, UK, 2001.

19T013 FILTRATION TEXTILES

3 0 0 3

FILTRATION PRINCIPLES : Filtration and Separation, Contaminants, Surface and Depth Filtration. Theory and Principles. Fabric design and selection considerations. Practical implications. (8)

CHARACTERISTICS OF NONWOVEN FILTER MEDIA : Air Laid Webs, Dry Laid Webs, Melt-spun Webs, Flash-spun Webs, Nanofiber Spun Webs, Wet Laid Webs, Electret Filter Media, Composite Structures, Coalescing Media, Sorption Media, Antimicrobial Media, Catalytic Media, Membrane Filter Media (8)

AIR FILTERS : Industrial Air Filtration, Heat Ventilation and Air Conditioning Systems, High Efficiency Air Filtration, Gas Turbine Air Intake Filters, Respirators and Facemasks, Vacuum cleaners, Air purifier (8)

LIQUID AND OIL FILTRATION : Water filters, Waste Water Treatments, Surface Treatment Chemicals. Oil and Hydraulic Systems: Engine filters, Oil-water separators, Oil cleaning and Hydraulic Systems. Gas filtration. Engine Filters, Oil–water Separators, Oil Cleaning, Hydraulic Systems. (8)

TESTING OF FILTER MEDIA : Basis Weight , Volatiles and Moisture Content , Formaldehyde Content, Thickness, Air Permeability, Density and Bulk, Solidity and Porosity, Pore Size and Pore Structure, Other Techniques for Measuring Porosity, Pore Size, and Structure, Strength Properties, Water Repellency and Water/Moisture Resistance, Flammability, Color, Filter Media Filtration Testing. (13)

Total L: 45

TEXT BOOKS:
1. Philip Brown, Christopher Cox , "Fibrous Filter Media", Woodhead Publishing Limited, UK, 2016.
2. Irwin M. Hutten , "Handbook of Nonwoven Filter Media", Elsevier, Burlington, 2008.

REFERENCES:
1. Ken Sutherland , "Filters and Filtration Handbook", Elsevier, Burlington, 2008.
2. Arunangshu Mukopadhyay , "Pulse-jet filtration: An effective way to control industrial pollution Part I: Theory, selection and design of pulse-jet filter", Taylor and Francis, UK, 2010.

19T014 CLOTHING SCIENCE

3 0 0 3

CLOTHING CHARACTERISTICS : Clothing science - importance and prospects. Clothing performance characteristics — comfort, durability, handle and tailorability. Physiological Comfort: Aspects of clothing physiological comfort. Tactile comfort — Effects of fabric and garment properties on tactile sensations. Factors influencing garment fit and ease of body movement. Pressure comfort — comfortable range of garment pressure and factors influencing pressure comfort. (9)

THERMOPHYSIOLOGICAL COMFORT : Humans and their thermal environment, heat transfer theories, thermal conductivity of fibrous materials, steady state measurement techniques for heat transfer, transient heat transfer mechanism: thermal insulation properties of fabrics and clothing, effects of garment design, moisture vapour transmission and liquid water transport properties of fabrics and clothing. (9)

PSYCHOLOGICAL COMFORT : Introduction. Assessment of psychological comfort. Factors influencing psychological comfort - colour, surface texture, garment design, size and fit. Aesthetic Properties: Introduction. Influence of fibre, yarn, fabric and processing parameters on pilling, drape, wrinkle recovery and luster. (9)

DURABILITY : Introduction. Influence of fibre, yarn, fabric and processing parameters on abrasion resistance, fabric and garment strength. Dimensional Stability: Introduction. Hygral expansion, relaxation shrinkage, swelling shrinkage and felting shrinkage. Shrinkage in knitted fabrics. Stretch and recovery properties of fabrics. (9)

HANDLE AND TAILORABILITY : Ideal fabric concept. Fabric properties related to tailoring performance. Fabric buckling and formability-Lindsberg theory. Effects of fibre, yarn and fabric properties, dyeing and finishing treatments on handle and tailorability. (9)

Total L: 45

TEXT BOOKS:

1. Fan J and Hunter L , "Engineering Apparel Fabrics and Garments", First, Woodhead Publishing Ltd, Cambridge, 2009.
2. Guowen Song , "Improving Comfort in Clothing", First, Woodhead Publishing Limited, Cambridge, 2011.

REFERENCES:

1. Kothari V K , "Testing and Quality Management", CBS Book Publishers, New Delhi, 2000.
2. Saville B P , "Physical Testing of Textiles", Woodhead Pubilication Limited, Cambridge, 1999.
3. Masaka Niwa , "Clothing Science, its Importance and Prospects", Textile Asia, 2001.
4. Apurba Das and Alagirusamy R , "Science in Clothing Comfort", Woodhead Publishing India Pvt. Limited, New Delhi, 2010.

19T015 PROCESS AND QUALITY CONTROL IN WEAVING

3 0 0 3

PROCESS CONTROL IN WINDING, PIRN WINDING : Importance and Consideration for evolving a System of Process Control. Winding - Quality of Knots and Splices - Quality of package - Winding Performance & Productivity - Control of Hard Waste - Material Handling.Ambient Conditions.Pirn Winding- Improving Build of Pirn - Productivity. Yarn Quality requirements for shuttle and shuttleless looms. (15)

PROCESS CONTROL IN WARPING : Warping and Sectional Warping - Performance - Process Parameters and Productivity. Minimizing End breaks - Quality of Warper'sBeam - Control of Hard Waste - Material Handling – Beam Count. (8)

PROCESS CONTROL IN SIZING : Choice of Size Recipe - Control of Size Pick Up - Yarn Stretch and Moisture. Quality of Sized Beam. Control of Hard Waste - Missing Ends - Dead loss - Productivity. (7)

DRAWING-IN AND WARP TYEING : Quality of Weaver's beam.Control of Cross - Extra - Missing and Buried Ends.Selection and Care of Reeds - Healds and Drop Pins - process parameters of drawing in and Tyeing machines. (8)

PROCESS AND QUALITY CONTROL IN LOOM SHED : Loom Efficiency - Factors influencing loom effiency - Hard Waste - Productivity. Fabric Defects and their Control.Ambient Conditions.Grey Cloth Realisation - Packing % - Benchmarking. (7)

Total L: 45

TEXT BOOKS:

1. Alagirusamy R, Das A, Majumdar A, Kothari V K , "Process Control in Manufacturing", Wood Head Publishing, UK, 2012.
2. Paliwal M C and Kimothi.P D , "Process Control in Weaving", ATIRA Publication, Ahmedabad, 1983.

REFERENCES:

1. BTRA , "Loom Shed", BTRA Publications, Mumbai, 1986.
2. BTRA , "Warping and Sizing", BTRA Publications, Mumbai, 1983.
3. BTRA , "Winding", BTRA Publications, Mumbai, 1986.

19T016 PROCESS AND QUALITY CONTROL IN TEXTILE CHEMICAL PROCESSING

3 0 0 3

INTRODUCTION: : Definition of process control and Quality control. Need for quality control in textile chemical processing. Flowcharts indicating process control and quality control tests to be carried out in textile processing. Analysis of Desizing and Scouring: Inspection of grey fabric. Identification and estimation of residual starch. Determination of weight loss during desizing and scouring. Estimation of residual wax content by Soxhlet extraction method. Estimation of copper number. Determination of cupprammonium fluidity. Determination of acid groups by Methylene blue absorption method. Norms. (8)

ANALYSIS OF BLEACHING AND MERCERISING : Absorbency tests by Drop test method and Wicks method. Determination of ash content. Determination of whiteness and whiteness retention. Determination of caustic soda concentration and silica in peroxide bleach bath. Determination of Barium Activity Number. Determination of fabric shrinkage, luster number and deconvolution count. Norms. (7)

ANALYSIS OF DYEING AND PRINTING : Determination of concentration of caustic soda and sodium hydrosulphite in vat dye liquor. Testing of suitability of thickener in print paste formulation. Analysis of print paste formulation. Colour dispensing system. Norms. (8)

FASTNESS TESTING : Methods of determination of fastness to washing, light, perspiration, rubbing, hot pressing, dry

cleaning, sublimation, bleaching, saliva and sea water. Norms. (7)

COLOUR MATCHING : Definition. Manual colour matching. Single constant (K/S) Kubelka — Munk theory. Spectral match. Tristimulus match. Computer Colour Matching: Concept of computer colour matching (CCM) system. Sample preparation in CCM, Application of CCM system to Textile processing. Colour constancy, theory, visual assessment of colour constancy, colour constancy and metamerism. Analysis of Finishing: Determination of efficiency of water proofing, flame proofing, starching & resin finishing. Estimation of residual formaldehyde present in resin finished fabric. Optical brightener test for uniformity of cross-linking in resin finished fabric. Assessment of degree of heat setting in polyester by Iodine absorption method. Norms. Processed fabric defects. Finished fabric realization. Characterization of industrial textiles. (15)

Total L: 45

TEXT BOOKS:

1. Doshi S M and Shah H A , "Quality and Process Control - Chemical Processing Tablet IX,", The Textile Association, Bombay, 1984.
2. Shenai V A , "Evaluation of Textile Chemicals", Sevak Publications, Bombay, 1990.

REFERENCES:

1. Vaidya A A and Trivedi S S , "Textile Auxiliaries and Finishing Chemicals", ATIRA, Ahmedabad,1985.
2. Indian Standards Institution, New Delhi, 1982.
3. Shah H S and Gandhi R S , "Instrumental Colour Measurements and Computer Aided Colour Matching for Textiles", MahajanPublications, Ahmedabad, 1990..
4. Slater K , "Chemical Testing and Analysis", Textile Progress Vol.25 No.1/2, Textile Institute, Manchester, 1994.

19T017 FUNCTIONAL FINISHES

3 0 0 3

CHEMICAL FINISHING: Importance, methods of chemical finishing. SOFTENING FINISHES: Mechanisms of the softening effect. Types of Softeners. Evaluation methods. Trouble shooting. (9)

HAND BUILDING FINISHES: The hand building effect. Textiles with hand building finishes. Evaluation methods. Non-Slip Finishes: Mechanisms, Application methods and combinability. Evaluation, Trouble shooting. (9)

ULTRAVIOLET PROTECTION AND ELASTOMERIC FINISHES : Mechanism of UV protection. EMI Shielding. Mechanism of elastomeric effect. Evaluation. Trouble shooting. (9)

ANTIMICROBIAL AND BLOOD REPELLENT FINISHES: Mechanism. Properties of an effective antimicrobial and blood repellent finish. Chemicals/agents used and their interaction. Evaluation. Trouble shooting. (9)

NOVEL FINISHES: Anti-odour and fragrance finishes. Mosquito repellent finish. Conductive finish. Finishes using plasma, radiation technologies. Application of nano and biotechnology in finishing. Microencaptulation technique in finishing. Smart textiles by chemical finishing. (9)

Total L: 45

TEXT BOOKS:

1. Schindler W D and Hauser P J , "Chemical Finishing of Textiles", The Textile Institute, Woodhead Publishing Ltd., Cambridge, 2004.
2. Charles Tomasino , "Chemistry & Technology of Fabric Preparation & Finishing", Department of Textile Engineering, Chemistry and Science", College of Textiles, North Carolina State University, Raleigh, 1992.

REFERENCES:

1. Perkins W S , "Textile Colouration and Finishing", Carolina Academic Press, United Kingdom, 1996.
2. Menachem L and Stephen B S , "Handbook of Fibre Science and Technology", Volume II, Part B, Marcel Dekker Inc., New York, 1983.

19T018 GREEN PROCESSING OF TEXTILES

3 0 0 3

ECO STANDARDS AND ECO-LABELS : Regulations concerning azo dyes- banned amines, Pesticides, Heavy metals, Formaldehyde and PCP in textiles. Global eco standards and eco-labels. Ecolabelling: Criteria for an eco-label based on the life cycle. Certification and labeling of ecofriendly textiles. (8)

ECO-TESTING OF TEXTILES : Testing of banned dyes and chemicals in textiles. Principle of Instruments used-Chromatography (HPLC, GC, TLC), Mass Spectrometry and Atomic Absorption/Emission Spectrometry. (9)

ECO-FRIENDLY PROCESSING : Concept of Sustainable Textiles. Alternative methods/chemicals in Pretreatments, Eco-friendly dyes and dyeing & printing, Eco-Friendly Finishing — formaldehyde free finishing, Halogen free finish. Standing bath technique. (8)

ENZYMATIC PROCESSING : Mechanism and activity of enzyme. Enzymes in preparatory processes. Enzymes used in

printing and finishing. Enzymes for surface modification. (8)

ADVANCED PROCESSING TECHNIQUES : Dry processing. Mechanism of plasma treatment. Surface modification by VUV irradiation. Laser. Super critical carbon dioxide processing, Ultrasonic dyeing. Concept of low level application of chemicals. (12)

Total L: 45

TEXT BOOKS:
1. Jamshed A Khan , "Eco-Friendly Textile Dyeing and Finishing", Scitus Academics LLC, 2016.
2. Richard Blackburn , "Sustainable Textiles", Woodhead Publishing, 2009.

REFERENCES:
1. Miraftab M and Horrocks AR , "Eco Textiles", The Textile Institute, UK, 2007.
2. Ryszard Kozlowski, Georg M, Guebitz, Artur Cavaco-Paulo , "Biotechnology in Textile Processing", CRC Press, 2006.
3. Chi-wai Kan , "A Novel Green Treatment for Textiles: Plasma Treatment as a Sustainable Technology", CRC Press, 2015.
4. Mohd Shabbir , "Textiles and Clothing: Environmental Concerns and Solutions", Wiley, 2019.

19T019 COLOUR SCIENCE, MEASUREMENT AND APPLICATIONS

3 0 0 3

LIGHT AND COLOUR : Properties of light-reflection, refraction, transmission, absorption and scattering. Colour Perception: The nature of colour-The physical basis of colour, The human colour vision system. Hue, Luminosity, Lightness, Saturation, Reducing power and Opacity. (9)

COLOUR DESCRIPTION : Colour primaries and colour mixing, additive and subtractive colour mixing, colour specification, colour order systems — Munsel colour order system and Ostwald colour order system. (8)

COLOUR MEASUREMENT OF SUBSTRATES : Principle. Spectroscopic reflectance measurement. Computation of tristimulus values, K/S value. Kubelka-Munk Theory. CIE standard illuminants and observer. Measurement of fluorescence, whiteness and yellowness indices. (8)

COLOUR MATCHING AND DIFFERENCES : Definition. Manual, Instrumental colour matching, spectral match, tristimulus match. CIELAB and CIELCH colour space. Computation of colour difference. Influence of moisture content on colour matching. Metamerism in colour matching. (8)

COLOUR MEASUREMENT OF LIQUIDS AND RECIPE PREDICTION : Principle. Measurement of absorption and transmission value, Calibration graph, Determination of concentration of colorants, application of Beer-Lambert"s law. Computer colour matching in recipe prediction. Advantages and limitations. (12)

Total L: 45

TEXT BOOKS:
1. Gulrajani M L , "Colour Measurement: Principles, Advances and Industrial Applications", Woodhead Publishing Ltd, Cambridge, 2010.
2. Xin J , "Total Colour Management in Textiles", Woodhead Publishing Limited, Cambridge, 2006.
3. McDonald R , "Colour Physics for Industry", Woodhead Publishing Limited, Cambridge, 1997.

REFERENCES:
1. Volz H G , "Industrial Colour Testing — Fundamentals and Techniques", VCH, 1994.
2. Lucas.J , "Colour Measurement — Fundamentals — Vol. I", Eurotex, 1996.
3. Shah H S, and Gandhi R S , "Instrumental Colour Measurements and Computer Aided Colour Matching for Textiles", Mahajan Publications, Ahmedabad, 1990.
4. Mc Laren K , "The Colour Science of Dyes and Pigments", Adam –Hilger, Bristol, UK, 1983.
5. Peters A T and Freeman, H S , "Physio –Chemical Principles of Colour Chemistry", Blackie, 1995.

19T020 THEORY OF COLOURATION

3 0 0 3

PHYSICAL CHEMISTRY OF DYEING : Thermochemistry — Thermodynamics of solutions. Theories of ionisaiton. Law of independent ionic migration. Acidity and alkalinity of aqueous solutions. Surface chemistry. Adsorption at dye bath–fibre interfaces. Kinetics of chemical reactions. (9)

DYE – FIBRE BONDS : Surface energy and Interfacial effect. Intermolecular forces — Hydrophobic interaction. Identification of dye –fibre forces — Dyeing mechanisms. Specific dye –fibre bonds. Fibre Structure on Dye Uptake- Fibre structure. Classification of dyeing systems. Heat treatment. (9)

THERMODYNAMICS OF DYE SORPTION : Activity of a dye — Substantivity, Aggregation of dyes. Heat of dyeing. Dyeing

at Equilibrium. Donnan Membrane effect. Fick"s laws of diffusion - diffusion in anisotropic media, steady state and non-steady state, boundary layers in diffusion, diffusion in finite baths. (9)

RESPONSE OF FIBRES TO DYEING PROCESSES : Dyeing phenomena and the molecular organisation of the fibre. Temperature and physical properties of man-made fibres . WLF equation. Solubility parameter concept and dyeing, swelling of fibres and plasticisation. (8)

REACTIVE DYE - FIBRE SYSTEMS : Dye-fibre reactions- Reactive dyes — Structure and classification of reactive dyes, mechanism of reaction with textile fibres and water. Efficiency of reactive dyeing. Reactive sites in textile fibres. Methods for identification of dye reactive sites. (10)

Total L: 45

TEXT BOOKS:

1. Bird.C L , Boston W S , "The Theory of Colouration of Textiles", Dyers Company Publications Trust, 1975.
2. Johnson A , "The Theory of Colouration of Textiles", SDC, 1990.

REFERENCES:

1. Trotman E R , "Dyeing and Chemical Technology of Textile Fibres", Charles Griffin & Company Limited, 1984.
2. Arthur D. Broadbent , "Basic Principles of Textile Coloration,", Bradford, 2001.

19T021 DESIGN CONCEPT OF TEXTILE MACHINERY

3 0 0 3

PRINCIPLE OF MACHINE DESIGN : Machine system - definition, structure & properties. Design process - procedural model for machine design, selection of manufacturing process and machine tools. Materials: factors determining choice of materials, major types & properties of materials used in textile machineries. Heat treatments and finishing of textile machine parts. Form Design: Factors affecting form design and their influence on form design. (9)

SPINNING PREPARATORY : Evolution of blowroom machinery. Conceptual design of bale openers, feeders, beaters & cleaners, scutcher and chute feed. Profile design and materials selection. Design concept of high production cards: skeleton - licker-in , cylinder , flats, rotary web doffing, coilers, suction. Conceptual design of drafting system in draw frame. Auto leveller design for draw frames. Design concept of high speed fly frames: creel, builder motion spindle, flyer, drafting system, shore hardness requirements. (9)

RING AND ROTOR SPINNING : Structure of ring frame - spinning geometry , high speed rings and travellers, selection of traveller profile, polishing and coating details, spindle, package size, drafting system. Design of machine drive. Design of open end spinning - feed Roller, opening rollers, wires, drive, rotor, transport tube, naval, take up system design. (9)

WEAVING PREPARATORY : Design of machine structure - winding drum, drives, stop motions, tensioning system, automatic splicing, doffing unit. Warping and sizing machines- Design of drive, stop motion , creel, drying cylinder design, beam winding mechanism. (9)

LOOMS : Frames, tappet shedding, shuttle picking, crank and cam beat up mechanism - drive - let-off - backrest - heald frames - take-up - cloth winding. Design of rigid & flexible rapier -drives. Design of Air-Jet & water jet nozzles, sub nozzles, relay nozzles, confusers. (9)

Total L: 45

TEXT BOOKS:

1. Shigley, Mischke , "Mechanical Engineering Design", Mc Graw Hill, New Delhi, 2000.
2. Klein W G , "The Technology of Short Staple Spinning, Vol. 1 to 5", Textile Institute, Manchester, 2002.

REFERENCES:

1. Robert L Mortan , "Machine Design- An Integrated Approach", Pearson, New Delhi, 2003.
2. Talavasek O, Svaty V , "Shuttleless Weaving Machines", Elsevier Scientific, New York, 1981.
3. Gordeev V , "Cotton Weaving", Mir, Moscow, 1987.
4. Granovsky T , "Repair and Adjustment of Textile Machines", Mir, Moscow, 1986.

19T022 COMPUTER APPLICATIONS IN TEXTILES

3 0 0 3

INTRODUCTION : Applications of electronics principles in Spinning, Weaving, Chemical Processing, Apparel machineries and Testing—CCM, HVI, AFIS, UTM. (9)

CONTROL AND SIGNALS FOR TEXTILE MACHINARIES : Machinery material flow and its variation controls — Feeders & Stop motions — Auto levelers — safety switches. SENSORS: Types — Applications in textile machines and testing instruments. (9)

IMAGE PROCESSING : Elements of Digital Image Processing - Principle of Human eye, CCD camera - Image

formation and measures. Pre-processing techniques, image transforms - enhancement - restoration — encoding. Image analysis and feature extraction methods — Application of image processing to textile process/product feature extraction. (9)

ARTIFICIAL NEURAL NETWORKS : Basic concept - Knowledge based Neural Networks - Application of ANN - Fuzzy logic in fabric care, pattern recognition, prediction of clothing performance, garment manufacturing. (9)

CAD / CAM / CIM IN TEXTILES : Basics - concepts of CAD / CAM / CIM. CAD in Designing, CAM in Garment Manufacturing - Hardware, software and pattern production. Concepts of data systems, MIS and ERP. (9)

Total L: 45

TEXT BOOKS:

1. Berkstresser G A. Grady P and Buchanan.D R , "Automation in the Textile Industry from Fibres to Apparel", The Textile Institute, Manchester, 1995.
2. Gordon A Berkstresser , "Automation and Robotics in the Textile and Apparel Industries", Noyers Publication Park Ridge, 1996.

REFERENCES:

1. Book of papers presented at Hongkong conference , "Computers in the world of textiles", Textile Institute, UK, 1984.
2. Summer School , "Computer applications in Textiles", ISTE, VJTI, Mumbai, 1981.
3. All India seminar , "Institution of Engineers (India)", Coimbatore Centre, 1983.
4. Gonzalez .R.C & Wintz.P , "Digital Image Processing", Wesley Publishing Co, Singapore, 1987.

19T023 KNITTING MECHANICS

3 0 0 3

KEY DEVELOPMENTS IN CIRCULAR WEFT KNITTING : Needle Selection Techniques in weft knitting - storage and positive feeding devices - Patterning for multitrack machines. Ring and rotor yarn quality requirements for weft knitting - Garment length - High Pile and Socks Knitting Machines. (10)

KNITTING DYNAMICS : Yarn tension and knitting forces - effect of cam shape, increase in number of feeders and increase in linear speed - needle breakages. Fabric Geometry and Properties: Tightness factor - Dimensional properties - Spirality - Relaxation - shrinkage. (9)

WARP KNITTING : Tricot & Rachel - Two, Three & Multibar Machines - Pattern Control Mechanisms – Pattern Wheels and Chain Links. (8)

FABRIC GEOMETRY : Dimensional characteristics of warp knits, Warp knitted fabric geometry - relation between loop length and construction - fabric relaxation and shrinkage. (9)

SPECIALITY WARP KNITS : Weft insertion - co-we-nit - cut presser — Laying-in - fall plate — double needle bar warp knitting machines — Jacquard knitting. Warp knitted technical textiles.Testing and Quality Control of Weft and Warp knitted fabrics. Various defects in knitting and their remedies. (9)

Total L: 45

TEXT BOOKS:

1. Spencer D J , "Knitting Technology", Pergamon Press, 1988.
2. Raz S , "Warp Knitting Technology", Verlag Melliand Textilberchte, Heidelberg, 1987.

REFERENCES:

1. Gottlieb N , "The Production and Properties of Warp Knitted Fabrics", Textile Progress, Vol.7, 1975.

19T024 TEXTILE MACHINERY MAINTENANCE

3 0 0 3

OBJECTIVE OF MAINTENANCE : Types of maintenance - organizational structure - duties of maintenance personnel. Systems and procedures of maintenance - Need for systems and procedures - planning - scheduling - controlling - implementation of planned maintenance - backlogs and rescheduling. (9)

MAINTENANCE IN SPINNING : Maintenance schedule - blow room - carding - drawing - comber - simplex - ring fram e - doubling - OE machines. Card clothing - wire inspection - grinding machines - grinding procedure - burnishing - wire mounting and tops clipping - flat end milling. Cots - top roller cots maintenance - cot selection and cot mounting - buffing frequency - berkolising - cot life - top roller greasing. Roller eccentricity - reasons - control - tolerance for drafting rollers. Spindle - Spindle oil characteristics - specifications - topping - replenishing. Lubrication - types - characteristics - equipments - lubrication schedule for various machines in a spinning line. (9)

MAINTENANCE IN WEAVING PREPARATORY, WEAVING AND PROCESSING : Weaving preparatory - maintenance schedule for cone winding - reeling - bundling & baling - warping - sizing - pirn winding. Loom - plain and auto loom s - shuttle care - selection - seasoning - life of shuttle. Picker - picking bands - healds - heald frames. Maintenance of reeds - reed

cleaning - rectification of damages in pitch-bound and all metal Reeds. Drop wires - types and maintenance. Weft feeders and accumulators - dobby maintenance - Jet nozzle maintenance in shuttleless weaving machine. Processing - kiers - washing machines - stenters - jiggers - padding mangles - calendaring machines. (9)

MAINTENANCE OF POWER HOUSE, HUMIDIFICATION & COMPRESSORS : Electrical power house equipments - motors - starters - lightings - humidification plant. Generator - air compressor - bearing care & maintenance. (9)

MACHINE ERECTION PROCEDURES AND MODERNISATION : Leveling instruments. Erection of carding machine - ring frame - looms. Modemisation and renovation: economics - priorities - modemisation versus replacement - policy decision factor. Modemisalion programs for carding - simplex - ring frame - sizing and loom. HOUSE KEEPING: Machinery layout, cleanliness, material handling and equipments. Machinery Audit - maintenance recording, maintenance ledger, machine cards· Maintenance cost control. Co-ordination of SQC department with maintenance department. (9)

Total L: 45

TEXT BOOKS:

1. Nijjawan N and Nijjawan R , "Modern approach to Maintenance in Spinning", Woodhead, UK, 2010.
2. Ratnam T V, Ramachandran M, Narayanaswamy G , "Maintenance Management in Spinning", SITRA, Coimbatore, 1977.

REFERENCES:

1. Joshi B B, Vora K B, Chetvani H G , "Spinning, Weaving, Processing machinery maintenance in Textile Mills", TAIRO, Baroda, 1971.
2. Maintenance Schedules , "Practices and Checkpoints in Spinning", BTRA, Bombay, 1979.

19T025 TEXTILE MACHINE DRAWING

3 0 0 3

CONVENTIONS : Code of practice for engineering drawing. Methods of dimensioning. Conventional representation of details - drilled and tapped holes, countersunk and counter bored holes, internal and external threads, undercuts, grooves, chamfers, fillet radii, key, key ways, bearings, gears, springs, belt, chains, wire. (9)

ASSEMBLY CONCEPTS : Methods and concepts of assemblies. Assembly requirements - methods of assembly using bolts, nuts, studs, screws and pins. Methods of arresting motion of a member inan assembly. (9)

FITS AND TOLERANCES : Types-representation of tolerances on drawing - calculation of minimum and maximum clearances and allowances, geometric tolerances, uses. Types of form and position tolerances — symbols, method of indicating geometric tolerances on part drawings, surface finish symbols, methods of indicating the surface roughness and special treatments. (9)

ASSEMBLY DRAWING PRACTICE : Preparation of assembly drawing and part drawings with necessary production details for assemblies like, keyed joints, Plummer block, roller stand, rotor assembly, spindle, cone holder, loom crank and connecting arm assembly. (9)

COMPUTER LABORATORY : Modelling Practice using Pro E. (9)

Total L: 45

TEXT BOOKS:

1. Gopalakrishnan K R , "Machine Drawing", 18th Edition, Subhas Stores, Bangalore, 2004.
2. Varghese P I, John K C , "Machine Drawing", Jovas, Delhi, 1993.

REFERENCES:

1. French, Svensen, Helsel, Urbanick , "Mechanical Drawing", 10th Edition, Mc Graw Hill, 1990.

19T026 APPAREL MARKETING AND MERCHANDISING

3 0 0 3

MARKETING MANAGEMENT AND MARKETING STRATEGIES : Defining Marketing, Core Marketing Concepts, Marketing Environment, Company Orientation towards the Market Place, marketing mix, Demand states and marketing tasks. Market Strategy - Value-delivery process, Strategic planning — intensive, integrative and diversification growth strategies. (9)

DEMAND MEASUREMENT, MARKETING RESEARCH & CONSUMER BEHAVIOUR : Market Demand - Estimating current demand and future demand. Market Research - Scope of Market Research, Marketing research process. Consumer behavior - Factors influencing consumer behavior, buying decision process. (9)

BUILDING BRANDS AND PRODUCT DEVELOPMENT : Market Segmentation: Segments of consumer markets, Market targeting, Brand Positioning — developing and establishing brand positioning. Product life cycle marketing strategies. roduct characteristics and classification, Differentiation, Product hierarchy, Product system and mixes. (9)

PRICING STRATEGIES, MARKETING COMMUNICATIONS AND MARKETING CHANNELS : Steps in price setting. Price

adaptation strategies. Marketing communications- Role of Marketing communications, Marketing communications mix. Developing effective communications. Marketing organization. Channel functions, flows and levels. Retailing and wholesaling — types, marketing decisions and trends. Market Logistics – objectives and decisions. (9)

MERCHANDISING AND MATERIALS SOURCING : Dimensions of product change. Nature and timing of merchandising responsibilities — line planning, line development and line presentation. Role of sourcing in an apparel industry. Materials sourcing processes - selection of fabrics, predicting aesthetics and performance and evaluation of fabric quality. Production strategies and concepts. Production planning - Determining sources of production. Production sourcing priorities and processes. (9)

Total L: 45

TEXT BOOKS:

1. Philip Kotler and Kevin Keller , "Marketing Management", 15th Edition, Pearson India Education Services Pvt Ltd, New Delhi, 2016.
2. Ruth E.Glock and Grace I.Kunz, "Apparel Manufacturing — Sewn Product Analysis", 4th Edition, Prentice Hall, New Jesey, 2004.

REFERENCES:

1. Virginia Grose , "Fashion Merchandising", 1st Edition, AVA Publishing, Switzerland, 2012.
2. Mike Easey , "Fashion Marketing", 1st Edition, A John Wiley & Sons Ltd Publication, United Kingdom, 2009.
3. Kiefer Lee, Steve Carter , "Global Marketing Management", 3rd Edition, Oxford University Press, United Kingdom, 2012.
4. Gerald Albaum, Edwin Duerr , "International Marketing and Export Management", 7th Edition, Pearson Education Limited, England, 2011.

19T027 APPAREL QUALITY EVALUATION AND STANDARDS

3 0 0 3

QUALITY CONTROL IN RAW MATERIAL, SPREADING, CUTTING AND BUNDLING : Raw material - Purchasing specifications, Testing and Inspection of raw materials, fabric inspection system-sewing threads-Zippers-Buttons-Interlining. Spreading - requirements, Properties of fabrics, Plaids and naps, Tension in spreading fabrics. Cutting & Bundling - Quality factors in cutting and drill- Bundling and ticketing as related to quality. (8)

STITCH AND SEAM QUALITY MEASUREMENT : Stitch size- Stitch tension-Seam elasticity and elongation- Fabric distortions - Seam size- Seam slippage and Seam strength Fabric Sewability- Principles for Selecting proper stitch and seam types. Control of sewing, seaming and assembly defects-In process inspection in sewing. (8)

QUALITY CONTROL IN FINISHED GARMENTS, PRESSING AND PACKAGING : Visual inspection and definition of defects and tolerance- Method of measuring. Pressing - Quality requirement for pressing operation, Packaging - Quality control in functional package for apparel, Merchandise package, Stock storage, Shipping package, Warehousing. (8)

CARE LABELLING OF APPAREL : American Care labelling System-British Care Labelling System- International Care Labelling System- Canadian Care Labelling System- Japanese Care labelling System -Symbols and meanings. (6)

STATISTICAL SAMPLING : Acceptable Sampling- Acceptable Quality level (AQL)- Single sampling- Double Sampling. Quality Control Tools and Management in Garment Industry: Managing quality- Seven tools of quality control — Flowcharts, Control charts, Cause and Effect diagrams, Pareto charts, Check sheets, Histogram and scatter diagram. Quality management - ISO series of standards- Introduction to TQM-Concepts of TQMKaizen–Benchmarkingtechniques. (15)

Total L: 45

TEXT BOOKS:

1. Solinger Jacob , "Apparel Manufacturing Hand book - Analysis , Principles and Practice", Columbia Boblin Media Corp, New York, USA, 1991.
2. Mehta Pradip V , "An Introduction to Quality Control for Apparel Industry", ASQC Quality Press, 1992.

REFERENCES:

1. Nambiar N M P , "A Guide on ISO 9000", Systems and Resources, India, 1994.", 1994.
2. Samuel K H , "Encyclopedia of Management - TQM", Vol 3, Crest Publishing House, India, 1999.

19T028 APPAREL PRODUCTION PLANNING AND CONTROL

3 0 0 3

PRODUCTION CONTROL : Definition - objectives of production control - co ordination of production control department to the manufacturing organizations other departments. Pre production functions - product acceptance - steps from prototype to production model - order requirements. (9)

PLANNING IN CUTTING DEPARTMENT : Cut order planning - types of spreads - spreading methods – marker utilization - economic cut quantities. Control forms in cutting department. (9)

PLANNING IN SEWING DEPARTMENT : Production systems-whole garment production system - progressive bundle system - unit production system - multiple flow system - modular system.principles for choosing suitable production system. Evaluation of garment production systems. FLOW PROCESS GRID : Garment breakdown with machine & attachment details - Flow process grid construction - flow process grids for production control. Control forms in production department. (9)

PLANT LOADING AND CAPACITY PLANNING : Determination of machinery requirements for a new factory - calculation of labour requirements - application of line balancing techniques - balance control. Establishing factory capacity - planning for multi style production - preparation of planning board. (9)

PRODUCTION SCHEDULING : Principles of scheduling - scheduling charts - GANTT chart - backlog graph - scheduling control techniques. Network representations - CPM and PERT. (9)

Total L: 45

TEXT BOOKS:

1. Jacob Solinger , "Apparel Manufacturing Handbook-Analysis, Principles and Practice", Columbia Boblin Media Corp., USA, 1988.
2. Rajesh Bheda , "Managing Productivity of Apparel industry", CBI publishers and distributors, New Delhi, 2002.

REFERENCES:

1. Chuter AJ , "Introduction to clothing production management", Blackwell Publishing, UK, 2004.
2. Patty Brown and Janett Rice , "Ready To Wear Apparel Analysis", Prentice Hall, India, 1998.
3. Glock R E and Kunz G I , "Apparel Manufacturing - Sewn Product Analysis", Prentice Hall, New Jersey, 1995.
4. David J Tyler , "Materials Management in Clothing Production", Prentice Hall, New Jersey, 1991.

19T029 APPAREL PRODUCT ENGINEERING

3 0 0 3

INTRODUCTION: Textile engineering attributes and concepts. Textile product development — basic concepts and critical factors. Textile product design — conceptualization and analysis. Fibre Selection: Structure, characteristics and types of fibre for textile and apparel product design. (9)

YARN SELECTION: Structure and types of yarn for textile and apparel product design. Design-related aspects of yarn structure. Case studies. (9)

FABRIC SELECTION: Types of fabric for textile product design. Fabric performance characteristics. Fabric attributes — structural, mechanical, hand-related and transfer. Finishing Processes: Introduction. Yarn finish. Fabric finish. Coating and lamination. Criteria for selection of finish for textile and apparel product design. Case studies. (9)

PRODUCT DEVELOPMENT: Development of denim product, sportswear, extreme climate clothing and fire fighter protective clothing – performance characteristics and related attributes. Case studies. (9)

ANALYSIS OF APPAREL PRODUCT DEVELOPMENT: Role of product analysis -professional garment analysis and methods of garment analysis. Processes of product analysis — product positioning strategy, sizing and fit, materials selection, garment structure and garment presentation. Professional perspectives on product developments. (9)

Total L: 45

TEXT BOOKS:

1. El Mogahzy. Y , "Engineering Textiles: Integrating the Design and Manufacture of Textile Products", First, Woodhead Publishing Ltd, Cambridge, 2009.
2. Fan J and Hunter.L , "Engineering Apparel Fabrics and Garments", Woodhead Publishing Ltd, Cambridge, 2009.

REFERENCES:

1. Mastudaira T., and Suresh M.N , "Design Logic of Textile Products", Textile Institute, Manchester, 1997.
2. Ruth E.Glock and Grace I.Kunz, "Apparel Manufacturing — Sewn Product Analysis", Prentice Hall, New Jersey, 2000.

19T030 ERGONOMICS IN TEXTILE AND GARMENT INDUSTRY

3 0 0 3

ERGONOMICS DEVELOPMENT : Definition, ergonomic knowledge, history, therblig's list, standards. Divisions of ergonomics: Categories of ergonomics, physical ergonomics, cognitive ergonomics, organizational ergonomics. Examples from textile and apparel industry. (10)

TYPES OF ERGONOMICS : Conceptual ergonomics, system ergonomics, corrective ergonomics, software ergonomics, hardware ergonomics. Micro-ergonomics and macro-ergonomics. Suitable examples from textile and apparel industry. (8)

ERGONOMIC CONDITIONS OF WORK : Physiological conditions, Psycho-sociological conditions: motivation, fatigue, monotony and stress. Anthropometric conditions, biomechanics, Ecological conditions. Suitable examples from textile and apparel industry. (9)

ERGONOMIC PRINCIPLES : Ergonomic principles in designing workplace: analysis of workplace, analysis of movement, standing workplace, sitting workplace. Designing working processes, determining working time, handling materials and tools, designing environment. Examples from textile and apparel industry. (9)

ERGONOMIC DESIGN OF WORK PLACE IN TEXTILE INDUSTRY : Ergonomics in storage of textile materials, ergonomics workplace in spinning, weaving and garment industries, warehouse and distribution, clothing store, maintenance workplace. (9)

Total L: 45

TEXT BOOKS:

1. Gordana Colovic , "Ergonomics in the Garment Industry", Woodhead publishing, India, 2014.
2. Bridger R S , "Introduction to Ergonomics", Mc Graw-Hill, International, New York, 2002.

REFERENCES:

1. David J Oborne , "Ergonomics at work", John- Wiley & Sons International, New York, 1995.
2. Stephen Pheasant , "Ergonomics-Work and Health", Macmillan Company, London, 1991.
3. Khan M I , "Industrial Ergonomics", PHI Learning, New Delhi, 2010.

19T031 TOTAL QUALITY MANAGEMENT

3 0 0 3

QUALITY MANAGEMENT : Relationship between TQM and corporate strategy. The TQM axioms. Deming's message: Deming's 14 points on quality management, Five DDs, Deming's cycle. Juran's message-Juran quality trilogy. Crosby's message-Crosby's quality Vaccine, Crosby's 14 steps for quality improvement. Ishikawa'smessage,Shingo's message & Kondo's message. (9)

TQMEX : TQMEX model, 5-S practice, Business process reengineering, quality control circle, quality management system,total productive maintenance. Pre-requisites for implementing TQMEX: Ten commandments,four pillars of TQM,four Cs of TQM. Kaizen-Strategy and practices. Applications in Textiles in Apparel industries. (9)

TOOLS AND TECHNIQUES IN TQM : Statistical Quality Control – process capability and performance. Seven quality improvement tools. Taguchi method, The six sigma principle – steps to six sigma. Benchmarking – types. Quality Function Deployment (QFD). (9)

MANAGEMENT SYSTEMS FOR TQM : ISO 9000 system — concepts, benefits and classifications. Requirements ISO 9001, implementation methodology for ISO 9000. ISO 14000 — triggers for adopting Environment Management System. Contents of ISO 14001 standard. (9)

STRATEGIC QUALITY MANAGEMENT : Principles of quality management. Quality planning road map. Quality dimensions for sustained success. Strategic planning process. Quality and strategic planning. Applications in Textiles and Apparel industries. (9)

Total L: 45

TEXT BOOKS:

1. Dale H.Besterfield , "Total quality Management", Third, Pearson, New Delhi, 2012.
2. Samuel K Ho , "TQM An Integrated Appraoch", Crest, New Delhi, 2002.

REFERENCES:

1. Juran J M, Gryna, F M , "Quality Planning and Analysis - From Product Development Through Use", Tata McGraw Hill, New Delhi, 2001.
2. Subburaj Ramasamy , "Total Quality Management", Tata McGraw Hill, New Delhi, 2012.
3. Tauseef Aized , "Total quality management and six sigma", First, Intech Prepress, Croatia, 2012.
4. Juran M, Blanton Godfrey , "Juran's quality handbook", Five, MC Graw hill, New york, 1998.

19T032 INDUSTRIAL ENGINEERING

3 0 0 3

IE CONCEPTS AND WORK STUDY : Evolution, pioneers, techniques, role of Industrial Engineer. WORK STUDY: Purpose, techniques and procedure. (9)

METHOD STUDY : Approach, Procedure, Recording techniques - Left hand & right hand chart, flow diagram, flow chart, string diagram, process flow chart, multiple activity chart, travel chart, SIMO chart. Principles of motion economy, Motion study –therbligs. (9)

WORK MEASUREMENT : Techniques. Time study - equipments, procedure, Rating concepts, standard data, Work sampling, Incentive Wage System. PTMS, MTM. Case studies in textile and apparel industries. SMV / SAM-Calculations, General Sewing Data (GSD). (9)

PRODUCTIVITY AND LINE BALANCING : Productivity - terms and analysis in textile and apparel industry. Line balancing in apparel industry - Objectives, procedure, techniques, line efficiency, applications. (12)

LAYOUT AND DESIGN OF WORKPLACE : Layout –Types, Selection, planning. Design of Workplace, Working Processes, Working Environment. (6)

Total L: 45

TEXT BOOKS:

1. ILO Geneva , "Introduction to Work Study", Universal Publishing Corporation, Mumbai, 2006.
2. Khanna O P , "Industrial Engineering & Management", Dhanpat Rai & sons, New Delhi, 2004.

REFERENCES:

1. Ruth E Glock, Grace I Kunz , "Apparel Manufacturing — Sewn Product Analysis", 1st Edition, Prentice Hall, New Jersey, 2004.
2. Rajesh Bheda , "Managing Productivity of Apparel industry", 1st Edition, CBS Publishers and Distributors, New Delhi, 2002.
3. Jacob Solinger , "Apparel Manufacturing Hand Book - Analysis Principles and Practice", 1st Edition, Boblin Media Corp, Columbia, 1991.
4. Dudeja V D , "Management of Textile Industry", 1st Edition, Textile Trade Press, Ahmedabad, 1981.

19T033 ENERGY MANAGEMENT IN TEXTILE INDUSTRY

3 0 0 3

ENERGY SOURCES : Limitations of Natural resources. Types of energy sources used in textile industry. Unexploited energy sources and problems in their exploitation. Energy exploration from various sources. (9)

ENERGY CONSUMPTION PATTERNS : Present energy consumption trends, Growth and Demand pattern. Energy use in production processes — Fibre production, Spinning, Textured yarn production, Weaving, Knitting, Dyeing and Finishing, Clothing Manufacture. Energy use in Auxillary Machinery — Boiler, Humidification plants, compressors. Energy & Material Balance Diagram. (9)

ENERGY AUDIT AND PERFORMANCE INDICATORS : Objectives. Types of Audit. Instrumentation and Methodology of conducting Audit. Analysis of Energy Audit Data. Specific Energy Consumption (UKG), Specific Water Consumption, Specific Fuel Consumption, Specific Steam Consumption. Cross — Country Comparisons of energy usage — Developed & Developing Nations. Benchmarking. Impact on environment. Policy options for promotion of Energy Efficient and Environmentally Sound Technologies. (9)

ENERGY CONSERVATION MANAGEMENT TECHNOLOGIES : Organizational rationalization, Improving the efficiency of usage of Electricity Fuel and Steam. Utilization of heat exchanger. Case Study : Benefits of energy efficient technologies / equipments- Fibre to fabric. Economics with payback period. (9)

UNCONVENTIONAL ENERGY CONSERVATION TECHNIQUES IN WET PROCESSING : Applications of Ultrasound, Plasma, RF Waves, Infra Red, Supercritical fluid, Electrochemical techniques. Economics with payback period. (9)

Total L: 45

TEXT BOOKS:

1. Sang Yong Kim, Grady P L, Hersh S P , "Energy Consumption and Conservation in the Fibre Producing and Textile Industry", Vol. 13, No. 3, Textile Progress, 1983.
2. Proceedings , "Energy Conservation in Textile Industry", UNIDO, MITI,1992.

REFERENCES:

1. TERI , "Energy Data Directory and Yearbook", Tata Energy Research Institute Publication, New Delhi, 1997/98.
2. SITRA Focus , "Energy Conservation Measures in Spinning Mills", Vol. 16, No. 6, SITRA, Coimbatore, 1999.
3. NITRA , "Norms for the Textile Industry", NITRA, Ahmadabad, 1991.

19T034 TEXTILE COSTING AND COST CONTROL

3 0 0 3

FUNDAMENTALS OF COSTING : Elements of cost, Cost Centre, Classification of Cost, Cost Allocation, Cost Apportionment, Cost Absorption, Methods of costing, Cost Sheet, Costing Procedure. (9)

COST VOLUME PROFIT ANALYSIS AND BUDGETING : Breakeven Analysis, Margin of Safety, Relevant Costs in Decision Making, Budgeting and Budgetary Control –Function Budget, Cask Budget. (9)

COSTING IN SPINNING INDUSTRY : Yarn realization statement, Classification of wastes, Mixing Cost, Clean Cotton Cost - Conversion cost. Blended Yarn Costing. Labour Cosr and Power cost estimation. Spinning Mill Cost Sheet. Cost Control and Cost Reduction in Spinning. (10)

COSTING IN WEAVING KNITTING AND PROCESSING INDUSTRY : Calculation of Yarn requirements for weaving and knitting, Cost Sheet- Weaving, Knitting, Cost centre wise conversion — Warping, Sizing, Weaving. Cost Control and Cost Reduction in Weaving and Knitting. (9)

COSTING IN GARMENT INDUSTRY : Estimating of cost of process loss in preparatory, cost of printing and dyeing of fabric. Calculation of fabric and accessories requirement for garment, Sewing Thread Consumption, Conversion cost- Cutting, Sewing and Other Expenses. (8)

Total L: 45

TEXT BOOKS:

1. Bhave P V, Srinivasan V , "Cost accounting in textile mills", 1st Edition, ATIRA, Ahmedabad,India, 1974.
2. Thukaram Rao M E , "Cost and management accounting", 1st Edition, New Age International, Bangalore, Karnataka, 2004.

REFERENCES:

1. Shinn William , "Elements of Textile Costing", 1st Edition, School of Textiles,, North Carolina state, 1965.
2. Jain IC , "Cost accounting-An introduction", 1st Edition, Prentice Hall, NewDelhi, 2001.
3. Ratnam T V , "Cost control and costing in spinning mills", 1st Edition, SITRA-Seshan printers, Coimbatore, India, 1992.
4. Varma H K , "Costing in Textile Industry", 1st Edition, Dhanpat Rai publications, New Delhi, 1965.

19T035 MANAGEMENT OF TEXTILE AND CLOTHING INDUSTRY

3 0 0 3

TEXTILE INDUSTRY : Indian Textile and clothing industry scenario, procedure to set up a new textile/apparel unit. Industry Layout, selection of site, working environment, SWOT analysis of Indian Textile Industry, WTO, Free Trade Agreement, Textile Policy, Five-year plan applicable to textile industry, promotional schemes announced by central and state Government. Roles and responsibilities of Service organizations. (9)

PRODUCTION MANAGEMENT : Production Planning for Textiles, Productivity analysis and its control in spinning and weaving. Production planning and control- Operational chart & PERT, Inventory control, ERP: Application of ERP in Textile Industry-SAP. (9)

INDUSTRIAL ENGINEERING AND PERSONNEL MANAGEMENT : Techniques of work study-method study and work measurement with case studies. Principles of motion economy, ergonomics, Materials handling equipments. Functions of Personnel management & time office. Basics of labour legislation, Trade union and its function. Wage and salary administration. (9)

FINANCIAL MANAGEMENT AND TEXTILE COSTING : Financial Management-concept,scope,functions,financial management cycle, sources of finance, Accounting-branches functions ,rules of accounting , accounting process, Accounting statements. Textile Costing: Elements of costing, Methods of textile costing. Cost system, costing of yarn, cloth and garments. (9)

MANAGEMENT TOOLS : Concept of Total quality Management-5 S, Business process reengineering, Quality circle, Quality management system, environmental management system, Total productive maintenance. Kaizen, Management information system, Supply chain management. (9)

Total L: 45

TEXT BOOKS:

1. Rattan JB , "Modern Textile Management", Abhinav, Chandigarh, 2008.
2. Khanna OP , "Industrial Engineering and Management", Dhanpat Rai, NewDelhi, 2017.

REFERENCES:

1. Purushothama B , "Training and development of technical staff in the textile industry", Wood head, NewDelhi, 2012.
2. Ormerod.A , "Management of Textile Production", Buttorworth, London, 1979.
3. Maheshwari SN , "Principles of management accounting", Sultan Chand & sons, New Delhi, 2014.
4. William Lanen, Shannon Anderson, Michael Maher , "Fundamentals of cost accounting", Five, Mc Graw hill, NewDelhi, 2017.

19T036 JOINING TEXTILES

3 0 0 3

MATERIALS AND THEIR JOINING REQUIREMENTS : Characteristics of natural, synthetic and high performance fibres. Characteristics of woven, knitted and non-woven fabrics. Joining fabrics: seams and stitches. Stitching in practice: the case of high performance fabrics. Alternative methods of joining fabrics: welded seams. (8)

THE QUALITY AND PERFORMANCE OF SEWN SEAMS : Seam strength. Seam extensibility and recovery. Seam puckering. Seam slippage. Drape and bending. Seam grinning/gaping. Barrier properties of seams. Flame retardancy of seams. Degradation/damage of seams. (8)

ADHESIVE BONDING OF TEXTILES : Introduction to adhesives in the textile industry. Textiles and adhesive joining. Properties achieved by adhesive joining. Reasons for the success and failure of adhesives. Trends in adhesive types. (8)

HEAT SEALING, HOT AIR AND HOT WEDGE JOINING : Heat sealing of textiles -Equipment for heat sealing, Factors affecting the quality of heat sealing, Applications of heat sealing in textiles. Hot air wedge and hot wedge welding of textiles- Equipment for hot air/wedge welding, Factors affecting the quality of hot air/wedge welding, Applications of hot air/wedge welding in textiles. (8)

ULTRASONIC, DIELECTRIC AND LASER WELDING : Ultrasonic welding-Equipment for ultrasonic welding, Factors affecting the quality of ultrasonic welding, Applications of ultrasonic welding in textiles. Dielectric welding- Equipment for dielectric welding, Factors affecting the quality of dielectric welding, Applications of dielectric welding.Laser seaming of fabrics- Laser seaming of fabrics. Textile materials that can be laser welded. Applications oflaser welding. (13)

Total L: 45

TEXT BOOKS:

1. Jones I, Stylios G.K , "Joining Textiles", Woodhead Publishing, UK, 2013.

REFERENCES:

1. David J Tyler , "Carr & Latham's Technology of Clothing Manufacture", Fourth Edition, Blackwell Science, Oxford, 2008.
2. Solinger Jacob , "Apparel Manufacturing Analysis", Columbia Boblin Media, USA, 2000.

19T037 CHARACTERIZATION OF INDUSTRIAL TEXTILES

3 0 0 3

FILTER FABRICS : Classifications of Technical textiles. Characteristic requirements, types of filters –dry & liquid. Testing - density, air permeability, pore size and pore structure, porosity measurement techniques. Water repellency and water resistance, filtration efficiency, standards for non woven filter media and filter. (8)

WIPES : Dry and wet wipes. Types, specifications & recipe for specific end uses. Characteristic requirements. Testing - physical test, moisture absorption, water retention property and dust pick up capacity. Standards for testing (8)

ACOUSTIC TEXTILES : Introduction of acoustics, characteristic requirements of acoustic textiles. Testing- physical test, sound absorption & transmission ,Test methods - Impedance tube, reverberation time. Thermal insulation test. (8)

CARPETS : Needled carpets- characteristic requirements. Testing - physical test, thickness, areal density, appearance, fastness, flammability and limiting oxygen index . (8)

OIL SPILL CLEAN UP PADS : Oil sorption and retention characteristics: Sorption capacity of loose fiber assembly, Fiber materials used for oil sorption and their characteristics , other materials used for oil sorption. Test for sorption capacity. Test for oil sorption rate. Absorbency test for oil retention. Test for recovery of sorped oil and reusability of sorbents. Test for water uptake and buoyancy methods for oil sorbents. (13)

Total L: 45

TEXT BOOKS:

1. Sabit Adanur , "Wellington Sears Handbook of Industrial Textiles", Technomic Publishing Co, USA, 1995.
2. Horrocks A R and Anand S C , "Handbook of Technical Textiles", Woodhead Publishing Ltd, Cambridge, UK, 2001.

REFERENCES:

1. Irwin M.Hutten , "Hand book of non woven filter media", Elsevier, London, 2007.
2. Purchas D and Sutherland K , "Handbook of Filter Media", Second, Elsevier, London, 2002.
3. Padhye R, Nayak R , "Acoustic Textiles", Springer, Singapore, 2016.
4. Goswami K K , "Advances in Carpet Manufacture", Woodhead Publishing Ltd, England, 2017.

19T038 BONDED FABRIC STRUCTURE AND MECHANICS

3 0 0 3

STRUCTURE OF NONWOVEN FABRICS : Comparison with other fabric structure. Structural features of webs, Geometrical arrangement of the fibres in the web, binding and bonding points. Binding elements — fibres, fibre strands, binding threads. (9)

BONDING STRUCTURES : Segment, agglomerate, point, controlled area and random area structure. (9)

COMPOSITE NONWOVENS : Multiforming - Multicard, Multiforming box airlay and wetlay , Multibeam spunbond and combined forming. Multi-bonding- Hydroknit, Evolon. Characteristics and properties of composite nonwovens and specifications. (9)

DIMENSIONAL AND STRUCTURAL PROPERTIES : Effect of process variables on the properties of needle punched, hydroentagled, stitchbonded, chemical bonded and thermal bonded fabrics. (9)

MECHANICS OF BONDED FABRIC : Degree of liberty of fibre movements, fibre orientation, Deformation mechanism. Modeling of nonwoven structures - Fabric porosity, pore size and pores size distribution Tensile strength, filtration properties. (9)

Total L: 45

TEXT BOOKS:

1. Russel.S , "Handbook of Nonwovens", Textile Institute Publication, UK, 2004.
2. Krcma R , "Manual of Nonwovens", Textile Trade Press, USA,1993.

REFERENCES:

1. Wilhelm Albrecht , "Nonwoven Fabrics", Wiley— VCH, Verlag Gmbh and Company, Germany, 2003.
2. Dipayan Das, Arun Kumar Pradhan, Chattopadhy, ay R and Singh S N , "Composite nonwovens", Vol 44, No.1, Textile progress, Textile Institute,, United Kingdom, 2012.
3. Hearle J W S, Grosberg P and Backer S , ""Structural Mechanics of Fibres, Yarns, Fabrics", Wiley Interscience, New York, 1999.
4. Irsak O , "Nonwoven Textiles", Textile Institute, United Kingdom, 1999.

19T039 ACOUSTIC TEXTILE PRODUCTS AND CHARACTERIZATION

3 0 0 3

FUNDAMENTALS OF ACOUSTICS : Sound Levels and the Decibel. Perception of Sound. Speech, music and noise. Control of interfering noise. Absorption of sound. Acoustics of the listening room. Different types of Material for Acoustics. (8)

ACOUSTIC BEHAVIOR OF TEXTILE STRUCTURES : Types of Sound Absorptive Materials. Mechanism of Sound Absorption in Fibrous Materials. Different types of Sound Absorptive Textile structures. Factors influencing Sound absorption-Fiber type, Fiber Size, Airflow Resistance, Porosity, Tortuosity, Thickness, Density, Fiber compactness, Surface Impedance. (8)

END USES OF SOUND ABSORPTIVE TEXTILES : Case studies pertaining to Reducing noise in automotive interiors, Home theatres, auditoriums. (8)

DEVELOPMENTS IN TEXTILE BASED ACOUSTIC MATERIALS : Textile Based Sound Absorptive Materials. Key technology developments in Textile Composites for Sound Absorption-Bicomponent Fiber in Sound Absorbent Production, Nanofibres as Sound absorbents. Technologies for the production of coated textiles for sound Absorption. Flammability behavior of acoustic textiles & products. Odour control in acoustics products. (8)

ACOUSTICS TEXTILES AND THE ENVIRONMENT : Environmental impact, manufacturing concerns, recycling of materials and components, sustainable product development. ACOUSTIC MEASUREMENTS AND STANDARDS: Impedance Tube Method. Reverberant Field Method. Steady State Method. Analysis of sound absorptive characteristics of fabrics tested by these methods. (13)

Total L: 45

TEXT BOOKS:

1. Ken C. Pohlmann, Alton Everest F , "Master Handbook of Acoustics", McGraw-Hill, USA, 2009.
2. Rajkishore Nayak, Rajiv Padhye , "Acoustic Textiles", Springer, Singapore, 2016.

REFERENCES:

1. Mike Hardcastle, Walter Fung , "Textiles in automotive Engineering", Wood head publishing Ltd, UK, 2001.
2. Shishoo R , "Textile advances in the automotive industry", Wood head publishing Ltd, UK, 2008.

19T040 LOGISTICS AND SUPPLY CHAIN MANAGEMENT

3 0 0 3

LOGISTICS AND SUPPLY CHAIN MANAGEMENT : Logistics - scope, elements, need, activities, role in the economy and

organisation, logistics and competitive performance, interface of logistics with manufacturing and marketing. Supply chain management: evolution, need, customer focus and service, supply chain management issues, efficient consumer response (ECR), quick and accurate consumer response. (9)

DESIGN AND MANAGEMENT : Logistics management - Inbound and outbound, design, management, domain, integration and perspectives. Supply chain management: phases, integrated supply chain, strategy — pull, push and push-pull strategy. Demand management - demand forecasting and shaping. Bull whip effect- Influencing factors, control measures. (8)

STRATEGIC SUPPLY CHAIN MANAGEMENT : Activities, decisions, supply alliances, supplier quality management, supply chain re engineering. Organizing for global markets: Globalization - Stages to global SCM, global tendering and criticalities. International logistics - World class logistics management (WCLM) and world class supply chain management (WCSCM). (8)

DISTRIBUTION NETWORK PLANNING AND COST : Role of network design, factors influencing distribution network design, Location strategy — plant location, distribution problem, ware house location, retail facility location. Role of IT in network design. Cost and performance measurement: Cost drivers, activity based costing, logistics cost, importance of accurate cost data, customer profitability analysis. Benchmarking — importance, role and methodology, challenges in implementation. Performance measurement systems. (10)

INFORMATION SERVICES IN LOGISTICS AND SUPPLY CHAIN : Importance, applications, information requirements, advanced order processing system in logistics, electronic data Interchange, decision support systems in logistics and database management. Intelligence information system — materials requirement planning, manufacturing resource planning and enterprise resource planning. Trends in Supply Chain Management: Collaborative strategies, vendor managed inventory (VMI), third and fourth party logistics, green supply chain, reverse logistics (10)

Total L: 45

TEXT BOOKS:

1. Sunil Chopra, Peter Meindl , "Supply Chain Management - Strategy, Planning and Operations", Pearson Prentice Hall, New Jersey, 2007.
2. Douglas M Lambert, James R Stock, Lisa, M Ellram , "Fundamentals of Logistics Management", McGraw Hill, Boston,, 1998.

REFERENCES:

1. Benjamin S Blanchard , "Logistics Engineering and Management", Prentice Hall, India, 2005.
2. D K Agrawal , "Textbook of Logistics and Supply Chain Management", Macmillan Publishers, India, 2010.
3. Janat Shah , "Supply Chain Management", Pearson education, India, 2009.

19T041 MECHANICAL AND CHEMICAL PROCESSING OF MAN MADE FIBERS AND BLENDS

3 0 0 3

PROCESSING OF MAN MADE STAPLE FIBERS: Fiber characteristics and spinnability.General problems - Spin finish, inadequacies of fiber materials. Static electricity. Blending methods. Spinning machine elements and general settings for manmade fibers. (9)

SPINNING OF STAPLE FIBERS AND BLENDS: Production of viscose staple, viscose blends, polyester staple, polyester blends and mélange yarns. Ring spinning systems, rotor spinning systems and Air vortex spinning systems. Process parameters. (9)

TECHNICAL YARNS AND SEWING THREADS: Technical yarns – Types, Manufacturing methods, Properties and Applications. Sewing threads - basic requirements and characteristics, types, manufacturing of synthetics sewing threads. Core spun sewing threads. Quality of sewing threads. (9)

WEAVING AND KNITTING OF BLENDED YARNS: Weaving-Warping-creel, control zone and headstock. Sizing-sizing materials, size recipe, pre-wet sizing and single end sizing, Synthetics and blended yarn characteristics for shuttleless loom. Size consideration for filament yarns suitable for various shuttleless loom. Weaving -Woven fabric formation in shuttleless loom. Process parameters. Knitting - yarn quality requirements and characteristics, Process parameters. (9)

CHEMICAL PROCESSING OF BLENDED MATERIALS: Preparatory processes for manmade textile, heat setting of synthetic fabrics, effects of heat setting on dyeing. Mass colouration of synthetic fibres. Yarn dyeing – Space dyeing. Chemical processing of synthetic yarns. Printing of synthetic and blended fabrics. Functional and easy care finishes on synthetics and blends. (9)

Total L:45

TEXT BOOKS:

1. Thomas Weide,"The Rieter Manual ofSpinning, Volume.7 –Processing of man made fibers", Rieter Machine Works Limited, Switzerland,2016.
2. Alagirusamy R and Das A, "Technical textile yarns -Industrial and medical applications",Woodhead Publishing Limited, New Delhi, 2010.
3. Pattabhiraman T K, "Synthetic weaving", Mahajan Brothers, Ahmedabad, 1976.
4. Vaidya A A, and Datye K V, "Chemical processing of Synthetic Fibres and Blends", John Wiley and Sons, New Delhi, 1999.

REFERENCES:

1. SalhotraK R, "Spinning of manmade and blends on cotton systems" The Textile Association, India, 1989.
2. Mahendra Gowda R V, "New Spinning Systems", NCUTE publications, 2006.

3. Jai Prakash and Gaur R K, “Sewing threads “, NITRA,1994.
4. Shore J, “Blend Dyeing”, Society of Dyers Colourists, London, 1998.
5. Gulrajani M L, “Polyester Dyeing”, Indian Institute of Technology Delhi, New Delhi, 1995.

19T042 TEXTILE IN MEDICAL INDUSTRY

3 0 0 3

BIOLOGY FOR ENGINEERS: Introduction. Cell-The basic unit of life. Biochemistry and Molecular Analysis- Chemical Composition of Living Forms, Analysis of Chemical Composition, Nature of Bonding and Qualitative Test. Metabolism-Metabolic Basis for Living—Anabolic and Catabolic Pathways, Concept of Non-Equilibrium and Steady State. Microbiology and Its Industrial Applications. (9)

BIOMATERIALS: Scaffolds/substrates for tissue regeneration, Metals, Ceramics, synthetic Polymers, biopolymers-Characteristics and applications. Nanomaterials Microscale patterning of cells and environment, Polymer scaffold fabrication, micro and nanoscale fabrication, Surface Modification- Objectives, biological coating. (9)

BIOMECHANICAL PROPERTIES OF TEXTILES: Biomechanical Engineering-Fiber mechanics, Yarn mechanics, Fabric mechanics, Clothing mechanics, The human body, Mechanics of the human skin and underlying soft tissues, Contact mechanics in wearing garments, Clothing comfort and compression therapy, Pressure comfort measurements. (9)

MEDICAL TEXTILES - Definition, classification. Requirements from medical textiles. Application areas of textiles in medical field. Bandages-types, properties and applications; Sutures: types and properties; implantable textiles: hernia mesh – vascular prostheses – stents; Extra corporeal materials: Cartilage nerves – liver ligaments, kidney, tendons, cornea; Drug delivery textiles: classification – mechanism various fabrication methods – characterization – applications. (9)

TISSUE ENGINEERING: Tissue culture principles, bioreactors in tissue engineering. Mass transfer studies- nutrients, growth factors and other regulatory molecules. Molecular and cell transport-diffusion, convection, cell migration. Tissue engineering: properties and materials of scaffolds- relationship between textile architecture and cell behavior – applications of textile scaffolds in tissue engineering. (9)

Total L:45

REFERENCES:

1. Joon B Park and Joseph D Bronzino, “Biomaterials – Principles and Applications”, CRC Press Boca Raton London, NewYork, Washington, 2002.
2. Allison Mathews and Martin Hardingham, “Medical and Hygiene Textile Production – A Hand Book”, Intermediate Technology Publications, 1994.
3. Anand S C, Kennedy J F, Miraftab M and Rajendran S, “Medical and Healthcare Textiles”,Woodhead publishing Ltd, Cambridge, UK, 2014.
4. Robert Lanza, Robert Langer and Joseph P. Vacanti eds, “Principles of Tissue Engineering”, Academic Press, 2013.
5. Alberts B, Lewis J, Johnson A, “Molecular Biology of the Cell”, 5th edition, Garland Publishing, Inc., London, 2008.

LANGUAGE ELECTIVES

19G001 COMMUNICATION SKILLS FOR ENGINEERS

0 0 4 2

COMMUNICATION CONCEPTS : Process of Communication ,Inter and Intrapersonal Communication, Inter and Intrapersonal Communication Activities (9)

FOCUS ON SOFT SKILLS : Etiquette — Work Place etiquette — Telephone etiquette, Body Language, Persuasive Communication, Public Speaking, Critical Reasoning and Conflict Management based on Case Studies, Group Communication, Meetings, Interview Techniques (14)

TECHNICAL WRITING : Technical Writing Principles, Style and Mechanics, Technical Definitions – Physical, Functional and Process Descriptions, Technical Report Writing, Preparing Instructions and Manuals, Interpretation of Technical Data. (15)

BUSINESS CORRESPONDENCE : Writing Emails, Preparing Resumes, Memos, Technical and Business Proposals (7)

TECHNICAL COMMUNICATION : Seminars, Process Description and Group Discussions, Use of Visual Aids (15)

Total P: 60

TEXT BOOKS:

1. Faculty Incharge "Course Material on "Communication Skills for Engineers"", PSG College of Technology., Coimbatore, 2019

REFERENCES:

1. Jeff Butterfield "Soft Skills for Everyone", Cengage Learning., New Delhi, 2013

2. Jean Naterop B and Rod Revell "Telephoning in English", Cambridge University Press., Cambridge, 2011
3. David A Mc Murrey and Joanne Buckley "Handbook for Technical Writing", Cengage Learning., New Delhi, 2011
4. Simon Sweeney "English for Business Communication", Cambridge University Press., New Delhi, 2012

19G002 GERMAN- LEVEL A1.1

0 0 4 2

GUTEN TAG! :
1. To greet, learn numbers till 20, practice telephone numbers & e mail address, learn alphabet, speak about countries & languages
2. Vocabulary: related to the topic
3. Grammar: W — Questions, Verbs & Personal pronouns I. (10)

FREUNDE, KOLLEGEN UND ICH :
1. To speak about hobbies, jobs, learn numbers from 20; build dialogues and frame simple questions & answers
2. Vocabulary: related to the topic
3. Grammar: Articles, Verbs & Personal pronouns II, sein & haben verbs, ja/nein Frage, singular/plural (10)

IN DER STADT :
1. To know places, buildings, question, know transport systems, understand international words; build dialogues and write short sentences
2. Vocabulary: related to the topic
3. Grammar: Definite & indefinite articles, Negotiation, Imperative with Sien verbs (12)

GUTEN APPETIT! :
1. To speak about food, shop, converse; Vocabulary: related to the topic; build dialogues and write short sentences
2. Grammar: Sentence position, Accusative, Accusative with verbs, personal pronouns & prepositions, Past tense of haben & sein verbs (13)

TAG FŸR TAG/ZEIT MIT FREUNDEN :
1. To learn time related expressions, speak about family, about birthdays, understand & write invitations, converse in the restaurant; ask excuse, fix appointments on phone
2. Vocabulary: related to the topic
3. Grammar: Time related prepositions, Possessive articles, Modalverbs (15)

Total P: 60

TEXT BOOKS:
1. Dengler Stefanie "Netzwerk A1.1", Klett-Langenscheidt Gmbh., München, 2013
2. Sandra Evans, Angela Pude "Menschen A1", Hueber Verlag., Germany, 2012

REFERENCES:
1. Stefanie Dengler "Netzwerk A1", Klett-Langenscheidt Gmbh., München, 2013
2. Hermann Funk, Christina Kuhn "Studio d A1", Goyal Publishers & Distributors Pvt. Ltd., New Delhi, 2009
3. Rosa-Maria Dallapiazza "Tangram Aktuell 1 (Deutsch als Fremdsprache)", Max Hueber Verlag., Munchen, 2004
4. Christiane Lemcke und Lutz Rohrmann "'Grammatik Intensivtrainer A 1", Goyal Publishers & Distributors Pvt. Ltd., New Delhi, 2012

19G003 FRENCH LANGUAGE LEVEL 1

0 0 4 2

PARTS OF SPEECH :
1. inviter et répondre à une invitation, Pronoms sujets
2. L'article définis, l'article indéfinis
3. Conjugation : présent, adjectifs possessifs
4. interrogation, décrire les personnes
5. La vie de quatre parisiens de professions différentes (12)

ELEMENTS OF GRAMMAR :
1. Exprimer l'ordre et l'obligation demander et commander
2. l'adjectif possessifs, l'article partitif, l'article démonstratif, négation ne
3. pas, l'article contracté
4. verbe pronominaux
5. prepositions (12)

SENTENCE STRUCTURE :
1. Raconter et reporter-donner son avis
2. Futur simple, pronom complètement d'objet direct, passé composé
3. plusieurs région de France, imparfait, pronom y/en, imparfait (12)

TENSES AND NUMBERS :
1. Demander l'autorisation-passé récent, futur proche
2. La vie administrative et régionale, Pluriel des noms, moyens de transport (12)

DISCOURSE :
1. le discours rapporté, décrire un lieu, exprimer ses préférences
2. décrire la carrière, discuter d'système éducation de France
3. parler de la technologie de l'information (12)

Total P: 60

TEXT BOOKS:
1. Christine Andant étal "À propos (livre de l'élève", LANGER., NEW DELHI, 2012
2. Myma Bell Rochester "Easy French Step By Step", MCGrawhill Companies., USA, 2008

REFERENCES:
1. Michael D. Oates "Entre Amis: An Interactive Approach", Houghton Mifflin., 2005 , 5th
2. Bette Hirsch, Chantal Thompson "Moments Literaries : An Anthology for intermediate French", .,
3. Simone Renaud, Dominique van Hooff "En bonne forme", .,

19G004 BASIC JAPANESE

0 0 4 2

JAPANESE PEOPLE AND CULTURE :
1. Basic greetings and responses
2. Basic script — Method of writing hiragana and katakana — Combination sounds and simple words
3. Self introductions: "Hajimemashite" -Demonstratives "Kore", "Sore", "Are" — Demonstrative "Kono", "Sono", "Ano"
4. Possessive noun particle "no" — Japanese apartments: Greeting your neighbor (12)

PATICLE "NI (AT)" FOR TIME :
1. kara (from) ~ made(until) — Particle "to (and)"
2. Time periods: Days of the week, months, time of day –Verbs (Present / future and pasttense)
3. Telephone enquiry: Asking for a phone no. And business hours- Destination particle "e". (12)

LIKES AND DISLIKES :
1. Potential verbs (wakarimasu and dekimasu) — "Kara (~ because)"
2. Adverbs — Asking some one out over the phone-Verbs denoting presence
3. Introduction to Adjectives (na and ii type) -Verb groups — I, II and III — Exercises to group verbs- Please do (te kudasai)
4. Present continuous tenses (te imasu) — Shall I? (~ mashou ka) — Describing a natural phenomenon (It is raining) (12)

DIFFERENT USAGES OF ADJECTIVES :
1. Comparison — Likes and dislikes — Going to a trip- Need and desire (ga hoshii) — Wanting to . . . (Tabeti desu)- Going for a certain purpose (mi –ni ikimasu)
2. Choosing from a menu-Adjectives ("i" and "na" type) — Adjectives (Positive and negative useage) (12)

ROLE PLAYS IN JAPANESE :
1. Framing simple questions & answers
2. Writing Short paragraphs & Dialogues
3. A demonstration on usage of chopsticks and Japanese tea party (12)

Total P: 60

TEXT BOOKS:
1. Minna no Nihongo, Honsatsu Roma "ji ban (Main Textbook Romanized Version)", . International publisher — 3A Corporation., Tokyo, 2012

REFERENCES:
1. Eri Banno et.al "Genki I: An Integrated Course in Elementary Japanese I -Workbook", ., 1999
2. Tae Kim "A Guide to Japanese Grammar: A Japanese Approach to Learning Japanese Grammar", ., 2014
3. Minna No Nihongo "Translation & Grammatical Notes In English Elementary",.,

ONE-CREDIT COURSES

19TF01 QUALITY MANAGEMENT IN SPINNING

1 0 0 1

RAW MATERIAL SELECTION AND COTTON PURCHASE : Mixing cost, Cotton varieties and selection, requirements, annual cotton consumption and yarn production, cotton quality, fibre – yarn relationship (3)

PRODUCTION PLANNING : Count pattern, production, balancing, machine utilization and efficiency, yarn realization, waste control. (2)

PROCESS OPTIMIZATION : Machine speeds and settings, production target in processing departments yarn quality and process parameters. (2)

MAINTENANCE MANAGEMENT : Objectives, types of maintenance, production and quality co-ordination, maintenance planning, half-cleaning and full cleaning, machine card and job card. (2)

QUALITY MANAGEMENT : Fibre quality, yarn quality, yarn quality prediction, towards zero defect in spun yarns, quality standards in processed materials, customer complaints, statistical techniques. (2)

PRODUCTIVITY AND WASTE MANAGEMENT : Spindles speed, Doffing time, restarting breaks, cop content, pneumafil waste, soft waste, saleable waste, hard waste, yarn realization, measures to reduce waste. (2)

TEXTILE TESTING AND INTERPRETATION OF TEST RESULTS : Fibre parameters from HVI, AFIS instruments and yarn parameters from UT5, UTR, UTJ, Classimate system. (2)

Total L: 15

REFERENCE:

1. Garde A R and Subramanian T A , "Process Control in Spinning", ATIRA, Ahmedabad, 1989.

19TF02 QUALITY CONTROL IN WEAVING

1 0 0 1

INTRODUCTION : Yarn quality requirements for Shuttle / Shuttleless looms - Endbreaks minimization in weaving preparatory operations - Control of hardwaste in weaving preparatory operations. - Choice of size recipe - Quality of Warpers beam / sized beam / weavers beam - Fabric defects and their control - Grey cloth realization, value loss in weaving. (5)

Total L: 15

REFERENCE:

1. Paliwal M C and Kimothi P D , "Process Control in Weaving", ATIRA Publication, Ahmedabad, 1983.

19TF03 QUALITY TESTING OF COLOURED TEXTILES

1 0 0 1

INTRODUCTION : Quality tests on dyed / printed textile materials. Importance. (2)

FASTNESS TESTING : Determination of colour fastness to washing, light, perspiration sea water, saliva, rubbing, hot pressing, bleaching, dry cleaning and sublimation. Norms and Standards. (4)

COLOUR ASSESSMENT : Introduction. Visual colour assessment. Instrumental colour assessment. Standard illuminant and observers. (4)

RECIPE PREDICTION : Principle. Procedure. Applications. Advantages. Limitations. Determination of colour difference. (5)

Total L: 15

REFERENCES:

1. Doshi S M and Shah H A , "Quality and Process Control Chemical processing Tablet IX", The Textile Association (India), Bombay, 1984.
2. Shah H S and Gandhi R S , "Colour Measurements and Computer Aided Colour Matching for Textiles", Mahajan Publications, Ahmedabad, 1990.

19TF04 DECORATIVE PRINTING

1 0 0 1

INTRODUCTION : New printing technologies and styles - Khadi printing — white khadi, colour khadi - Brosso Printing - Metal Powder Printing - Flock Printing — PE, Cotton, Nylon, A - Zari / Glitter printing-Khadi zari, Rainbow Zari Suppertime zari, Glitter zari - Mica (pearl) printing - Raise (Foam) printing - Plastisol printing — Hosiery / knitted goods - Foil Printing - Bead Printing - Dew Drop or Shabnam Printing - Combo Styles. (15)

Total L: 15

REFERENCES:

1. Ujiie H , "Digital printing of textiles", Woodhead Publishing, Cambridge, 2006.
2. Miles LWC , "Textile Printing", Society of Dyers and Colourists, England, 1994.

19TF05 APPAREL MERCHANDISING

1 0 0 1

INTRODUCTION : Terminology related to merchandising. Merchandising responsibilities — Line planning, line development, product development and line presentation. (4)

MATERIALS SOURCING : Introduction. Role of sourcing in an apparel industry. Materials sourcing processes. Selection of fabrics. Predicting aesthetics and performance. Evaluation of fabric quality. (4)

PRODUCTION PLANNING AND SOURCING : Introduction. Production strategies and concepts. Production planning. roduction capacity. Determination of sources of production. Production sourcing priorities and processes — selection of vendor, quality management of sourced goods. Managing production of sourced goods and managing logistics and custom issues. (4)

COSTING : Elements of cost. Costing procedure. Costing methods. Costing of any one menswear, ladies wear and children's wear. (3)

Total L: 15

REFERENCE:

1. Ruth E Glock, Grace I Kunz , "Apparel Manufacturing — Sewn Product Analysis", Prentice Hall, New Jersey, USA, 2002.

19TF06 INDUSTRIAL ENGINEERING

1 0 0 1

WORK STUDY : Definition, purpose, techniques of work study. Procedure of work study. Method study-steps in conducting method study, principles of motion economy. (5)

MOTION STUDY : Therbling, SIMO chart, Left hand & right hand chart, flow diagram,flow chart,string diagram,process flow,multiple activity chart. (5)

WORK MEASUREMENT : Techniques of work measurement, Time study-time study equipments, steps in conducting time study, scale of rating, basic time, allowances and standard time. PTMS, MTM .Case studies in textile and apparel industries. (5)

Total L: 15

REFERENCES:

1. ILO Geneva , "Introduction to Work Study", Universal Publishing Corporation, Mumbai, 2006.
2. Solinger Jacob , "Apparel Manufacturing Handbook-Analysis, principles and practice", Bobbin Blenheim Media Corp, South Carolina, USA, 1988.

19TF07 TEXTILE AND APPAREL COSTING

1 0 0 1

YARN COSTING : Determination of Yarn cost — carded, combed. Determination of Yarn realization. Relation between yarn realization and yarn cost. Yarn cost with respect to parameters like count, ply and type of material. Yarn cost with respect to quality parameters and specifications. (5)

FABRIC COSTING : Determination of fabric cost per square meter — woven and knit (In grey stage & finished stage). Factors influencing fabric cost — woven and knit. Determination of GSM with respect to count and fabric parameters like ends per inch and picks per inch (for woven), course per inch, wales per inch and loop length (for knits). Relation between GSM and fabric cost. Costing of fabric with respect to weave structure. (5)

GARMENT COSTING : Determination of fabric requirement for a single garment. Determination of Garment cost without accessories and with accessories. Costing for different finishes and accessories. Determination of CM and CMT for a garment. Factors influencing garment cost. Cost for packaging and transport — local and international. Total Costing for an order sheet with example. Costing for an order with respect to quantity and style. (5)

Total L: 15

REFERENCES:

1. Ratnam T V. , "Cost control and costing in spinning mills", 1st Edition, SITRA-Seshan printers, Coimbatore, India, 1992.
2. Thukaram Rao M E , "Cost and management accounting", New Age International, Bangalore, Karnataka, 2004.

19TF08 ENTERPRISE RESOURCE PLANNING IN TEXTILE & GARMENT INDUSTRY

1 0 0 1

ENTERPRISE RESOURCE PLANNING (ERP) : Definition and evolution of ERP, Reasons for growth of the ERP, Importance of ERP — what it is, how to achieve it. Importance of integrated information systems to ERP. (3)

ERP MODULES IN TEXTILE INDUSTRY : Basic issues, approach and database implementation, ERP modules, Production Planning, Maintenance, Sales and distribution, Material management, plant maintenance, Finance, Costing and Human resources. (6)

ERP IMPLEMENTATION : Strategy and steps, Benefits of ERP systems, Reduction of lead time, Reduction in cycle time, Increased flexibility, Improved information accuracy and decision making capability. Case studies in ERP implementation, Future direction in ERP. (6)

Total L: 15

REFERENCE:

1. Surjit R, Rathinamoorthy R and Vishnu Vardhini K J, "ERP for Textiles and Apparel Industry", 1st Edition, Woodhead Publishing, India, 2016.

19TF09 COATED AND LAMINATED FABRICS AND PRODUCTS

1 0 0 1

INTRODUCTION TO COATED AND LAMINATED TEXTILES : Scope of coated textiles, Basic principles of coating and laminating processes, polymeric materials for coated and laminated products, textile substrate for coated and laminated products, preparation for coating. (4)

COATED AND LAMINATED TEXTILE PRODUCTS : Automotive products: Carpets, seat coverings, headliner structure, other interior coverings, drive belts, air bags and filters. (5)

OTHER PRODUCTS AND QUALITY CHARACTERIZATION : Sports, Marine, Civil Engineering, Home textiles and Medical textiles products. Quality characterization of coated and laminated textiles. (6)

Total L: 15

REFERENCES:

1. Walter Fung , "coated and Laminated Textiles", Woodhead Publishing Ltd, United Kingdom, 2002.
2. Ashish Kumar Sen , "Coated Textiles: Principles and Applications", 2nd Edition, CRC Press, New York, 2008.

19TF10 WARP KNIT FABRICS AND APPLICATIONS

1 0 0 1

INTRODUCTION TO WARP KNIT MACHINES : Introduction to the basic functions and operation of tricot, raschel, simplex and milanese machines. Function and principle of operation of guide bars, chain links and pattern discs. (5)

TRICOT FABRICS : Mosquito nets, tulle fabrics, Sport wear, Shoe Fabrics, Ground fabrics for printing / advertising media, Coating substrates, Laminating backings, Lingerie, Swimwear, Elastic tulle, outwear. (5)

RASCHEL FABRICS : Outerwear, shoe fabrics, neck ties, scarves, plush/ pile fabrics, laces, power nets, veils, edgings, swimwear and trimmings. (2)

SIMPLEX FABRICS : Gloves, sportswear, braziers, girdles, automotive upholstery and embossed leather imitations. (3)

Total L: 15

REFERENCES:

1. Chandrasekara Iyer , "Circular Knitting", Melsenvech Gmbh Bomberg, Germany, 1992.
2. Agaonkar D B , "Knitting Technology", Universal Publication Corpn, Bombay, 1998.

19TF11 VALUE ENGINEERING FOR TEXTILE AND APPAREL INDUSTRY

1 0 0 1

ONSTRUCTION OF FAST DIAGRAM, ANALYSIS OF CRITICAL PATH, CRITICAL PATH FUNCTIONS, HOW-WHY QUESTIONS, THE HIGHER ORDER FUNCTION AND BASIC FUNCTION, SECONDARY FUNCTION AND CAUSATIVE FUNCTION, SUPPORTING FUNCTIONS, DEVELOPING THE FAST DIAGRAM : Definition, objectives, concepts, necessity, scope, value, function, cost,

prerequisites for implementation. Job Plan: Information Phase, Speculation Phase, Evaluation Phase, Development Phase, Implementation Phase. Information Gathering, Defining function: Project understanding, making of charts. (3)

TECHNICAL FAST DIAGRAMMING : Construction of FAST diagram, analysis of critical path, critical path functions, HOW-WHY questions, the higher order function and basic function, secondary function and causative function, supporting functions, developing the FAST diagram. (4)

TASK / CUSTOMER FAST DIAGRAMS : Assure Convenience, Assure Dependability, Satisfy User, Attract User, Developing a task oriented FAST Diagram. Function Cost: Determination of function cost, Function Attitudes and Visual Mismatch, Function Analysis and Creativity. (3)

EVALUATION : Feasibility ranking, Idea comparison, paired comparison, Value Engineering Change Proposal (VEPC): Probability of success. Performing VE study. Management's role in Value Engineering. Case studies. (5)

Total L: 15

REFERENCE:

1. Department of Textile Technology, "Course materials prepared by the faculty of textile technology", Textile Technology, 2019.

19TF12 LEAN MANUFACTURING FOR TEXTILE AND APPAREL INDUSTRY

1 0 0 1

INTRODUCTION TO LEAN MANUFACTURING : Need for Lean manufacturing, Lean manufacturing model, systems and systems thinking, Muda and its types. (4)

LEAN FOR TEXTILE & APPAREL INDUSTRY : Visual Management, 5S, total productive maintenance, Small group activity, process flow diagram, establishing TAKT, Case studies. (2)

JUST IN TIME (JIT) : Definition, Principels of JIT, Continous Flow, Kanban, Value Stream Mapping, Current State VSM and Future state VSM, Poke—Yake. (5)

LEAN INVOLVEMENT AND CULTURE : ractical Kaizen Training, Key factors in Practical Kaizen Training, Lean Culture, Standardization, Standards and abnormality Control, 'Five Why' analysis. (4)

Total L: 15

REFERENCES:

1. Dennis P. Hobbs , "Lean manufacturing implementation", Cengage learning India Pvt Ltd, New Delhi, 2004.
2. John Black , "Lean production implementing a world class system", Industrial Press Inc, New York, 2008.
3. Askin G, Goldberg B , "Design and analysis of lean production system", John Wiley & Sons, Singapore, 2003.
4. Bill Carrieva , "Lean manufacturing that works", Prentice Hall of India Pvt Ltd, New Delhi, 2007.

19TF13 SIX SIGMA FOR TEXTILE AND APPAREL INDUSTRY

1 0 0 1

SIX SIGMA CONCEPTS : Diagnostic journey - definition and measurements. - Remedial journey - analyze and improve. - Institutionalization and integration — control. - Case studies. (15)

Total L: 15

REFERENCES:

1. William Truscott , "Six sigma continuous improvement for business", Butterworth-Heinemann, Burlington, 2003.
2. Subir Choudhury , "The power of Six sigma", Pearson Education, New Delhi, 2001.
3. Baird W , "The Six sigma manual for small and medium business", Yes Dee publishing Pvt Ltd, Chennai, 2011.
4. Bhote R , "The power of ultimate Six sigma", Jaiko Publishing House, Mumbai, 2010.

19TF14 BUSINESS ACUMEN

1 0 0 1

SEEING THE BIG PICTURE : Short and long term interactions, Recognize growth opportunities, Mindfulness of decisions-Case study. (2)

KEY PERFORMANCE INDICATIORS : Decisiveness ,Flexible strong initiative ,Intuitive- Case study. (2)

RISK MANAGEMENT STRATEGIES : Continuous assessment, Internal and External factors making adjustments and corrections- Case study. (4)

BUSINESS ACUMEN IN MANAGEMENT : Talent management, Change management, Asset management ,Organizational management- Case study. (4)

FINANCIAL LITERACY : Income statement, Balance sheet, Cash flow statement - Case study. (3)

Total L: 15

REFERENCE:
1. Steven Haines , "The Manager's Survival Guide", Mc Graw Hill, New York, 2016.

19TF15 ACCESSORIES AND ALLIED MACHINERY REQUIREMENTS OF A SPINNING MILL

1 0 0 1

HUMIDIFICATION PLANT : Need for Maintaining Humidity. Types of Humidifiers: Localised Humidification Control – Air Handling Units — Concept of Total Air Control — Humidity and Health. Air Conditioning Units — Dehumidification HVAC Systems. (4)

COMPRESSOR : Types, calculation of compressor capacity, selection of compressor line. (3)

ELECTRICAL SYSTEMS : Transformer, Switchgears and control panel, Capacitors, Earthing, power cable requirements for machines, lighting. (3)

OTHERS : Wire mounting and Grinding machines, Spindle oil topping, Cots mounting and buffing, Material handling equipments, Tools and Gauges. (5)

Total L: 15

REFERENCE:
1. Purushothama B , "Humidity and Ventilation Management in Textile Industry", Woodhead Publishing Limited, New Delhi, 2002.

19TF16 ERECTION AND COMMISSIONING OF TEXTILE MACHINERY

1 0 0 1

ERECTION AND COMMISSIONING : Floor leveling, Machine case handling while shifting machines. - Packing list and physical stock verification — Arranging components for erection — Storing sensitive and expensive components. - Work table / area arrangement — special tools — provisions for power and pneumatic lines. - Manpower: Skilled and unskilled manpower requirement. - Machine layout line marking — positioning the base machine — machine leveling. - Erection sequence — Erection schedule — Trial run — Commissioning procedure. Training to operators and Maintenance personnel — Reports and Sign off. (15)

Total L: 15

REFERENCES:
1. Nijjawan N , "Modern approach to maintenance in spinning", Woodhead publishing, UK, 2010.
2. Textile machinery manufacturer's erection manuals and handouts , 2019.

19TF17 DENIM PROCESSING

1 0 0 1

DENIM DYEING : Yarn Specifications, Warping, Warp Dyeing — Vat and Sulphur dyes, Surface dyeing effect, quality control. Dyeing and Finishing Machines. (4)

DENIM WASHING : Stone wash, Enzyme wash, Acid wash, combined washing effects, Special fadings - $KMnO_4$ Spray, Bleaching agents, laser and ozone fadings, trouble shoot and problem solving, quality control. (4)

DENIM VALUE ADDITION : Special effects — worn out look, Pleats and creases, Patterned effects, Specialty prints, Functional finishes — water and stain repellent, antimicrobial, aroma finishes, and stretch denims. (7)

Total L: 15

REFERENCES:
1. Roshan Paul , "Denim: Manufacture, Finishing and Applications", Elsevier, Woodhead Publishing Ltd, Cambridge,

2015.
2. Industry Expert Presentations , "One Day National Seminar on Denim Processing", Organized by Department of Textile Technology, PSG College of Technology, Coimbatore, 2013.

19TF18 CHEMICAL PROCESSING OF TEXTILES

1 0 0 1

COTTON AND PROTEIN FIBRE PROCESSING : Current industrial practices and comparison and advances in Batch and Continues preparatory process and dyeing. (4)

DEVELOPMENTS IN MACHINES : Automation, quality, production, effluent reduction, continuous operation, energy consumption and safety aspects in recent and conventional dyeing, finishing and printing machines. (6)

EFFLUENT TREATMENTS : Current situation of effluent treatment plants - economics, sludge management, health and safety aspects, scope for future developments in the global scenario. (5)

Total L: 15

REFERENCES:

1. Schindler W. D., Hauser P. J. , "Chemical Finishing of Textiles", The Textile Institute, UK, 2004.
2. Peter J. Hauser , "Advances in Treating Textile Effluent", Janeza Trdine, Rijeka, Croatia, 2011.
3. Christie, R.M , "Environmental Aspects of Textile Dyeing", The Textile Institute, 2007.

19TF19 ACOUSTIC TEXTILE PRODUCTS AND THEIR CHARACTERIZATION

1 0 0 1

ACOUSTICS : Basics of sound, Sound Absorptive Materials, Sound Insulation, Acoustic interaction, Mechanism of Sound Absorption in Fibrous Materials, Nonwovens and Sound Absorption. (7)

ASSESSMENT OF ACOUSTIC PRODUCTS : Influence of Fibre Type, Fibre Linear Density, Fibre Cross-section and Process Parameters on Sound Absorption Properties. (8)

Total L: 15

REFERENCES:

1. F. Alton Everest, Ken C , "Master Handbook of Acoustics", McGraw-Hill, USA, 2009.
2. Shishoo R , "Textile advances in the automotive industry", The Textile Institute, Cambridge, UK, 2008.

19TF20 NEEDLE PUNCHED NONWOVENS AND THEIR CHARACTERIZATION

1 0 0 1

MANUFACTURE OF NEEDLE PUNCHED NONWOVENS : Influencing Factors — Raw Material Variables –Fibre Type, length, fineness, cross section and mechanical properties. Web Characteristics — Orientation, Web weight and uniformity. Machine Parameters and Variables — Needle Density, Type of needle, Arrangement of Needle, Speed- Entry,Exit, Depth of Penetration. Finishnig –Chemical bonding, Coating, Lamination. (7)

CHARCTERIZATION OF NEEDLE PUNCHED NONWOVENS : Effect of the influencing factors on properties of needle punched nonwovens — Porosity, Pore Size Distribution, Stiffness, Strength, Air Permeability, Abrasion Resistance. (8)

Total L: 15

REFERENCES:

1. Wilhelm Albrecht , "Nonwoven Fabrics", Wiley — VCH, Verlag Gmbh and Company, 2003.
2. Russel S , "Handbook of Nonwovens", Textile Institute Publication, UK, 2004.

19TF21 3D WOVEN FABRICS

1 0 0 1

STRUCTURE : Structure, Comparison of 2D and 3D fabrics, classification, Multilayer fabrics — theory, weaving process. (5)

MANUFACTURING: 3 D orthogonal weaving — Design and Manufacturing of Orthogonal panels. (5)

APPLICATIONS : Properties and applications of 3D Woven fabrics. (5)

Total L: 15

REFERENCES:

1. Hu J , "3-D fibrous assemblies: Properties, applications and modelling of three - dimensional textile structures", Woodhead Publishing Ltd, 2015.
2. Scardino F , "Textile Structural Composites", T W Chou and F K Ko (Elsevier, Tokyo), 1989.
3. N. Khokar , "3D-weaving: Theory and practice", Journal of the Textile Institute, 2001.
4. N. Khokar , "3D fabric-forming process: Distinguishing between 2D-weaving, 3Dweaving and an unspecified non-interlacing process.", Journal of the Textile Institute, 1996.
5. N. Khokar , "A classification of shedding methods", vol. 90 (1), Journal of the Textile Institute, 1999.

19TF22 3D KNITTED FABRICS

1 0 0 1

STRUCTURE : Structure, Comparison of 2D and 3D fabrics, classifications. (3)

MANUFACTURING : 3 D Knitting — Design and Manufacturing of Multiaxial fabrics , Spatial fashioned knitted fabrics, Sandwich/spacer fabrics. (7)

APPLICATIONS : Properties and applications of 3D Knitted fabrics. (5)

Total L: 15

REFERENCES:

1. T W Chou, F K Ko , "Scardino F, in Textile Structural Composites", Elsevier, Tokyo, 1989.
2. F Au K , "Advances in knitting technology", Woodhead Publishing,Series, India, 2001.
3. Spencer D J , "Knitting technology", Woodhead Publishing Series, India, 2011.
4. Raz , "Knitting Technology", Woodhead Publishing Limited, Cambridge, 1991.

19TF23 DIGITAL PRINTING

1 0 0 1

DIGITAL PRINTING : Printer-Inkjet printing technology. Drop formation and impaction and industrial production printers. Printer software — Digital encoding and formation of printed images and digital colour management. (5)

DIGITAL PRINTING COLOURATION : Substrate preparation for ink-jet printing, pigmented ink formulation. Formulation of aqueous inkjet ink. (5)

TESTING : Effect of pretreatment on print quality and its measurement, and inkjet printing of cationized cotton with reactive inks. (5)

Total L: 15

REFERENCES:

1. Ujiie H , "Digital Printing of Textiles", CRC, Wood Head Publishing Ltd, UK,2006.
2. Tyler D , "Textile Digital Printing Technologies", Vol.37 No.4, Textile Institute Publication,, UK, 2005.

19TF24 OIL SPILL CLEAN UP PADS

1 0 0 1

STRUCTURED FIBRE ASSEMBLES FOR OIL SORPTION : Oil sorption phenomenon. Fluid flow through fibrous materials. Methods of oil spill cleanup, Oil sorbents, Characteristics of oil sorbent materials. Oil sorption and retention Characteristics. Sorption capacity of loose fiber assembly, Fiber materials used for oil sorption and their characteristics -Other materials used for oil sorption. (8)

STANDARDS AND TEST METHODS : Different oil sorption materials. Test for sorption capacity. Test foroil sorption rate. Absorbency test for oil retention. Test for recovery of sorped oil and reusability of sorbents. Test for water uptake and buoyancy methods foroil sorbents. (7)

Total L: 15

REFERENCES:

1. William B Katz , "The ABCs of Environmental Science", Scarecrow press Inc, Maryland, USA, 2005.
2. Russel.S , "Handbook of Nonwovens", Handbook of Nonwovens, UK, 2004.
3. Horrocks A R and Anand S C , "Handbook of Technical Textiles", Woodhead publication and Textile Institute, England, 2000.

19TF25 COLD WEATHER PROTECTIVE TEXTILES

1 0 0 1

THERMAL INSULATION CHARACTERISTICS : Human thermoregulation in the cold. Thermal and tactile comfort in the cold. Yarn/fabric structure and thermal insulation. Layering the cold weatherclothing. New trends in thermoregulatory textiles for cold protection. (5)

COATING AND LAMINATED FABRICS FOR COLD WEATHER APPAREL : Breathable membranes. Manufacture and properties of hot melt coated and laminated fabrics. Testing of coated and laminated fabrics. (5)

STANDARDS AND LEGISLATION GOVERNING COLD WEATHER TEXTILES : Development of legislation and standards. Directives on personal protective equipment. standards for cold protective clothing. (5)

Total L: 15

REFERENCES:

1. Williams J T , "Textiles for cold weather apparel", Woodhead publishing Ltd, Cambridge, UK, 2009.
2. Richard A. Scott , "Textiles for protection", The Textile Institute, CRC Press, Woodhead publishing Ltd, Cambridge, UK, 2005.
3. Horrocks A R and Anand S C , "Handbook of Technical Textiles", The Textile Institute, CRC Press, Woodhead publishing Ltd, Cambridge, UK, 2001.

19TF26 FABRIC SOURCING

1 0 0 1

SOURCING : Need for sourcing, sourcing materials, manufacturing resources planning (MRP). Sourcing strategies. Local, national and international sourcing. Commercially available woven andknitted structures- woven –crepe, seersucker. Knitted- airtex, honeycomb, pique. (8)

SAMPLE DEVELOPMENT : Fabric construction, analysis and sample development and applications. (7)

Total L: 15

REFERENCES:

1. E.Glock Ruth, I. Kunz Grace , "Apparel Manufacturing - Sewn Product Analysis", Blackwell Scientific Publications, 1996.
2. Department of Textile Technology , "Course materials prepared by the Industry expert / faculty of Textile Technology", Textile Technology, 2019.

19TF27 SPECIALITY FABRIC SOURCING

1 0 0 1

SOURCING : Need for sourcing, sourcing materials, manufacturing resources planning (MRP). Sourcing strategies. Local, national and international sourcing. Specialty fabric - technical woven and knitted fabrics, spacer knitted fabric. (8)

SAMPLE DEVELOPMENT : Fabric construction, analysis and sample development and applications. (7)

Total L: 15

REFERENCE:

1. Department of Textile Technology, "Course materials prepared by the Industry expert / faculty of Textile Technology", Textile Technology, 2019.

19TF28 HOME TEXTILES

1 0 0 1

TEXTILE FURNISHINGS : Definition - different types of furnishings materials - woven and non-woven - factors affecting selection of home furnishings. Choice of fabrics — calculating the amount of material needed for constriction of home textile products. Home decoration - curtains, types of curtains. Method of finishing draperies. floor covering carpets, mats. (8)

LIVING ROOM FURNISHING : Sofa covers, wall hangers, cushion, cushion covers, upholsteries, bolster and bolster covers. Kitchen and dining textiles - types of kitchen linens and dinning textile products selection, use and care. Bed linens- different types of bed linen and their uses and care. Bath mlinen-towels — types, selection use and care. Testing of home textile products. (7)

Total L: 15

REFERENCES:

1. Subrata Das , "Performance of Home Textiles", Woodhead Publishing Ltd.,, Cambridge, 2010.
2. Wingate I.B., & Mohler J.E , "Textile Fabrics & Their Selection", Prentice Hall I, Newyork, 1984.

19TF29 RECYCLING TEXTILES AND INNOVATING VALUE FROM WASTE

1 0 0 1

INTRODUCTION : Need, Eco-Concerns and Labeling, Procedures, Types and Life Cycle of Textile and Polymeric Materials.(5)

PROCESS AND TECHNOLOGY : Recycling Challenges and Technology, Recycling and reuse of Textile Industrial Wastes. (5)

REUSE, PRODUCTS AND APPLICATIONS : Reuse of Fibrous and Non fibrous PET, Nylon 6, Nylon 66, Polypropylene, Polyethylene, Acrylic and other non fibrous polymers, Various Recycled Products and their Applications. (5)

Total L: 15

REFERENCES:

1. Youjiang Wang , "Recycling in Textiles", Woodhead Publishing Limited, Cambridge, 2006.
2. Miraftab M and Horrocks R , "Eco-Textiles", Woodhead Publishing Limited, Cambridge, 2007.

19TF30 CARBON FIBRE TECHNOLOGY

1 0 0 1

INTRODUCTION : Origin, Definition, Classification, Properties. (3)

PRECURSORS : Acrylics, Cellulosics, Pitch, Vapor-Grown Carbon Fibres, CNT. (3)

APPLICATIONS : Established and Special Purpose Applications, Matrices, Carbon Fibre Treatments, Testing, CNT, Challenges and R&D, Recycling, Structure and State of Carbon Fibre Industry. (9)

Total L: 15

REFERENCES:

1. Soo-Jin Park , "Carbon Fibres", Springer, New York, 2015.
2. Hearle JWS , "High Performance Fibers", Textile Institute, CRC Press, London, 2001.

19TF31 SUSTAINABLE TEXTILES

1 0 0 1

INTRODUCTION : Importance, Theory, EMS and Eco-Labelling. (3)

SUPPLY CHAIN : Natural and Man-Made Fibres, Yarn to Garment Manufacture, Disposal, Reuse and Recycling Scenarios. (5)

PRODUCTS, TECHNOLOGY, MARKETING : Natural Fibre Composites, Bast and other Cellulosic Fibres as Alternatives, Life Cycle Assessment, Consumer Awareness and Global Status. (7)

Total L: 15

REFERENCES:

1. Marion I. Tobler-Rohr , "Handbook of Sustainable Textile Production", The Textile Institute, Woodhead Publications, UK, 2011.
2. R.S. Blackburn , "Sustainable Textiles — Life Cycle and Environmental Impact", Woodhead Publications, UK, CRC Press, 2009..

19TF32 TEXTILE QUALITY DATA ANALYSIS AND STANDARDS

1 0 0 1

QUALITY EVALUATION OF TEXTILES : Need for quality assessment and quality control. Fibre, yarn and fabric quality parameters- Case studies. (5)

DATA ANALYSIS : Analysis of test results — fibre , yarn and fabric testing. Interpretation of results and standards. Case studies. (10)

Total L: 15

REFERENCE:

1. Department of Textile Technology, "Course materials prepared by the Industry expert / faculty of Textile Technology", 2019.

ENGLISH

19GF01 INTERPERSONAL AND ORGANIZATIONAL COMMUNICATION

1 0 0 1

INTRA ORGANIZATIONAL COMMUNICATION : Communication Networks in an Organization; Intra- organizational communication (2)

INTER ORGANIZATIONAL COMMUNICATION : Flow Nomenclature; Workplace diversity and intercultural aspects of communication (2)

COMMUNICATION FUNCTIONS IN ORGANIZATIONS : Teamwork and team dynamics; Conflict resolution strategies and styles; Leading and influencing others-facilitation skills (3)

WRITTEN COMMUNICATION : Email Writing, Professional Reports, and Memos (4)

INTERPERSONAL SKILLS : Nature and Dimensions of Interpersonal Communication; Personality and Communication styles; Active listening and intentional responding; Working with emotional intelligence (4)

Total L: 15

REFERENCES:

1. Bagchi Subroto , "The Professional", Penguin Publications, UK, 2011.
2. PMBOK guide , "A Guide to the Project Management Body of Knowledge", Project Management Institute Inc, USA, 2013.

19GF02 HUMAN VALUES THROUGH LITERATURE

1 0 0 1

PROSE : Kalam's vision of college education in Wings of fire - Emerson's advocation of independence of Human will in Self-reliance - Harmony in Education-views of Betrand Russel (4)

POETRY : Maintaining Human relations in Robert Frost's Mending Wall - Quest for identity and freedom in Kamala Das's An Introduction (2)

DRAMA : Statesmanship and friendship in Girish Karnad's Tughlaq (3)

ONE-ACT PLAY : The theme of love in Chekhov's The Bear (3)

SHORT STORY : Empathy in Somerset maugham's Mr. Know-all - Family bond in Anita Desai's Devoted son (3)

Total L: 15

TEXT BOOKS:

1. Faculty - Department of English , "Course materials", PSG College of Technology, Coimbatore, 2019.

REFERENCES:

1. Abrams M .H, Harpham , "A Glossary of Literary Terms", Cengage, Boston, 2015.
2. Scholes R, et.al. , "Elements of Literature", IV, Indian Rpt. OUP, New Delhi, 2013.

HUMANITIES

19OFA1 EXPORT – IMPORT PRACTICES

1 0 0 1

INTRODUCTION : Export – Import Business – Preliminaries for starting Export – Import Business Registration. (3)

EXPORT PROCEDURES: : Obtaining an Export License – Export Credit Insurance – Procedures and Documentation (4)

FOREIGN EXCHANGE : Finance for Exports – Pricing - Understanding Foreign Exchange Rates. (3)

IMPORT PROCEDURES : Import Policy – License - Procedure and Documentation. (3)

EXPORT INCENTIVES : Incentives - Institutional support (2)

Total L: 15

REFERENCES:

1. Ramagopal C , "Export Import Procedures - Documentation and Logistics", New Age International, 2014.
2. Cherian and Parab , "Export Marketing", Himalaya Publishing House, New Delhi, 2008.

3. Parul Gupta , "Export Import Management", MC-Graw Hill, 2017.
4. Justin Paul, Rajiv Aserkar , "Export Import Management", Oxford, 2013.

19OFA2 INSURANCE - CONCEPTS AND PRACTICES

1 0 0 1

INTRODUCTION TO INSURANCE AND RISK MANAGEMENT : Origin, History, Nature and Scope of insurance – Meaning, types and significance of risk. (3)

INSURANCE LAWS AND REGULATIONS : Insurance Act, IRDA Act, Consumer Protection Act, Ombudsman Scheme. (2)

INSURANCE UNDERWRITING AND RISK MANAGEMENT : Meaning of underwriting and underwriter, guidelines and steps in the process of underwriting – characteristics, significance and principles of risk management. (4)

FINANCIAL ASPECTS OF INSURANCE MANAGEMENT : Role and functions of financial institutions, determination of premium for various insurance products. (3)

SETTLEMENT OF INSURANCE CLAIMS : Documents needed during various claims, Factors affecting insurance claims (3)

Total L: 15

REFERENCES:

1. Scott Harrington, Gregory Niehaus , "Risk Management and Insurance", McGraw Hill Education, 2017.
2. George E Rejda , "Principles of Risk Management & Insurance", Pearson Education, 2017.
3. John Hull , "Risk Management & Financial Institution", John Wiley and Sons, 2018.
4. Arjun Mittal, D D Chaturvedi , "Insurance and Risk Management", Scholar Tech Press, 2017.

19OFA3 PUBLIC FINANCE

1 0 0 1

INTRODUCTION: Nature and Scope of public finance – Principles of taxation. (2)

PUBLIC REVENUE AND TAXATION: Sources of Revenue – Tax and non-tax revenue – Classification of Taxes, GST. (4)

PUBLIC EXPENDITURE: Importance – Types – Causes of increase in public expenditure – Effects of public expenditure in India. (3)

DEFICIT FINANCING AND BUDGET: Sources of public debt – Debt redemption – Budget – Types – Preparation of Budget in India. (3)

FEDERAL FINANCE: Centre-State financial relations – Finance commissions. (3)

TOTAL: 15

REFERENCE BOOKS:

1. Richard A Musgrave and Peggy B Musgrave, “Public Finance in Theory and Practice” – Tata McGraw Hill Education, New Delhi, 2004.
2. Bhatia H.L, “Public Finance” – Vikas Publishing House, 29th Edition, New Delhi, 2012.
3. David N Hyman, “Public Finance: A contemporary application of theory and policy”, Cengage Publication, 11th Edition, Noida, 2014.
4. Santhosh Dalvi and Krishnan Venkatasubramanian, “An introduction to Goods and Service Tax: The biggest tax reform in India”, CCH Publisher, New Delhi, 2015.

19OFA4 SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

1 0 0 1

INVESTMENT ENVIRONMENT : Financial Markets - Classification - Financial Instruments – Security Trading. (2)

TYPES OF SECURITIES : Trading – Orders, Margin Trading – Clearing and Settlement Procedures. (5)

SECURITY ANALYSIS I : Industry Analysis –Estimation of Rates of Return. (2)

SECURITY ANALYSIS II : Company Analysis –– Estimation of Rates of Return. (2)

PORTFOLIO MANAGEMENT : Measuring Risk and Returns and Treatment in Portfolio Management. (4)

Total L: 15

REFERENCES:

1. William F Sharpe, Gordon J. Alexander, Jeffery V Bailey , "Investments", Prentice Hall, 2012.
2. Prasanna Chandra , "Investment Analysis and Portfolio Management", TATA McGraw Hill Publishing, 2011.
3. Ranganathan , "Investment Analysis and Portfolio Management", Pearson, 2004.
4. Bhalla V K , "Investment Management", TATA McGraw Hill Publishing, 2011

19OFA5SOCIAL ENTREPRENEURSHIP

1 0 0 1

INTRODUCTION TO SOCIAL ENTREPRENEURSHIP: Social Entrepreneur - Meaning, qualities and skills. Social Entrepreneurship – Characteristics, process and ecosystem – Case Studies. (3)

SOURCES OF FUNDING FOR SOCIAL ENTREPRENEURSHIP: The Social Entrepreneurship Frame work. Start-ups and funding - Internal and External. Schemes for social entrepreneurship. (4)

STRATEGIES IN SOCIAL ENTREPRENEURSHIP: Industry and Market Analysis, Business planning, concepts of value creation,new ideas and risk taking. (4)

PROSPECTS AND PROBLEMSIN SOCIAL ENTREPRENEURSHIP: Opportunities for Social entrepreneurs, an overview of legal structure, tax structure and other liabilities. (4)

TOTAL: 15

REFERENCE BOOKS:

1. S.S.Khanka, “Creativity and Innovation in Entrepreneurship”, Sultan Chand & Sons, 2021.

2. C. Paramasivan, “Social Entrepreneurship”, New Century Publications, 2016.

3. Robert A. Philips Margret Bonefiel Ritesh Sharma, “Social entrepreneurship, the next big business opportunity”, Global Vision Publishing House, 2011.

4. Drucker, Peter, “Innovation and Entrepreneurship”, Harper Business, 2006.