

B.TECH FASHION TECHNOLOGY

SEMESTER - 1

19H101 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

19H102 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

19H103 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 and 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 of 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 on solid and liquid interfaces, adsorbed mono layers, Critical micelle concentration. Applications of 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, electro dialysis 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 and 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

19H104 FIBRES AND YARNS FOR APPAREL DESIGN**3 0 0 3**

NATURAL FIBRES : Classification of textile fibres. Essential and desirable properties of textile fibres. Natural fibres: Types, structure, properties, cost and end uses of cotton, jute, flax, wool, silk and banana fibre, Organic cotton, coloured cotton and unconventional fibres. **SYNTHETIC FIBRES:** Principle of fiber formation, types, structure, properties, cost and end uses of polyamide, polyester, polypropylene and polyacrylonitrile fibres. Mono and multi filaments. (9)

REGENERATED FIBRES : Principle of fiber formation, regenerated cellulosic fibres- types, structure, properties, cost and end uses of viscose rayon, lyocell, modal, bamboo and Polyinosic fibers. Regenerated protein fibres: Milk, soybean — structure, properties, and end uses. High performance fibres- Types, properties, and applications of elastomers, glass, aramid, carbon fibres, Speciality fibres: Principle of production, properties and applications of bi component fibres, micro fibres, ultra fine denier fibres, Nano fibres, Dope dyed fibres, Developments in manmade fibres to enhance comfort properties. (9)

IDENTIFICATION OF FIBRES : Feeling Test, burning test, microscopic test, staining test, chemical test and density

measurement. Analysis of blend proportion in yarn. FIBRE SELECTION CRITERIA: Fibre selection for apparels — casual, formal and party wears. Basic properties and fibre selection for home textiles, sportswear, intimate garments, medical garments and protective clothing. (9)

SPUN YARNS: Types of yarns - spun and filaments. yarn numbering system, twist. Short staple system: Yarn manufacturing process: flow chart, objectives of ginning, blow room, carding, drawing, combing, speed frame, ring spinning. Characteristics of carded, combed, compact, hosiery and blended yarns. LONG STAPLE SPINNING: objective, application and properties of woolen, worsted yarn, silk filament and spun silk. UNCONVENTIONAL YARNS: Working principle, yarn properties and applications of rotor spinning, air - jet spinning, air vortex spinning, self twist spinning, DREF spinning, electrostatic spinning, wrap spinning. POST SPINNING: yarn doubling: objectives, types, yarn properties, cost and application. (9)

FANCY YARNS : Types, manufacturing and application of Marl yarn, Spiral or Corkscrew yarn, Gimp yarn, Diamond yarn, Loop yarn, Snarl yarn, Nep yarn, Knop yarn, Slub yarn, Fasciated yarn, Tape yarn, Chenille yarn, Ribbon yarns, Composite yarn, Covered yarn, milange yarns and metallic yarns. SEWING THREADS: Fibres used, essential quality requirements, package types, ticket number, properties, cost and applications of different types of sewing threads. EMBROIDERY THREAD: Types, properties, cost and applications. Texturized yarn-principle of texturization, properties and applications. Yarn selection criteria for woven and knitted garments. (9)

Total L: 45

TEXT BOOKS:

1. Mishra S. P "Text book of Fibre Science and Technology", Newnes-HV Butterworths & Co. Publishers Ltd., Oxford, 2000
2. Klein W.G. "The Technology of Short Staple Spinning", Textile Institute., Manchester, 1998

REFERENCES:

1. Gupta V. B. and Kothari V. K. "Manufactured Fibre Technology", Chapman & Hall., London, 1997
2. Wynne A. "The Motivate Series", Macmillan Education Ltd., London, 1997
3. Mahendra Gowda R.V "New spinning systems", NCUTE publication., New Delhi, 2006
4. Premamoy Ghosh "Fibre Science and Technology", McGraw Hill., India, 2004

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 BOOK:

1. Faculty Incharge "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

19H110 ENGINEERING GRAPHICS

0 0 4 2

LETTERING :

LETTERING PRACTICE AS PER BIS

DIMENSIONING :

DIMENSIONING PRACTICE AS PER BIS

GEOMETRICAL CONSTRUCTIONS :
GEOMETRICAL CONSTRUCTION OF DIFFERENT FORMS OF SOLID

PROJECTION OF POINTS :
PROJECTION OF POINTS IN DIFFERENT QUADRANTS

PROJECTION OF STRAIGHT LINES :
PROJECTION OF STRAIGHT LINES TO FIND TRUE LENGTH AND TRUE INCLINATION

PROJECTION OF PLANE SURFACES :
PROJECTION OF PLANE SURFACES INCLINED TO BOTH PLANES

PROJECTION OF SOLIDS :
PROJECTION OF SOLIDS INCLINED TO BOTH PLANES

ORTHOGRAPHIC VIEWS :
DRAWING OF ORTHOGRAPHIC VIEWS FROM THE GIVEN ISOMETRIC VIEWS

ISOMETRIC VIEWS :
DRAWING OF ISOMETRIC VIEWS FROM THE GIVEN ORTHOGRAPHIC VIEWS

DEVELOPMENT OF SURFACES :
DEVELOPMENT OF SURFACES OF SOLIDS USING PARALLEL AND RADIAL LINES AND STUDY ON SECTION OF SOLIDS

Total P: 60

19H111 FASHION EVOLUTION AND ILLUSTRATION LABORATORY

0 0 4 2

1. Study on human anatomy and skeletal features
2. Illustration of Lines, Strokes, gradation and perspective shading techniques
3. Developing a stick figure into block and flesh figures using head theory
4. Illustration of a garment on the flesh figure of men, women and kids
5. Analysis of historic motifs, designs, colors and costumes of Egypt, Greece and Rome
6. Analysis of historic motifs, designs, colors and costumes of English during middle ages
7. Analysis of historic motifs, designs, colors and costumes of America during 18th to 20th centuries
8. Analysis of historic motifs, designs, colors and costumes of France during middle ages
9. Analysis of historic motifs, designs, colors and costumes of Northern part of India
10. Analysis of historic motifs, designs, colors and costumes of Eastern part of India
11. Analysis of historic motifs, designs, colors and costumes of Western part of India
12. Analysis of historic motifs, designs, colors and costumes of Southern part of India
13. Analysis of historic motifs, designs, colors and costumes of Africa
14. Analysis of historic motifs, designs, colors and costumes of Other Asian countries (Thailand, Myanmar, China, Japan, Srilanka, Pakistan)
15. Design Collection of Indian and International Designers

Total P: 60

REFERENCES:

1. Department of Fashion Technology , " Fashion Evolution and Illustration Laboratory Manual", 2019.

19H112 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

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**19H201 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 Fourier transform—DIT algorithm. (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

19H202 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 VISCOELASTIC BEHAVIOUR OF MATERIALS : Concepts of stress and strain, Hooke's law, three moduli of elasticity and relation among them, Poisson'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

19H203 POLYMER AND FIBRE CHEMISTRY

2 0 0 2

INTRODUCTION TO POLYMERS : Classification, functionality of monomers, degree of polymerization, mechanism of polymerization — chain and condensation. Molecular weight of polymers —polydispersity, number average and weight average molecular weights. Determination of molecular weight by gel permeation chromatography and viscometry.(6)

POLYMERISATION METHODS : Addition polymerisation -bulk, solution, suspension and emulsion techniques. Condensation polymerisation -melt, solution and interfacial techniques. Compounding of polymers, Processing techniques:, injection, extrusion & blow moulding, fibre spinning-melt, dry and wet spinning. (6)

PROPERTIES OF POLYMER : Amorphous and crystalline states—degree of crystallinity —factors affecting crystallizability. Thermal analysis - 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. (6)

NATURAL AND REGENERATED FIBRES : Structure and properties of cotton, silk and wool. Regenerated fibres - manufacture of viscose rayon, cellulose acetate and cellulose nitrate. (6)

SYNTHETIC POLYMERS : PET, nylon 6, nylon 66, acrylic, polypropylene, polyethylene. Structure dependant properties of these fibres. (6)

Total L: 30

TEXT BOOKS:

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

REFERENCES:

1. Joel R. Fried "Polymer Science and Technology", Prentice Hall of India Pvt. Ltd., India, 2003 , 1
2. J. M. G. Cowie, Valeria Arrighi "Polymers: Chemistry and Physics of modern Materials", CRC Press., USA, 2007 , 1

19H204 KNITTING TECHNOLOGY AND DESIGN

3 0 0 3

WEFT KNITTING : Principle of knitting, comparison of weaving and knitting process, woven and knitted fabric. Classification of knitting machines. Needle loop, sinker loop, face loop, reverse loop, course, wale. CIRCULAR WEFT KNITTING: Knitting elements - needles - types, cam, sinker, jack, feeder, cylinder, dial, yarn storage device, take-up. Passage of material. Single jersey, rib, interlock — knitting action and fabric properties. (9)

WEFT KNIT DESIGN : Stitches — knit, tuck and float stitches — characteristics, representations — structural, symbolic-needle, graph paper, cam. Single jersey — derivatives, Air tex-production principle, loopknit- production principle. Double jersey structures—derbyrib, swiss rib, eightlock structure, milano rib and single pique. Stripe design —feederstripe, auto stripe. (9)

FLAT WEFT KNITTING : Knitting elements — needles, cam, feeder, brush, carriage, cover plate, take-up. passage of material, knitting action, Special technique: loop transfer, racking, plated knitting and spacer fabric knitting. Shape generation-fashioning, knitwear components knitting in flat knitting. Concept of seamless knitting. (9)

WARP KNITTING AND DESIGN : Weft knitting and warp knitting - comparison. Warp knitting machineries: Tricot, Raschel machines - passage of material, knitting elements: guide bar, sinker bar, needle bar, latch wire, presser, trick plate, pattern drum and disc. STRUCTURES: Lapping - over lap & under lap; closed lap & open lap — needle representation. Basic stitches-pillar, blind lap, tricot, inlay, satin and atlas stitches. Tricot structures - full tricot, locknit and loop raised fabric. Raschel structures- power nets, curtain net. (9)

PROCESS CONTROL : WEFT KNITTING - Weft knit fabric defects — types, causes and remedies. Relaxation. Spirality: factors responsible for spirality, measurement of spirality and remedies. weft knitting calculation- production, number of needles, loop length, course length. Fabric weight (GSM) alteration-loop length; positive yarn feeding system -yarn tension; take up device. comfort stretch and power stretch. - WARP KNITTING- Quality, run-in, rack, Warp knit Fabric defects - types, causes and remedies. (9)

Total L: 45

TEXT BOOKS:

1. David J. Spencer "Knitting Technology - A comprehensive handbook and practical guide", Pergamon Bros., Oxford, Third edition, 2001
2. Sadhan Chandra Ray "Fundamentals and Advances in Knitting Technology", Woodhead Publishing India Pvt. Ltd., New Delhi, India, Second Edition, 2012

REFERENCES:

1. Ajgaonkar D B "Knitting Technology", Universal publishing corporation., Mumbai, 1998
2. Anbumani N "Knitting – Fundamentals, Machines Structures and Developments", New age International publishers., India, 2006

19H205 FABRIC MANUFACTURING AND DESIGN

3 0 0 3

SHUTTLE WEAVING : Fabrics classification, Process flow for woven fabric development and significance of cone and pirn winding, Direct and sectional warping, sizing, looming. Working principle of loom — Primary, secondary and auxiliary motions. Working of Power loom & Automatic loom. Production calculation. (9)

SHEDDING & SHUTTLELESS WEAVING : Working principle of dobby and jacquard. Limitations of shuttle looms. SHUTTLELESS WEAVING: Scope of shuttleless loom, Basic principles of weft insertion — projectile, rapier, air jet. Scope of multiphase loom. Commercial fabrics woven from shuttleless looms (9)

FABRIC DEFECTS & NONWOVENS : Selvege — objectives, plain, leno, fringed. Merits and Demerits of shuttleless looms. Woven fabric defects — root causes and remedies. NON-WOVENS: Definition, Classification, raw materials, Web formation techniques - dry laid, wet laid, air laid. Bonding techniques — mechanical, thermal and chemical. Properties of nonwoven fabrics, Commercial products and its applications. (9)

WOVEN DESIGN : Elements of woven design — design, draft and pegplan. Design, characteristics, drapability, its application and visual impact of elementary weaves — plain weave, warp rib, weft rib, matt rib. Twill & its derivatives Warp faced, weft faced, pointed twill and herring bone twill. sateen and satin. Brighton and ordinary honey comb. Mock leno — Perforated and distorted mock leno. (9)

SPECIAL WOVEN DESIGN : Design, characteristics, drapability and its application: Bed ford cord - Plain faced and twill faced bed ford cord, ordinary welt. Pile fabrics — Velveteen and Velvet, plain velveteen, Corduroy, weft plush and terry pile. Double cloth -Concept and its application, self stitch double cloth, thread interchange double cloth, centre stitched double cloth and cloth interchange double cloth. Extra thread figuring — Extra warp and weft figuring with single and two colours. (9)

Total L: 45

TEXT BOOKS:

1. Mukesh Kumar Singh "Industrial practices in weaving preparatory", Wood Head Publishing., 2014 , 1
2. Hayavadana J "Woven Fabric Structure Design and Product Planning", Wood Head Publishing., 2015 , 1

REFERENCES:

1. Grosicki Z. J "Watson's Textile Design and colour", Newness-Butterworth., London, 2005 , 2
2. Russel S "Handbook of Nonwovens", Textile Institute., Manchester, 2007 , 1
3. Hu J "3 D Fibrous Assemblies: Properties, Applications and Modeling of Three-Dimensional Textile structures", Woodhead Publishing., 2008 , 1

19H210 FABRIC MANUFACTURING LABORATORY

0 0 4 2

WOVEN FABRIC MANUFACTURING :

1. Development of plain fabric sample in shuttle loom — Non-Automatic loom
2. Development of Twill fabric sample in shuttle loom — Automatic looms

3. Study and fabric development in shuttleless loom — Air Jet
4. Development of dobby fabric sample in shuttleless loom — Rapier
5. Study and fabric development in shuttle loom — Terryweaving
6. Practice on designs development in Jacquard looms and fabric development. (30)

WEFT KNITTED FABRIC MANUFACTURING :

1. Study of driving mechanisms in weft knitting machine.
2. Study of passage of material, knitting action of single jersey circular knitting machine.
3. Study of knitting action, take-up mechanism of double jersey circular knitting machine.
4. Study of working mechanism of flat knitting machine.
5. Study of working mechanism of socks knitting machine.
6. Practice on weft knit patterning — horizontal stripe and vertical stripe patterning. (30)

Total P: 60

REFERENCE:

1. Department of Fashion Technology , "Fabric Manufacturing Laboratory Manual", 2019.

19H211 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 Mifflin Company, New York., 2009

19H212 INTERNSHIP

0 0 0 2

INDUSTRY ORIENTED ACTIVITIES:

Factory visit to study the layout, organization structure and various departments. Study of garment styles manufactured ,buyer details , process and working of the following machines.

Spreaders

Cutting machine

Single and double needle lock stitch machine

Over lock machine

Flat lock machine

Button holing and button sewing machine

The students have to prepare a report on the above activity and a committee will evaluate based on the report submitted by the students

SEWING PRACTICE:

Study of sewing machine parts and functions

Learning the mechanism of sewing machine
Practice the threading of sewing machine
Operation of sewing machine
Sample preparation

STUDY OF APPAREL MACHINES:

Study and understand the various components and threading of single needle lock stitch machine.
Analysis of the working mechanism of single needle lock stitch machine and its important settings
Threading and working of double needle lock stitch machine.
Threading and working of overlock machine.
Threading and working of Flatlock machine.

DOCUMENT PRAPARATION: Creating and editing a document, checking spelling and grammar, enhancing a document with various formats, inserting graphs and figures in the text

SPREADSHEET CREATION: Entering text, numbers and formulas, specifying ranges, enhancing a worksheet, editing the worksheet, creating variety of charts and tables

PRESENTATION: Creating presentations, inserting slides, graphics, editing and enhancing presentation

REFERENCES:

1. Richard Jones "The Apparel Industry", Wiley Publishers., UK, 2006
2. Arora V. N, Laxmi Chandra "Improve Your Writing", Oxford University Press., New Delhi, 2008

SEMESTER - 3

19H301 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.

19H302 FASHION DESIGN CONCEPTS

3 0 0 3

FASHION DESIGN : Fashion – definition, terminologies – high end fashion, ready to wear, street fashion, style, classic, fad, trend, motif and pattern, silhouettes, fashion cycle. Fashion adoption theories – trickle down, trickle up and trickle across. Fabric design – traditional, geometrical, abstract, naturalistic and folk. Garment design – structural, decorative and functional. (9)

ELEMENTS OF DESIGN : Types of elements. Space - definition, perception and visual effects. Line - definition, aspects and visual effects. Shape and form - definition, attributes, visual effects and guidelines for choosing in dress. Colour - dimensions, physical and psychological effects. Texture - definition determinants, aspects and use. Pattern - aspects, introducing pattern

and visual effects. Light - physical and psychological aspects. (9)

PRINCIPLES OF DESIGN : Types of principle. Design, concept and application -harmony , balance - symmetrical, asymmetrical and radial, proportion, emphasis, rhythm - through repetition, alteration, gradation, radiation and continuous line movement, parallelism, sequence, alternation, concentricity, contrast, scale, unity. (9)

FIGURE ANALYSIS AND FABRIC RENDERING : Identification of suitable type of design details - stout figure, slim figure, narrow shoulder, broad shoulder, round shoulder, large bust, flat bust, large hip, large abdomen, short waist, long waist, large neck, short neck, square or broad face, round face. Fabric rendering - colouring mediums - drawing papers, brushes, graphite pencils, pastels, water soluble coloured pencils, felt-tip pens, markers, inks, gouache, acrylics, rendering texture and embellishments, 3D garment designing and simulation. (9)

PORTFOLIO DEVELOPMENT : Analysis of market and customer preferences, fashion forecasting, designer boards mood board, fabric board, colour board and accessory board, types of portfolio, professional portfolio preparation, communication, practicalities and style of presentation. (9)

Total L: 45

TEXT BOOKS:

1. Suzanne G Marshall, Hazel O Jackson , "Individuality in Clothing and Personal Appearance", Prentice Hall, New Jersey, 2000.
2. Marian L Davis , "Visual Design and Dress", Prentice Hall, New Jersey, 1996.

REFERENCES:

1. Caroline Tatham, Julian Seaman , "Fashion designing and drawing course", Thames and Hudson Publishers, UK, 2003.
2. Harold Carr , "Fashion Design and Product Development", John Wiley and Sons Inc, NewYork, 1992.
3. Angel Fernandez, Gabriel Martin Roig , "Drawing for fashion designers", Anova books company ltd, UK, 2007.
4. John Hopkins , "Fashion Design: The Complete Guide", Fairchild Books, USA, 2012.

19H303 PATTERN ENGINEERING AND GARMENT CONSTRUCTION I

2 1 0 3

HUMAN ANTHROPOMETRICS AND SIZING SYSTEMS : Garment manufacturing process flow chart. Sizing system: size categories in men's wear, women's and kids wear, pattern making techniques - drafting, draping and flat pattern making, types of industrial patterns, 3D body scanning- principle, operations and advantages. (6+3)

PATTERN MAKING & CONSTRUCTION TOOLS : Pattern making tools, pattern making terms - basic pattern set, basic block, blending and trueing, fabric terms, dart, notches, grain line, drill hole marks, ease allowance, seam allowance, style lines and pattern details. Garment construction tools, sewing needles-parts, types, sizes, designation and selection criteria, sewing threads — types and selection criteria. Stitches and seams: British standard, types, characteristics and application (7+2)

FLAT PATTERN TECHNIQUES, GRADING & LAYOUT : Dart manipulation methods - pivot, slash & spread and measurement method. Pattern grading-principle, types. Pattern Layout- types, application, marker planning. (5+4)

GARMENT COMPONENTS : Definition, types and selection factors of fullness: yokes, necklines, collars, plackets, pockets, sleeves, hems and cuff. Assembling of T-shirt, shirt, skirt and trouser. (8+1)

DRAPING : Introduction, tools, types of dummies, transferring body measurements to dress stand, preparation of dummy — padding, taping. Muslin — types, preparation, principles of balanced draping. Draping basic patterns - bodice, sleeve, collar, yoke, fullness, skirt and pant. (4+5)

Total L: 30 +T: 15 = 45

TEXT BOOKS:

1. Helen Joseph and Armstrong , "Pattern Making for Fashion Designing", Prentice Hall, Newyork, 2004.
2. Harold Carr and Barbara Lathon , "The Technology of Clothing Manufacture", Blackwell Sciences, UK, 1996.

REFERENCES:

1. Conne Amaden-Crawford , "Fashion Sewing: Advanced Techniques", Bloomsbury Publishing Plc., UK, 2015.
2. Laing R M and Webster J , "Stitches and Seams", Textile Progress, The Textile Institute, Manchester, 1998.
3. Ukponmwan J O, Chatterjee K N and Mukhopadhyay A , "Sewing Threads", Textile Progress, The Textile Institute, Manchester, 2001.
4. Joseph-Armstrong, Helen , "Draping for Fashion Design", Fairchild Publications, New York, 2000.

19H304 TEXTILE CHEMICAL PROCESSING TECHNOLOGY

3 0 0 3

CHEMICAL PREPARATORY PROCESSES : chemical processing sequence: cellulosic, protein, synthetic and blends. objectives and methods: singeing, desizing, scouring, bleaching, mercerisation, wool carbonizing, degumming and weighting of silk, heat setting of synthetic fibres. wet processing equipment: kier, J box, pad roll, conveyer steamer, stenter, continuous scouring and bleaching range, combined process and single stage grey preparatory process. process and quality control measures in wet preparatory process, quality assessment tools. (9)

FABRIC DYEING : color: concept and utility. classification of dyes: direct, vat, sulphur, reactive, acid, basic, disperse and natural dyes: properties and application. fabric dyeing machineries: jigger, winch, HTHP, soft flow, jet, padding mangle, continuous dyeing range, process and quality control measures in fabric dyeing, problems in fabric dyeing, causes and remedial measures, assessment of dyed fabrics, metamerism: illuminant, geometric and observer. visual color assessment standards and techniques (9)

FABRIC PRINTING : identification of prints, preparation of screens, printing paste constituents, printing styles: direct, discharge, resist and pigment, stencil and spray. methods of printing: screen, roller, rotary, transfer and digital-inkjet, fixation and after treatment, process and quality control measures, problems in fabric printing, causes and remedial measures, assessment of printed fabrics (9)

GARMENT DYEING & PRINTING : classification, garment dyeing machines: principle, factors, selection of fabrics, sewing thread, accessories and dyes, advantages and limitations. garment printing machines: carousal printing, DTG, sublimation and plastisol prints, process and quality control measures in garment dyeing and printing. (9)

ENVIRONMENT FRIENDLY PROCESSING : problems in conventional processing, german ban & red listed chemicals, eco-labels, natural dyes: properties and application. eco-friendly processing: desizing, scouring, bleaching, dyeing, printing and sustainable practices. (9)

Total L: 45

TEXT BOOKS:

1. Clark M , "Handbook of Textile and Industrial Dyeing: Principles, processes and types of dyes", 1st Edition, Woodhead Publishing House, England, 2011.
2. Bhagwat R S , "Handbook of Textile Processing Machinery", 1st Edition, Color Publications, Mumbai, 1999.

REFERENCES:

1. Shenai V A , "Technology of Dyeing", 1st Edition, Sevak Publications, Mumbai, 1995.
2. Miles J W C , "Textile Printing", 1st Edition, Society of Dyers and Colorists, England, 1994.
3. Vaidya A A and Trivedi S S , "Textile Auxiliaries and Finishing Chemicals", 1st Edition, ATIRA, Ahmedabad, 1985.
4. Richard Aspland J , "Textile Dyeing and Coloration", 1st Edition, AATCC, United States, 1997.

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, McEachern, Simrit Kaur , "Micro ECON", Cengage Learning, Noida, 2013.
2. William A, McEachern, 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.

19H310 FABRIC ANALYSIS LABORATORY

0 0 4 2

WOVEN FABRIC ANALYSIS :

1. Visual examination of commercial available fabrics.
2. Woven fabric structural analysis -Design, draft, pegplan and denting Plan. Visual Impact-Relative Prominency of fabric in garment design. Thread density, yarn count, crimp percentage, cover factor, GSM and thickness - Plain weave
3. Twill weave
4. Satin/Sateen weave
5. Honey comb fabric
6. Extra thread figuring fabric
7. Jacquard fabric
8. Terry towel

WEFT KNITTED FABRIC ANALYSES :

1. To analyse the following fabric with respect to structure and technical parameters. Knitted structural analysis: Symbolic representations — needle, graph paper, cam. Technical particulars: course per unit length, wales per unit length, stitch density, yarn linear density, loop length, tightness factor, fabric weight - calculated, physical (GSM) - Single jersey/derivatives, rib/derivatives, interlock/derivatives.
2. Warp Knitted Fabric Analyses-Lapping and structural representations of single bar or two bar fabric.

Total P: 60

REFERENCE:

1. Department of Fashion Technology , "Fabric Analysis Laboratory Manual", 2019.

19H311 APPAREL PRODUCTION LABORATORY I

0 0 4 2

PATTERN MAKING AND CONSTRUCTION :

1. Practice on taking body measurements
2. Pattern drafting of basic bodice
3. Construction of seams and seam finishes & calculation of number of stitches per inch and sewing thread consumption
4. Construction of fullness — darts, tucks, pleats, godets, ruffles, gathers and development of a basic bodice using suitable fullness
5. Pattern drafting and construction of plackets with fasteners such as zippers, hooks and eyes, hook and loop fasteners
6. Pattern drafting and construction of set-in-sleeves with suitable hem finishes
7. Pattern drafting and construction of sleeves combined with bodice with suitable hem finishes
8. Pattern drafting and construction of yokes — partial yoke, midriff yoke, yoke with fullness
9. Construction of necklines — binding and facing
10. Pattern drafting and construction of collars — peter pan collar, shirt collar, shawl collar, chinese collar, cowl necklines
11. Construction of pockets — patch pocket, set-in pocket, pocket set into a seam
12. Pattern drafting and assembling of kids frock using above components and calculation of fabric consumption and sewing thread consumption
13. Pattern making and assembling of romper using above components and calculation of fabric consumption and sewing thread consumption

Total P: 60

REFERENCE:

1. Department of Fashion Technology , "Apparel Production Laboratory I Manual, 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.

19H313 TEXTILE CHEMICAL PROCESSING LABORATORY

0 0 4 2

CHEMICAL PREPARATORY PROCESSES AND FABRIC COLORATION :

1. Identification of different fibres using chemical test
2. Identification of fibre blend composition
3. Acid Desizing of cotton fabric and determination of weight loss (%)
4. Alkaline scouring of cotton fabric and determination of absorbency
5. Peroxide bleaching of cotton fabric and determination of whiteness index
6. Dyeing of cotton fabrics using natural Dyes
7. Dyeing of cotton fabrics using hot brand reactive dyes
8. Dyeing of polyester fabric using disperse dyes
9. Assessment of wash, rubbing and light Fastness Properties of the Dyed Samples
10. Analysis of color strength(K/S) and color difference measurement using spectrophotometer
11. Development of print pattern using tie & dye Technique
12. Development of prints on fabric using screens
13. Development of prints on fabric using Discharge Style
14. Development of prints on fabric using Resist Style
15. Stiffening and crease resistant finishing of Cotton fabric
16. Peach finishing and bio-washing of denims

Total P: 60

REFERENCE:

1. Department of Fashion Technology , "Textile Chemical Processing Laboratory Manual", 2019.

SEMESTER - 4

19H401 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)

ARIANCE 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.

19H402 ELECTRONICS IN APPAREL DESIGN

3 0 0 3

BASICS OF ELECTRICAL ENGINEERING : Electric circuits — Ohm's law, circuit basics — series and parallel, circuit construction, simple DC circuits, fundamentals of single phase AC and 3 phase AC circuits, breadboard circuit, protoboard circuit. DC Motor —principle of operation, types. Single phase and three phase induction motor- types. Synchronous motors, stepper motor —working principle. multimeter. (9)

ELECTRONIC COMPONENTS AND MATERIALS : Principles of electronic components- resistance, inductance, capacitance, electronic circuit, battery, specific requirements and applications of sensors, actuators, microprocessor, micro controller, micro switches, basic LED's lights, electroluminescent materials, data acquisition and processing, wireless technology. fiber transistors, triboelectric textiles, textiles antenna, textile battery, textile super capacitors, nano generators. (9)

E-TEXTILES AND WEARABLE ELECTRONICS : Electro-textile-principle, concepts and development . Conductive polymers and fibers, conductive fabric — properties and types. Wearable electronics - introduction, chronology, need and textile fibres used. Flexible wearable electronics in fabrics, wearable sensors, biomonitoring devices. Interfacing circuits and garments. Circuits for smart shirt, data processing, storage and communication in intelligent textile assembly. (9)

DEVELOPMENT OF FABRIC INTEGRATED ELECTRONIC MATERIALS AND CIRCUITS : Concept of integration of electronic gadgets like chips, microphones, LED, and low voltage wires in fabrics. Interaction design in smart clothing, Development of heat-generating circuit for nichrome fabric, communication circuit for copper core conductive fabric, signal-transferring circuit for optical core conductive fabric, bullet wound intimation circuit for tele-intimation fabric. (9)

DEVELOPMENT OF WEARABLE ELECTRONIC GARMENTS : Integration of electronic gadgets in garments - introduction and concept. Development of camouflage garments using cotton-wrapped nichrome yarn, Heating garment, communication garment using copper core conductive fabric. Capacitive sensing garments, smart shoes, smart wrist band, heating gloves. wearable mobile health care system. Smart clothes for ambulatory remote monitoring, electronic jerkin. musical jacket, smart wear yoga pants, integration of garment and solar panel, clothing-integrated photovoltaics, illuminated garment. tele-intimation garment, smart shirt. (9)

Total L: 45

TEXT BOOKS:

1. Xiaoming Tao , "Wearable Electronics and Photonics," CRC press, UK, 2005.
2. L.Ashok kumar & C.Vigneswaran , "Electronics in Textiles and Clothing – Designs, products and Applications", CRC Press, Coimbatore, 2015.

REFERENCES:

1. Sarah Kettley , "Designing with Smart Textiles", 1st Edition, Fairchild books,, 2016.
2. Rebeccah Pailes-Friedman , "Smart Textiles for Desiners Inventing the future of fabrics", 2nd Edition, 2016.
3. Tilak dias , "Electronic Textiles - Smartfabrics and wearable technology", 1st Edition, Wood Head publishing, 2015.
4. Tao, Xiaoming , "Handbook of smart textiles", 1st Edition, Springer singapore, singapore, 2015.

19H403 MECHANICS OF APPAREL MACHINES**2 1 0 3**

DRIVES AND BELTS : Belt drives: introduction, types, belt types, velocity ratio, power transmission: effect of slip, creep and friction. Ratio of driving tensions. Gear trains and cams: Introduction, types, follower types, cam profile. (6+3)

SPREADING AND CUTTING MACHINES : Spreading Requirements, methods, classification of machines. Marker planning: requirements, efficiency. Cutting: requirements, methods, classification of cutting machines. Working mechanism: straight knife, round knife, rotary shears, band knife, die cutting, computer controlled cutting machine, laser cutting, end cutter, stripe cutter, rag cutter. Notches and drills: requirements, types. Automations and advancements. (6+3)

MECHANICS OF LOCK STITCH MACHINES : Sewing needles: classifications, size, selection, application, selection procedure. Sewing machine: classification. Single needle lock stitch machine: parts and functions, working mechanism, gearing, stitch formation mechanism & timing diagram, settings. Double needle lock stitch machine: parts and function, gearing, working mechanism, settings. Automation and advancements. (6+3)

MECHANICS OF CHAIN STITCH MACHINES : Edge covering sewing machine: special parts and function. Working and gearing mechanism, settings, needle to looper settings, timing diagram. Multi thread chain stitch machine: parts and functions, gearing, working mechanism, critical settings, stitch formation, timing diagram. Automation and advancements. (6+3)

FEED MECHANISM AND ATTACHMENTS : Feed mechanism: elements, classification — manual feed, drop feed, differential feed, needle feed, compound feed, unison feed, puller feed, cup feed, wheel feed, clamp feed. Machine speed and rate of feed, stitch size regulation. Attachments: classification, guide attachments, positioning attachments. Presser foot: types, working methods and applications. Sewing machine maintenance. Common sewing machine problems and solutions. (6+3)

Total L: 30 +T: 15 = 45**TEXT BOOKS:**

1. Ganapathy Nagarajan , "Textile mechanisms in spinning and weaving machines", Woodhead Publishing India Pvt Ltd, Delhi, 2015.
2. Rathinamoorthy R, Surjit R , "Apparel Machinery and Equipments", Woodhead Publishing India Pvt Ltd, Delhi, 2015.

REFERENCES:

1. Harold Carr, Barbara Lathon , "The Technology of Clothing Manufacture", Blackwell Sciences, UK, 1996.
2. N.Gokerneshan, B.Varadarajan, C.B Senthilkumar , "Mechanics and calculations of Textile machinery", Woodhead Publishing India Pvt Ltd, Delhi, 2013.
3. Grace I. Kunz, Ruth E. Glock , "Apparel Manufacturing: Sewn Product Analysis.", 4th Edition, Prentice Hall,, USA, 2004.
4. Solinger Jacob , "Apparel Manufacturing Analysis", Columbia Boblin Media, USA,, 1988.

19H404 TEXTILE FINISHING AND GARMENT CARE**3 0 0 3**

FUNCTIONAL & INNOVATIVE FINISHES : Objectives, types, merits and limitations, selection of chemicals, application methods: practices and suitability. functional finishes: chemistry, application and assessment of water repellent, flame retardant, anti-static, soil release, UV protection, anti microbial, heat resistant, wrinkle free, elastomeric finishes. innovative finishes: plasma, finishing using micro capsules and nano-particles. (9)

MECHANICAL & DENIM FINISHES : Mechanical finishes: peach finish, zero-zero finishes, raising, calendaring: swissing, embossing, schreiner, friction calendaring and moiré effect. denim finishes: process conditions, machineries, special effects: pumice stones, acid and enzyme wash, biopolishing and biostoning, sand blasting, PP spray, grinding, whiskering, ozone and laser fading. (9)

GARMENT FINISHING : Pressing machines: functions, pressing process, types: iron, buck/ steam press, carousel press, trouser pressing, double legger, steam air finisher, steam tunnel. fusing: requirements, resins used, application methods, types, quality control, packing: function, types, packing materials, merchandising packages, shipment packages, packing machines and equipments. (9)

WASHING AND LAUNDERING OF GARMENTS : Principles of washing: suction washing, washing by kneading and squeezing. machine washing: process and machineries used. laundering of different fabrics: cotton and linen, woolens, colored fabrics, silks, rayon and nylon. special types of laundry: water proof coats, silk ties, leather goods, furs, plastics, lace. dry cleaning, drying equipments. (9)

GARMENT CARE : Application of soaps, detergents, bleaches, optical whiteners, stiffeners, softeners, dry cleaning agents for different fabrics. stain removal: stain identification, types, characteristics, stain removers used, methods for removal, storage of house hold linen, care labeling. special care: protein and synthetic garments. (9)

Total L: 45

TEXT BOOKS:

1. Wolfgang D. Schindler, Peter J. Hau , "Chemical Finishing of Textiles", WoodHead Publishing, UK,2004.
2. Shishoo R, "Plasma Technologies for Textiles", Woodhead Publishing, UK,2007.

REFERENCES:

1. Whittall N S , "Laundering and Dry Cleaning", Textile Progress, Manchester, 1996.
2. Heywood D , "Textile Finishing", Woodhead Publishing, UK, 2003.
3. Hall A J , "Textile Finishing", Elsevier, USA, 1996.
4. Nomeia D Souza , "Fabric Care", NewAge International, Chennai, 1998.

19H405 PATTERN ENGINEERING AND GARMENT CONSTRUCTION II

3 0 0 3

CHILDREN'S WEAR : Body measurements, categories, selection of thread, colour, material, trims and accessories. Pattern making and construction process — Baba suit, rompers, tank top jumpsuits, snow suits, A- line dress, pinafore, cardigan jacket. (9)

MEN'S WEAR : Body measurements, categories, selection of thread, colour, material, trims and accessories. Pattern making and construction process –trouser and its variation, leisure wear, dungarees, shirts, blazers. (9)

WOMEN'S WEAR : Body measurements, categories, selection of thread, colour, material, trims and accessories. Pattern making and construction process- skirt types: tier skirt, peplum, godet , circular, pleated, cascade wrap and uneven circular skirt, pant types: culottes, capri and palazzo, dress, strapless princess torso foundations, double breasted coat, knit wears- leotard. (9)

METHODS OF FITTING AND EVALUATION : Proportion and disproportion of human figure. Fit- importance, standards, methods of testing fit- fit models, measured methods, tissue fitting methods and trial garment, fit evaluation- structural line, grain line, wrinkles, pinch test and inside measurement. (9)

PATTERN AND GARMENT FIT : Pattern alteration- importance, principles, pattern alteration for different types of garments and irregular figures. Garment fit- evaluation techniques, fitting problem & analysis, length, back, shoulder, sleeve, neckline, bust & upper body. (9)

Total L: 45

TEXT BOOKS:

1. Helen Joseph and Armstrong , "Pattern Making for Fashion Designing", Prentice Hall, Newyork, 2004.
2. FanJ, YuW and Hunter L , "Clothing Appearance and Fit", Wood head Publishing Limited, England,2004.

REFERENCES:

1. Connie Amaden Crawford , "A Guide to Fashion Sewing", Fairchild Publications, New York, 1999.
2. Marie Clayton , "Ultimate Sewing Bible — A Complete Reference with Step-by-Step Techniques", Collins & Brown, London, 2008.
3. Sandra Betzina , "Fast fit — Easy pattern alterations for every figure", The Taunton Press, USA, 2001.

19H410 APPAREL PRODUCTION LABORATORY II

0 0 4 2

DESIGNING, DRAFTING, CONSTRUCTION AND FIT ANALYSIS OF THE FOLLOWING GARMENT STYLES :

1. Ladies skirt and top
2. Kameez and salwar
3. Saree blouse
4. Round neck T-shirt
5. Woven full sleeve shirt
6. Woven trouser
7. Blazer

Total P: 60

REFERENCE:

1. Department of Fashion Technology , "Apparel Production Laboratory II Manual", 2019.

19H411 COMPUTER AIDED FABRIC SIMULATION LABORATORY**0 0 4 2****SIMULATION OF PRINTED AND WOVEN FABRIC DESIGNS USING SOFTWARE:**

1. Introduction about computer aided fabric simulation software, tools and their applications.
2. Development of symmetric and asymmetric designs using motifs.
3. Importing of designs from different sources and manipulation for design development.
4. Creation of multi-colour print designs with technical specification for screen printing.
5. Simulation of simple colour and weave effects — Houndstooth, Dog's tooth and Bird's eye patterns.
6. Simulation of technical striped designs and their variations based on colour and weave combinations.
7. Simulation of technical checked designs and their variations based on color and weave combinations.
8. Development of dobby designs and simulation of fabric based on dobby capacity.
9. Development of jacquard designs based on jacquard capacity- Border, Body and Pallu designs for sarees.
10. Simulation of silk saree based on commercial jacquard fabric specifications.
11. Development of motifs for spot figuring based on fabric specifications.
12. Development and simulation of ogee and sateen based all over designs for home textiles.
13. Texture mapping of woven and printed fabrics for apparels and home textiles.
14. Demonstration of commercial textile CAD Software application in fabric simulation.
15. Portfolio development.

Total P: 60**REFERENCE:**

1. Department of Fashion Technology , "Computer aided fabric simulation laboratory manual", 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 the Parliament and their functions; Composition of State Legislature; Powers, Functions and Position of Governor, Function 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 , "Introduction to the Constitution of India", 20th Edition, Prentice Hall of India, New Delhi, 2011.

REFERENCES:

1. Brijji Kishore Sharma , "Introduction to the Constitution of India", 8th Edition, Prentice Hall of India, New Delhi, 2017.
2. Hoshier Singh , "Indian Administration", 1st Edition, Pearson Education, New Delhi, 2011.
3. Jain M C , "The Constitution of India", 5th Edition, State Mutual Book & Periodical Service, Limited, New Delhi, 1988.
4. Shukla V N , "Constitution 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.

19H414 FASHION DESIGN LABORATORY

0 0 4 2

FASHION ILLUSTRATION AND RENDERING :

1. Practice on Colouring mediums and techniques used for fashion designing
2. Study on Drapes and practice on rendering of woven, knits and Non-woven
3. Illustration and rendering of styles of collar, cuff and sleeve
4. Illustration and rendering of styles of yoke, neckline and pocket
5. Illustration and rendering of flat sketches of kid's garment applying elements and principles of design
6. Illustration and rendering of flat sketches of women's garment applying elements and principles of design
7. Illustration and rendering of flat sketches of men's garment applying elements and principles of design
8. Illustration and rendering of accessories — glares, belts, bags, jewellery and footwear
9. Rendering clothing composition on figure with various garment details
10. Identifying inspiration and developing research board for the identified inspiration
11. Developing a story board and moodboard for the identified inspiration
12. Developing a colour board and fabric board for the developed mood board
13. Developing a collection for any category from the developed boards
14. Portfolio presentation

Total P: 60

REFERENCE:

1. Department of Fashion Technology , "Fashion Design Laboratory Manual", 2019.

SEMESTER - 5

19H501 APPAREL QUALITY EVALUATION

3 0 0 3

FABRIC QUALITY EVALUATION : Fabric sampling, standard atmospheric conditions for apparel testing, sling hygrometer, tensile strength, tear strength, bursting strength. Abrasion and pilling resistance. Flammability regulatory testing: significance, mandatory county regulations, protocol of vertical flammability, 45° flammability and cigarette flammability testing, material compliance for apparel, upholstery and carpets, requirements of adult and children's sleepwear. (9)

APPAREL PERFORMANCE TESTING : Dimensional stability testing, spirality. Print and sequins durability evaluation, colour fastness to washing, light, sublimation. seam strength and seam slippage. Analysis of sewability. care labelling: standards for care label instructions, verification of care label, interpretation of care label, tolerance for fibre composition analysis, interpretation of test reports. (9)

GARMENT SAFETY : Consumer product safety regulatory. torque test, tension test, impact test, sharp point, sharp edge, small parts testing and draw string regulation. Accessory testing - zipper endurance, button impact testing, snap pull strength testing. Comfort and handle evaluation: Air permeability, moisture management tester, water vapour permeability, drapability, stiffness, crease recovery testing method. (9)

FABRIC AND IN-PROCESS INSPECTION : Inspection and its significance. Fabric Inspection — 4 point and 10 point system. Different types of defects in fabrics. Quality parameters and their control in pattern making, cutting and sewing. Root cause analysis for defects. quality control of trims and accessories, instrumental shade sorting. (9)

APPAREL QUALITY INSPECTION : Acceptable quality level (AQL) — sampling plan, level of inspection, acceptance criteria. arbitrary sampling. selection of samples, categorization of critical, major and minor defects, measurement tolerances and standard for finished garment. seven tools of quality control — cause and effect diagram, control chart and pareto analysis. (9)

Total L: 45

TEXT BOOKS:

1. Subrata Das , "Product Safety and restricted Substances in Apparel", 2nd Edition, Woodhead Publishing, England, 2016.
2. Jinlian HU , "Fabric testing", 1st Edition, Woodhead Publishing, England, 2008.

REFERENCES:

1. Saville , "Physical Testing of Textiles", 1st Edition, Woodhead Publishing, England, 2004.
2. Das S , "Quality Characterisation of Apparel", 1st Edition, Woodhead Publishing, England, 2012.

19H502 APPAREL MARKETING MANAGEMENT

3 0 0 3

MARKETING : Marketing concepts-Production, product, selling, marketing and societal marketing, marketing management, strategic marketing process, competitive marketing strategy — market leader, challenger, follower and nicher. Segmentation —bases and segmentation variables , patterns of segmentation. (9)

MARKETING RESEARCH AND MEASUREMENT : Target marketing — Differentiated, undifferentiated and concentrated. Market Research -purpose, procedure and applications. Market potential — estimation. Market demand — methods of forecasting demand. Factors affecting consumer buying behaviour. Buying process. (9)

MARKETING MIX : Product- hierarchy, line and branding decisions, price - pricing decisions and procedures, promotion mix - advertising : message and appeal , media selection, measuring effectiveness, publicity, sales promotion and distribution, marketing channel, functions, various marketing systems. (9)

PRODUCT LIFECYCLE & NEW PRODUCT DEVELOPMENT : Patterns of life cycle, Life cycle of product — introduction, growth, maturity and decline. Marketing strategy for various stages of life cycle. New product development —Stages of new product development, challenges in NPD. (9)

DIGITAL MARKETING : B2C, B2B, C2B and C2C, e-marketing objectives, adding digital value to product, QR codes, Search Engine Optimisation (SEO), Pay Per Click (PPC) search marketing, managing pay per click , social media marketing , online partnerships, interactive advertising, viral marketing. E-business security. Web analytics : Metrics and KPI s-Page views , visits and visitors, quantitative and qualitative indicators , digital dashboards- stages in building dashboards, constructing and launching. (9)

Total L: 45

TEXT BOOKS:

1. Philip Kotler, Kevin Lane Keller, Abraham Koshy, and MithileshwarJha , "Marketing Management A South Asian Perspective", Pearson Education,, New Delhi,, 2006.
2. Dave Chaffey and PR Smith , "E marketing Excellence - Planning and optimizing your digital marketing", Taylor & Francis, London,, 2013.

REFERENCES:

1. Dr.K.Karunakaran , "Marketing management", , Himalaya Publishing House,, Mumbai,, 2015..
2. Simon Kingsnorth , "Digital Marketing Strategy: An Integrated Approach to Online Marketing", Kogan page Ltd,, UK,, 2019.

19H503 APPAREL COSTING

3 1 0 4

COST ACCOUNTING: Elements of cost — Material, labour and expenses, direct and indirect costs. Classification of cost. Determination of factory cost, administration cost, sales cost and manufacturing cost. Cost sheet, cost sheet with inventory. Methods of costing — Job costing and process costing. Process costing - normal loss, abnormal loss and abnormal gain. (9+3)

OVERHEADS AND MATERIAL COST : Overheads distribution — primary distribution. Re distribution of overheads — secondary distribution of overheads, simultaneous equation method and trial and error method. Cost control measures in apparel industry. MATERIAL COST: Estimation of yarn consumption for knitted and woven fabric, yarn and fabric cost. Determination of gram per square meter (GSM) - knitted and woven fabric. Estimation of fabric consumption and cost per garment - woven and knitted. (9+3)

PROCESS COST : Estimation of warping, sizing and weaving and knitting cost — cost calculations per pick, square meter, kilogram, garment. Preparatory and dyeing cost — influencing factors, labour, material and overhead cost. Processing cost per meter (woven), kilogram (knitted) and for order quantity. Printing and finishing cost - influencing factors, labour, material and overhead cost, cost estimation per garment and order quantity. Overall fabric cost calculations. (9+3)

GARMENT COST : Cutting cost — influencing factors — number of components, bundle size. Estimation of labour, material and overhead cost, cost per garment. Sewing cost — labour, material and overhead cost, cost per garment, trimming and checking cost, packing cost — labour, material and overhead cost, machinery rental cost, cost per

garment. cut make trim (CMT), cut make and pack (CMP) costs. Costing difference in domestic and export orders. Developing cost sheet for different styles (9+3)

SHIPMENT COST : Shipment process sequence and procedures, influencing factors. International commercial (INCO) terms - FOB, EXW, CFR, CIF, CF, FAS, CPT. Importance of INCO terms with shipment and forwarding cost, shipment and forwarding cost estimation — freight charge, ICD charges, container charges and total shipping and forwarding cost. Total cost estimation for an order — different garment styles. Goods and Service Tax. Break even analysis — breakeven point calculation and chart. Cost ratio, cost volume profit analysis. Budgeting — principles, types and limitations. Performance and zero base budgeting. (9+3)

Total L: 45 +T: 15 = 60

TEXT BOOKS:

1. Jain S.P, Narang K.L., Aggrawal Simmi , "Cost Accounting Principles and Practice", Kalyani Publishers, New Delhi, 2016.
2. R.Rathinamoorthy, R.Surjit , "Apparel Merchandising", Woodhead Publication India Pvt Ltd, New Delhi, 2018.

REFERENCES:

1. M.Krishnakumar , "Apparel costing", Abishek Publications, Delhi, 2008.
2. Michael Jeffrey, Nathalie Evans , "Costing for the Fashion Industry", Berg publisher, NY, 2011.
3. Tulsian P.C., Tulsian Bharat , "Cost Accounting", 2nd Edition, S. Chand Publishing, New Delhi, 2011.
4. P. V. Bhave, V. Srinivasan , "Cost Accounting in Textile Mills", 1st Edition, Ahmedabad Textile Industry's Research Association,, Ahmedabad, 1974.

19H504 INDUSTRIAL ENGINEERING

2 1 0 3

INDUSTRIAL ENGINEERING : Definition, scope, techniques, roles of industrial engineer, functions of IE department in apparel industry. Productivity - Definition, measurement methods, causes for low productivity, suggestions for improvement: Industrial engineering and lean manufacturing techniques. Work study- Definition, techniques, procedure. Basic work content and added work content, reduction of work content and ineffective time. Work study and productivity. (6+3)

METHOD STUDY : Definition, procedure, process chart and symbols, charts indicating process sequence- outline process chart, flow process charts (man, material and equipment types); charts using time scale —multiple activity chart; Diagrams indicating movement — flow diagram, string diagram, cycle graph, chrono cycle graph, travel chart, examples from apparel industry. Operation analysis, motion analysis, motion economy, two handed process chart, micro motion analysis — SIMO Chart. Principles for improving operation methods, examples from apparel Industry. (6+3)

WORK MEASUREMENT : Definition, procedure, techniques - time study: equipments, forms, procedure, rating, allowances and standard time; predetermined motion time standards (PMTS), work sampling, standard data- general sewing data (GSD). Examples from apparel industry. Standard Allowed Minute (SAM) range for various styles of garments .Applications- capacity study, operation bulletin (OB), incentive calculation. (6+3)

WORK ENVIRONMENT & SERVICES : Work environment: Lighting, ventilation, climatic condition — temperature control, humidity control, noise control, safety and ergonomics. Services- physical plant, production, personnel, administration, convenience related. (6+3)

PLANT LAYOUT & MATERIAL HANDLING : Layout: Objectives, layout planning and development, types of layout — fixed, process, product, group and combination; layout for apparel industry. Material handling: Objectives, classifications of material handling equipments, descriptions and characteristics of material handling equipments, specialized material handling equipments used in apparel industry. (6+3)

Total L: 30 +T: 15 = 45

TEXT BOOKS:

1. George Kanawaty, ILO , "Introduction to Work study", Universal Publishing Corporation, Mumbai, 2005.
2. Kiell B.Zandin , "Maynard's Industrial Engineering Hand Book", Mc Graw Hill, Inc, New York, 2001.

REFERENCES:

1. Chuter A J , "Introduction to Clothing Production Management", Blackwell Publishing, Oxford, UK, 2007.
2. Colovic.G , "Management of technology systems in garment industry", Woodhead publishing India Pvt Ltd, New Delhi, 2010.
3. Rajesh Bheda , "Managing Productivity of Apparel industry", CBI publishers and Distributors, New Delhi, 2002.
4. Ramesh Babu V , "Industrial engineering in apparel production", Woodhead publishing India Pvt Ltd, New Delhi, 2011.

19H510 COMPUTER AIDED FASHION DESIGNING LABORATORY

0 0 4 2

PERFORMING THE FOLLOWING EXPERIMENTS USING SOFTWARE:

1. Introduction about computer aided fashion designing software, their tools and applications.
2. Illustration and rendering of collars, cuffs and sleeves.
3. Illustration and rendering of yokes, necklines and pockets.
4. Illustration and rendering of accessories with specifications.
5. Illustration and rendering of kids garment with technical details.
6. Illustration and rendering of men's wear with technical details.
7. Illustration and rendering of women's wear with technical details.
8. Introduction about fashion forecasting process and trend forecasting services.
9. Development of story board and mood board based on trend forecast for the given season for men's wear/women's wear/kids wear.
10. Development of fabric board and colour board based on trend forecast for the given season for men's wear/women's wear/kids wear.
11. Development of accessory board and silhouette board based on trend forecast for the given season for men's wear/women's wear/kids wear.
12. Development of design board for men's wear/women's wear/kids wear based on trend forecast for the given season.
13. Development of design board for home textiles based on trend forecast for the given season.
14. Development of technical specification sheet for men's wear/women's wear/kids wear.
15. Portfolio presentation.

Total P: 60

REFERENCE:

1. Department of Fashion Technology, "Computer aided fashion designing laboratory manual", 2019.

19H511 ACCESSORIES AND EMBELLISHMENT LABORATORY

0 0 4 2

SURFACE EMBELLISHMENT & ACCESSORY DEVELOPMENT :

1. Practice on Basic hand embroidery stitches -a) Linear stitches b) Pattern stitches c) Filling stitches d) Textural stitches e) Threaded stitches
2. Practice on Traditional Indian embroideries -a) Kantha b) Kasuti c) Kutch d) Phulkari e) Chikankari
3. Design development on fabric by embroidery machine
4. Design development on fabric by bead work, mirror work and Zardosi
5. Appliqué & Patch work
6. Quilting — corded & wadded
7. Preparation of tassels, fringes and pompom
8. Hand and machine smocking
9. Fabric painting —Filling, water shading and folk art
10. Jewellery making - Chain, bracelet and earrings
11. Demonstration of computerised embroidery machine

Total P: 60

REFERENCE:

1. Department of Fashion Technology , "Accessories and surface embellishment laboratory manual", 2019.

19H512 APPAREL QUALITY EVALUATION LABORATORY

0 0 4 2

PERFORMING THE FOLLOWING EXPERIMENTS AS PER ASTM/ISO INTERNATIONAL STANDARDS AND DETERMINING THE NORMS FOR COMMERCIAL ACCEPTANCE :

1. Determination of apparel seam strength and seam slippage.
2. Determination and analysis of fabric tensile characteristics.
3. Determination of stretch and recovery of knits and stretch denim.
4. Determination of fabric bursting strength and tearing strength.
5. Determination of flammability for children wear and sleep wear
6. Determination of fabric drape co-efficient
7. Determination of fabric abrasion resistance and air permeability
8. Determination of fabric pilling resistance
9. Determination of stiffness and crease recovery
10. Determination of apparel dimensional stability.
11. Determination of button impact, button and snap pull strength
12. Determination of zipper endurance
13. Determination of color fastness properties — perspiration
14. Determination of color fastness properties - sublimation fastness
15. Analyse and validate garment safety test — torque, sharp point, sharp edge test & small part testing.

Total P: 60

REFERENCE:

1. Department of Fashion Technology , "Apparel quality evaluation laboratory manual", 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**19H601 APPAREL MERCHANDISING****3 1 0 4**

MERCHANDISING : Role of merchandising department. Merchandiser: responsibilities, classifications, steps in receiving an order, technical specification sheet interpretation, sampling procedure. Merchandising department - interface with other departments, terminologies used. (9+0)

ROLE OF MERCHANDISER : Concept of fashion forecasting, apparel line and seasons, steps in fashion forecasting. Line planning: fashion forecasting techniques - market research, consumer research, product research, fashion research - trend research, colour research. Line development - fabric and trims selection, prototyping, pre-costing, final product development. Line presentation. Line adoption, apparel analysis, market/customer profiling. (9+5)

PLANNING AND ORDER EXECUTION : Planning: elements, calendar planning/time and action planning, activities, order scheduling methods. Consumptions: yarn, fabric and sewing threads, GSM calculation. Cut quantity estimation — size wise and colour wise. Production departments: capacity planning and calculation, operator efficiency and operation bulletin development, line efficiency calculation, production scheduling. ERP systems — applications and uses. (9+5)

SOURCING : Process, types, role of merchandiser, factors influencing sourcing. Sourcing centers - international and domestic. Sourcing lead time, supplier types, vendor management and evaluation criteria's. Communication skills for merchandiser: Importance, objectives, types, barriers. Documents: intra factory communication, export and import documents, commercial, principle and auxiliary documents, regulatory documents. (9+0)

COSTING : Cost calculation: yarn, pre treatment, knitting/ weaving, processing, dyeing, printing and surface ornamentation. Estimation of cutting, sewing, trimming, checking, packing and shipment cost. (9+5)

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

1. Grace Kunz , "Merchandising theory, principles and practice", Fair Child Books,, New York,,2005..
2. R.Rathinamoorthy, R.Surjit , "Apparel Merchandising", Woodhead Publication India Pvt Ltd, New Delhi, 2018.

REFERENCES:

1. Grace I. Kunz, Ruth E. Glock , "Apparel Manufacturing: Sewn Product Analysis", 4th Edition, Prentice Hall, India, 2004.
2. Evelyn C Moore , "Math for Merchandising", Wiley Eastern Inc, India, 1999.
3. Solinger Jacob , "Apparel Manufacturing Analysis", 1st Edition, Columbia Boblin Media,, USA, 1988.
4. Jeremy A. Rosenau, David L. Wilson , "Apparel Merchandising: The Line Starts Here", 3rd Edition, Fairchild books, NY, 2014.

19H602 APPAREL PRODUCTION PLANNING AND CONTROL

2 1 0 3

PRODUCTION PLANNING & CONTROL : Definition, objectives and functions of production planning and control department , importance of SAM value on production planning, Overview of pre production functions , purpose and procedure of conducting pre-production meeting– sampling stages in apparel manufacture, steps from prototype to production model, apparel analysis , determination of order quantity for a style. (6+3)

CUT ROOM AND PRODUCTION SYSTEMS PLANNING : Cut order Planning - types of spreads, spreading methods, fabric utilization in cut room. Calculation of size wise cut quantity from size ratio, economic cut quantities. Control measures in cutting department. Production systems-whole garment , progressive bundle ,unit and multiple flow , modular systems. Guidelines for choosing suitable production system. Garment breakdown with machine & attachment details - flow process grid construction, sewing line lay out planning. (6+3)

PLANT LOADING AND CAPACITY PLANNING : Determination of machinery requirements for a new factory, calculation of labour requirements. Line balancing techniques — line and operator efficiency, balance control. Establishing factory capacity, planning for multi style production — preparation of planning board. Subcontracting — reasons. (6+3)

PRODUCTION SCHEDULING : Principles of scheduling, scheduling charts- master schedule , GANTT chart, backlog graph for WIP control, scheduling control techniques. Network representations - CPM and PERT. Preparation of time and action calendar. (6+3)

PRODUCTION CONTROL AND MATERIALS MANAGEMENT : Control measures in production department — cutting order, bundle ticket, stickers, daily and hourly production reports, efficiency and productivity report, manpower and machine utilization, material inventory report. Manufacturing Resources Planning (MRP), Just In Time production system (JIT), Optimised Production Technology (OPT), Economic Order Quantity (EOQ),inventory control, various inventory modeling, production planning software for garment manufacture. Case studies related to apparel Industry. (6+3)

Total L: 30 +T: 15 = 45

TEXT BOOKS:

1. Rajesh Bheda , "Managing Productivity of Apparel industry", CBI publishers and distributors,, New Delhi, 2002..
2. David J Tyler , "Materials Management in Clothing Production", Prentice Hall,, New Jersey,, 1991.

REFERENCES:

1. Chuter AJ , "Introduction to clothing production management", Blackwell Publishing, India, 2004.
2. Glock R E and Kunz G I , "Apparel Manufacturing - Sewn Product Analysis", second edition,, Prentice Hall,, 1995.

19H603 FABRICS FOR FASHION

3 0 0 3

FASHION FABRICS : Designers terms, fabric orientation — influence on drape, texture & colour. types of fibres used in fashion fabrics, properties and application. yarn dyed, piece dyed, pre-fibre dyed, fibre dyed, garment dyed - special features and applications. fabric clusters in India. Types of prints — screen, rotary, roller, digital printing. Fabrics - lawn, calico, high density fabrics, broadcloth, poplin, surface shine cire, chintz. (9)

STRUCTURE FABRICS : Design features, drape, weight, strength, weakness and commercial applications - oxford, seersucker, checks and madras plaids, shantung, tweeds, dobby weaves, taffeta, faille and bengaline, sateen, bridal satin, flannel, flannelette, linen, sheeting, muslin, canvas, homespun, hopsacking, denim, gabardine, chino, serge, ripstop, jacquard brocade, velveteen, corduroy, brushed fabrics, coated fabrics, leather, suede leather, bonded and fused fabric. (9)

FLUID FABRICS : Design features, drape, weight, strength, weakness and commercial applications - chiffon, georgette, voile, gauze, lining, satin, crepe de chine, crinkled fabric, challis, surah, jersey, interlock, matte jersey, fine gauge jumper knits, pointelle knits, mesh, tricot, traditional lace, mass market lace, lame, satin crepe, French terry, fleece, polar fleece, velour, velvet. (9)

EXPANSION FABRICS : Design features, drape, weight, strength, weakness and commercial applications - organza, organdy, netting, crinoline, buckram, pleated silk fibre fabrics, pleated cotton fibre fabrics, polyester plain weave pleated fabrics, crepe and satin crepe pleated fabrics, stitched pleating, shirring, boucle, chenille, terry cloth, minimum loft quilting, medium loft quilting, high loft quilting, fur apparel, repurposed fur, faux fur, exotic faux fur. (9)

COMPRESSION FABRICS : Design features, drape, weight, strength, weakness and commercial applications - compression with rigid fabrics, ribbed knits, elastic ribbed knit banding, stretch denim, comfort stretch — top weights, casual woven, stretch suiting, comfort stretch double knits, power stretch athletic knits, elastic power mesh, narrow elastic bands. ornamentation fabrics: facts, performance and care - contrast fabric shapes, creating lines and outlines with fabrics, functional tapes, passementerie trim, fringes, velvet decorative ribbon, grosgrain decorative ribbon, jacquard decorative ribbon, narrow novelty trims, allover embroidered fabric, garment specific embroidery, embroidered denim. (9)

Total L: 45

TEXT BOOKS:

1. Gail Baugh , "The Fashion Designer's Textile Directory: The Creative Use of Fabrics in Design", 3rd Edition, Thames and Hudson Ltd, United Kingdom, 2019.
2. Stefanella Sposito , "Fabrics in Fashion Design: The Way Successful Fashion Designers Use Fabrics", 1st Edition, Promopress, United Kingdom, 2017.

REFERENCES:

1. Clive Hallett , "Fabric for Fashion: The Complete Guide: Natural and Man-made Fibers", 1st Edition, Laurence King Publishing, London, 2014.
2. Amanda Johnston , "Fabric for Fashion: A Comprehensive Guide to Natural Fibres", 1st Edition, Laurence King Publishing, London, 2010.

19H610 METHODS ENGINEERING LABORATORY**0 0 4 2****ENGINEERING OF WORK METHODS AND MEASUREMENT OF WORK IN APPAREL MANUFACTURE USING INDUSTRIAL ENGINEERING TECHNIQUES:**

1. Analysis of sewing operations in the construction of basic t-shirt and development of two handed process chart for existing and improved operation methods.
2. Analysis of sewing operations in the construction of basic t-shirt and development of simultaneous motion cycle (SIMO) chart for existing and improved operation methods.
3. Analysis of spreading operation and development of element sheet for the determination of standard allowed minute (SAM) value and target production using time study technique.
4. Analysis of cutting operation and development of element sheet for the determination of standard allowed minute (SAM) value and target production using time study technique.
5. Analysis of sewing operation and development of element sheet for the determination of standard allowed minute (SAM) value and target production using time study technique.
6. Analysis of packing operation and development of element sheet for the determination of standard allowed minute (SAM) value and target production using time study technique.
7. Engineering operation sequence for men's basic t-shirt and calculation of standard allowed minute (SAM) value and target production using predetermined time standards (PMTS) with software.
8. Engineering operation sequence for a men's shirt and calculation of standard allowed minute (SAM) value and target production using predetermined time standards (PMTS) with software.
9. Engineering operation sequence for a women's wear and calculation of standard allowed minute (SAM) value and target production using predetermined time standards (PMTS) with software.
10. Engineering operation sequence for a kids wear and calculation of standard allowed minute (SAM) value and target production using predetermined time standards (PMTS) with software.
11. Preparation of operation bulletin and development of sewing line layout for a style of garment for the given data.

Total P: 60**REFERENCE:**

1. Department of Fashion Technology , "Methods engineering laboratory manual", 2019.

19H611 DIGITAL PATTERN DESIGN AND MARKER DEVELOPMENT LABORATORY**0 0 4 2****PERFORMING THE FOLLOWING EXPERIMENTS USING PATTERN DESIGN SOFTWARE :**

1. CAD Drafting of patterns for Men's T shirt using specification sheet
2. CAD Drafting of patterns for Men's Shirt with yoke using specification sheet
3. CAD Drafting of patterns for Kids wear and Men's Trouser using specification sheet
4. CAD Drafting of patterns for Princess line Salwar Kameez with godets
5. Grading the Men's T shirt pattern developed for the given sizes
6. Grading the Men's shirt pattern developed for the given sizes
7. Grading the Kids wear and Men's Trouser pattern developed for the given sizes
8. Grading the Princess line Salwar Kameez pattern developed for the given sizes
9. Developing marker for the graded Men's T shirt and Kids wear in solid colour knitted fabric
10. Developing marker for the graded Men's Shirt and Trouser in solid colour woven fabric based on size ratio and order quantity
11. Developing marker for the graded Salwar Kameez pattern in striped / checked fabric
12. Digitizing the flat pattern to computer system
13. Demonstration on plotting the drafted pattern

Total P: 60**REFERENCE:**

1. Department of Fashion Technology , "Apparel CAD Laboratory Manual", Coimbatore, 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.

19H620 INNOVATION PRACTICES

0 0 4 2

THE INNOVATION PRACTICES INVOLVES THE FOLLOWING :

1. Problem identification
2. Development of Innovative products/Process/Theme based garments with innovative features
3. Preparation of a project report/Portfolio and specification sheet for the garment developed

Total P: 60

SEMESTER - 7

19H701 RETAIL MANAGEMENT

3 0 0 3

RETAILING AND ITS ORGANISATION : Characteristics and functions, trends, types, retailing channels, international fashion retailer strategy, challenges in retail business. Organisation structures of fashion retailing - single unit specialty store, small department store, large department store, human resource management in retailing. (9)

CONSUMER BEHAVIOUR : Types and levels of consumer decision making. Factors affecting consumer decision making- consumer demographics, lifestyle, shopping attitude, perception, learning and behaviour. Consumer profiling and 'Retailment', customer relationship management. (9)

RETAIL LOCATION, DESIGN : Location — types, choice, location and site evaluation. Store layout — type, feature areas. Space planning – location of departments and merchandise, planograms, retail performance measures. Experiential retailing. (9)

MERCHANDISE MANAGEMENT AND ANALYTICS : Components of merchandise management — Merchandise planning - Inventory turnover. Sales forecasting - Collaborative planning forecasting replenishment (CPFR), merchandise mix, merchandise budget plan for fashion merchandise. Retail analytics — scope, ways for optimising marketing, operation and merchandising decision. Analysing merchandise performance – ABC analysis, sell-through analysis, multi attribute method. (9)

RETAIL PRICING AND LATEST TRENDS IN RETAILING : Retail pricing- Pricing strategies, pricing on internet. Consumer responsiveness to prices. Latest trends - ethics and social responsibility, consumerism, subscription retailing, omnichannel retailing. E-Tailing - Scope, online retail categories, pitfalls, successful business models, security problems and solutions. (9)

Total L: 45

TEXT BOOKS:

1. Chetan Bajaj, Rajnish Tuli, Nidhi V Srivastava , "Retail Management", 3rd Edition, Oxford University press, New Delhi, 2016.
2. Michael Levy, Barton A Weitz, Dhruv Grewal , "Retailing Management", 9th Edition, McGraw Hill education, India, 2013.

REFERENCES:

1. Ellen Diamond , "Fashion Retailing: A Multi-Channel Approach", Pearson education, India, 2007.
2. John Fernie, Suzanne Fernie, Christopher Moore , "Principles of Retailing", Reed Elsevier India, New Delhi, 2007.
3. Margaret Bruce, Christopher M Moore, Grete Birtwistle , "International Retail Marketing - A Case Study Approach", Reed Elsevier India, New Delhi, 2006.
4. Bernadette Tieman , "E-Tailing", Dearborn Financial publishing, Chicago, 2000.

19H702 SCIENCE OF CLOTHING COMFORT**3 0 0 3**

FUNDAMENTALS OF CLOTHING SCIENCE AND COMFORT : Clothing science - importance and prospects. Clothing performance characteristics — comfort, durability, handle and tailorability. Clothing comfort - introduction, components, wearers attitude, internal and external factors. Comfort properties of textile fibres (9)

THERMAL COMFORT : Human thermal comfort; physics and physical phenomena. Heat transfer- effect of fabric properties. Moisture vapour permeability, liquid moisture permeability; absorbency, wettability, waterproof breathable fabrics, contact angle, moisture management. Air permeability; influencing factors, thermal degradation, thermal conductivity. (9)

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

PHYSIOLOGICAL AND PSYCHOLOGICAL COMFORT : Concepts of physiological clothing comfort- Factors affecting garment fit and comfort; air gap thickness, garment ventilation, fluctuating microclimate in loose-fit garment, garment fit and pressure sensation. Psychological comfort - introduction, influencing factors. Effects of colour, surface texture, garment design, sizing and fit. (9)

DIMENSIONAL STABILITY : Introduction. Hygral expansion, relaxation shrinkage, swelling shrinkage and felting shrinkage. Shrinkage in knitted fabrics, stretch and recovery properties of fabrics. (9)

Total L: 45**TEXT BOOKS:**

1. Das A and Alagirusamy R , "Science in clothing comfort", Wood head publishing Limited,, England, 2010.
2. Fan J, Yu W, and Hunter L , "Engineering apparel fabrics and garments", Wood head Publishing Limited, Cambridge, 2009.

REFERENCES:

1. Fan J, Yu W, and Hunter L , "Clothing appearance and fit: Science and technology", Wood head Publishing Limited, Cambridge, England, 2004.
2. Saville B.P , "Physical Testing of Textiles", The Textile Institute, Wood head Publishing Ltd, Cambridge, 1999.
3. Li.Y and Wong A S W , "Clothing biosensory engineering", Wood head publishing Limited, Cambridge, England, 2006.
4. Guowen song , "Improving comfort in clothing", Wood head Publishing Limited, Cambridge, 2011.

19H710 VIRTUAL GARMENTING LABORATORY**0 0 4 2****PERFORMING THE FOLLOWING EXPERIMENTS USING 3D SIMULATION SOFTWARE :**

1. Introduction to Software used for 3D simulation.
2. Creating an avatar using body measurement for men, women and children.
3. Development of specification sheet from the parametric mannequin
4. 3D Simulation of leotards
5. 3D Simulation of women's shirt and fit analysis using created avatar.
6. 3D Simulation of trouser, fit analysis and pattern alteration using 2D modification tools.
7. 3D Simulation of women's blouse with darts, fit analysis and pattern alteration using 2D modification tools.
8. 3D Simulation of circular skirt with pleats and pencil fitted skirt with slit, fit analysis and pattern alteration using 2D modification tools
9. Visual effects simulation , fabric and texture.
10. Visual effects simulation , seams and derived elements.
11. Visual effects simulation , logos, print and embroidery
12. Analyzing the influence of fabric low stress mechanical properties on fit of the garment

Total P: 60

REFERENCE:

1. Department of Fashion Technology , "Virtual Garmenting Laboratory Manual", Coimbatore, 2019.

19H711 APPAREL PRODUCT DEVELOPMENT LABORATORY

0 0 4 2

RE-ENGINEERING AND PRODUCT DEVELOPMENT :

1. Analysis of given sample and interpretation of technical specifications.
2. Analysis of fabric and construction parameters and sourcing/production of similar fabric.
3. Evaluation of fabric finishes / surface embellishments/ prints/ wash details/ and development of similar fabric.
4. Re-engineer the sample and preparation of operation bulletin, standard minute values, machine layout.
5. Development /sourcing of accessories and trims.
6. Pattern development and grading.
7. Reproduction of sample.
8. Analysis and reproduction/sourcing of packing materials/methods.
9. Costing of the garment.
10. Development of technical specification sheet.

Total P: 60

REFERENCE:

1. Department of Fashion Technology , "Product development Laboratory manual", Coimbatore, 2019.

19H712 IN - PLANT TRAINING AND PRESENTATION

0 0 2 1

REPORT PRESENTATION :

Reports are to be presented based on the observations of the students after the industry visits with their personal comments / suggestions.

Total P: 60

19H720 PROJECT WORK I

0 0 4 2

1. Identification of a real life problem in thrust areas
2. Finalisation of system requirements and specification
3. Proposing different solutions for the problem based on literature survey
4. Future trends in providing alternate solutions
5. Consolidated report preparation

Total P: 60

SEMESTER - 8

19H820 PROJECT WORK II

0 0 8 4

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 - (Product / Process / both) Testing & Validation of the developed product Learning in the Project

PROFESSIONAL ELECTIVES

19H001 FUNCTIONAL APPARELS AND CLOTHING

3 0 0 3

SMART APPARELS : Functional design of textiles, Properties — structural, aesthetic, functional and their advantages, comfort and fit, Smart manufactured fibres: properties, production techniques, application, phase change materials, shape memory polymers. Body sensor: moisture management, heat and moisture transfer properties, heat and pressure receptors. Smart clothing: design requirements for therapeutic, bio-sensing, emergency care and rehabilitation activities. (9)

PROTECTIVE WEAR : Protection against rain, heat, hazardous chemicals, cold, snow, wind and insect: material selection, finishing treatments. Clothing requirements for soldiers, fire service personnel. Protection against knives and other weapons, Clothing requirements for ballistic protection. Design requirements, factors and norms influencing protective gloves, masks, helmet, respiratory devices, eye glasses and shoes. Garment construction parameters; accessories used and ergonomic considerations. (9)

MEDICAL WEAR : Classification of medical textiles and their functions, characteristics of fibre/ yarn / fabrics for implants and non-implants, design and development of healthcare and hygiene products. Specific requirements and application of bio compatible materials, composites, non-woven hygienic products. Application: compression garments, surgical gowns, sutures, surgical dressing, tissue engineering. Specialty finishes for various medical garments. (9)

SPORTS WEAR : Current sportswear market, sustainable key features in sportswear design, clothing requirements, functional fibers, yarns and fabrics used, properties, application, principle of aero-dynamics and body movements, design requirements: yoga wear, gym suits, trekking and running wears. Biomechanical engineering of sports bra & compression stockings. (9)

FUNCTIONAL DESIGN OF SPORTS WEAR : Comfort and fit requirements for sportswear, design of moisture management fabrics, heat and moisture vapour transmission characteristics, specialty fabrics, use of accessories, clothing requirements, functional design of sport footwear, application of composites, quality standards and evaluation methods. (9)

Total L: 45

TEXT BOOKS:

1. Xiaoming Tao , "Smart fibres, Fabrics and Clothing", CRC, UK,2005.
2. Anand S.C., Kennedy J.F. Mirafab M. and Rajendran S. , "Medical Textiles and Biomaterials for Health care", CRC, UK, 2006.

REFERENCES:

1. Adanur S , "Wellington Sears Handbook of Industrial Textiles", Technomic Publishing Inc, 1995.
2. Sanjay Gupta , "Smart Textiles — Their Production and Marketing Strategies", Bhumica Printers, NewDelhi, 2000.
3. Tao X, "Smart Fibers, Fabric and Clothing", Textile Institute, 2001.
4. Richard A Scott , "Textiles for protection", The Textile Institute, England,2005.

19H002 HOME TEXTILES

3 0 0 3

TEXTILE FURNISHINGS : Market potential. Furnishings materials: types - woven, non-woven, knit. Manufacturing concepts — damask, brocade, organdy, chiffon, oxford, tapestry. Textile surface design- basic techniques. Finishes types, applications. (9)

FLOOR COVERINGS : Types - soft floor coverings: selection factors, carpet — types, properties, laying procedure; rugs: types - accent rug, scatter rug; maintenance and care. Manufacturing concepts: machine made carpet — cut pile, wilton; handmade rug —turkish, persian. (9)

WINDOW DRESSINGS : Types — doors, windows. Window treatment — selection factors, types: draperies - fabric selection, material requirement; curtains — types, design, fabric selection; valence, swag. Drapery finishing — tucks, pleats. (9)

KITCHEN AND DINING ROOM FURNISHINGS : Kitchen furnishings- types, quality requirements. Fabric selection - dishcloth, hand towels, aprons, mittens. Dining furnishings - types, fabric selection and design concept —table cloth, skirt, fabric basket, runners, napkins. (9)

BED, BATH AND LIVING ROOM FURNISHINGS : Bed linens- types, fabric selection & design concept — sheets; blankets — cover; comforts — covers; duvets; mattress — covers; pillows — covers; bed spreads, bed skirts. Bath

linens- types, quality requirements; fabric selection - towels, robes, bath rugs, maintenance and care. Living room furnishings - types, fabric selection & design concept- wall hangers; cushion- covers; upholsteries- cover; bolster- covers. (9)

Total L: 45

TEXT BOOKS:

1. Brian. D Coleman , "Luxurious Home Interiors", Gibbs Smith Publication, Hong Kong, 2004.
2. Premavathy Seetharaman and Parveen Pannu , "Interior Design and Decoration", CBS Publishers and Distributors, New Delhi, India,2005.

REFERENCES:

1. Jay Diamond and Ellen Diamond , "Fashion Apparel, Accessories and Home Furnishings", Prentice Hall, New Delhi, 2007.
2. Katrin Cargill , "Simple Curtains", Ryland Peters and Small, London, 2002.
3. Wendy Baker , "Curtain and Fabric Selector", Collins and Brown, London,2000.

19H003 ERGONOMICS FOR CLOTHING INDUSTRY

3 0 0 3

ERGONOMICS : Definition, history, standards, categories, types, micro-ergonomics and macro - ergonomics. Ergonomic conditions of work - Physiological, psycho-sociological, anthropometric and ecological conditions. (9)

ERGONOMIC PRINCIPLES : Ergonomic principles in designing : Workplace, handling material and tools, environment and determining working time. (9)

WORKPLACE DESIGN : Definition, human technological system, multidisciplinary engineering approach, human– machine system, manual, mechanical, automated system, human system reliability, conceptual design, advanced development, detailed design and development. (9)

ERGONOMICS IN WORKPLACE DESIGN : Applied anthropometry, workspace design and seating, arrangement of components within a physical space, interpersonal aspects of work place design and design of repetitive task, design of manual handling task, work capacity, stress and fatigue. (9)

ERGONOMIC DESIGN OF WORKPLACE IN GARMENT INDUSTRY : Ergonomics work place in garment manufacture - Storage of textile materials, preparation, cutting room, sewing room, finishing room, garment warehouse and distribution, clothing store and maintenance workplaces. (9)

Total L: 45

TEXT BOOKS:

1. Gordona Colovic , "Ergonomics in the garment industry", Wood head publishing India Ltd, New Delhi, 2014.
2. Bridger R S , "Introduction to Ergonomics", Taylor and Francis, London,2003.

REFERENCES:

1. Parker S, Wal T , "Job and Work Design, Organizing Work to Promote Well-Being and Effectiveness", Sage Publications, California, 1998.
2. Mark S Sanders , "Human Factors in Engineering and Design", McGraw Hil, New York, 1993.
3. Stefan Trzcielinski, WaldemarKarwowski , "Advances in Ergonomics in Manufacturing", Taylor & Francis, US, 2012.
4. Campion M.A, Medsker G J , "Job design, Handbook of Industrial Engineering", John Wiley and sons Inc, Newyork, 2001.

19H004 LEATHER APPAREL TECHNOLOGY

3 0 0 3

LEATHER TANNAGES : Leather, hide, skin, types, components and structure. preservation techniques, pre tanning processes: soaking, liming, deliming, bating, and pickling. Types of tannages: vegetable, synthetic. Post tanning operations: neutralisation, fatliquoring, bleaching, dyeing and drying of leathers, combination tanned leather (9)

TYPES OF LEATHER : Special features and applications of different types of leather - E.I tanned leather, sole leather, wet blue leather, full chrome upper leathers, upholstery leathers, chamois leather, fashion garment leathers, utility glove leathers, picking band leathers, light, heavy and Industrial leathers, lining leathers, harness, belting and saddlery leathers, football, hockey ball, cricket ball and other sports goods leathers (9)

MACHINERIES, TOOLS AND EQUIPMENTS : Machineries used in leather processing: drum, sammying machine, shaving machine, splitting machine, setting machine, spray dyeing machine, embossing, ironing and measuring machines, Tools and equipments used in leather garment preparatory and manufacturing processes : gimping scissors, wooden & iron hammer, stone slabs, skiving and spitting machines, cloth cutting machines, industrial sewing machines, button hole & button stitching machines, ironing process, types of sewing needles and sewing threads. (9)

DESIGNING AND CONSTRUCTION OF LEATHER GARMENTS : Special care during pattern making, cutting and construction of leather garments. Fabrication of leather garments- principle of cutting components, type of stitching and attachment, sequence of operation for assembly of components, accessories used. Preparation of sectional patterns, pattern sets, arrangements of patterns to minimize wastage of leathers. Types of leather garments, Leather jackets –pattern and construction sequence, Shoe: parts, selection of leather, designing and fabrication of shoes, machineries. (9)

CHARACTERISTICS AND QUALITY CONTROL OF LEATHER GARMENTS : General properties of leather such as feel, texture, strength, elongation, comfort, rub resistance, uniformity of shades, defects in skin. Types of tests carried out, testing instruments and methods. In process and final process control of leather garments. Impact of leather processing on environment and remedial measures (9)

Total L: 45

TEXT BOOKS:

1. Dutta.S S , "An Introduction to the Principles of Leather Manufacture", Indian Leather Technologists Association, Calcutta, 2002.
2. Thomas C, and Thorstensen , "Practical Leather Technology", Krieger Publishing Company, USA, 2001.

REFERENCES:

1. Sandy Scrivano , "Sewing with Leather & Suede", Lark Books, New York, 2002.
2. Sarkar.K.T , "Theory and practice of leather manufacture", Macmillan India Press, Madras, 1997.
3. Somenath Ganguly , "Comprehensive Footwear Technology", Indian Leather Technologists' Association, India, 2005.
4. Dutta.S.S , "An Introduction to the Principles of Physical Testing of Leather", Indian Leather Technologists' Association, India, 1991.

19H005 DENIM GARMENT MANUFACTURING

3 0 0 3

YARNS AND FABRICS FOR DENIM : Overview of denim production, market potential, product varieties and ranges, manufacturers & brands, Yarn: characteristics, pre-requisites, quality requirements and trouble-shooting. spinning, yarn dyeing and sizing. Lycra: properties, yarn parameters influencing denim manufacturing. Fabric: characteristics, types, fabric parameters, factors influencing denim manufacturing, fabric faults, manufacture of lycra denim, knit denims. (9)

DENIM PROCESSING : Dyes: properties and characteristics, conditions, requirements & chemistry of dyeing. Machineries: types, process variables and parameters, factors to be considered. Precautions & developments, assessment of dyed fabrics, Finishing: permanent press, preshrinking, integrated finishing and shrinking range, sanforizing, pre-drying, ammoniation & skewing, specialty finishes and novel effects, sustainable routes for denim processing. (9)

DENIM GARMENTING : Men's wear, women's wear, children's wear, style variations, construction sequence, sewing parameters, machineries used, special attachments, sewing thread specifications, factors influencing thread cost, seam & stitch parameters, trims, accessories, size & fit requirements, care labeling, fastening, pressing and inspection. (9)

DENIM WASHING : Process conditions, machineries, chemicals used for special effects: pumice stones, acid and enzyme wash, denim bleaching, biopolishing & biostoning, sand blasting, PP spray, grinding, whiskering, ozone and laser fading, Tinted denim, over dyed denim, reverse denim, pseudo denim, stretch denim, peach skin effect, quick wash denim, vintage wash, enzyme- soda wash, dextrose- caustic wash, sueding wash, golf ball wash, tie 'n' wash, marble wash and crush finish. Inspection. (9)

ADVANCES IN DENIMS : Future scope and challenges, novel denims, sustainable practices adopted by leading denim brands in their supply chain; use of circular economy in denim manufacturing; energy conservation techniques used in denim manufacturing, coating and embossing techniques applied on denims, 3D effects using resins, staining effects, patch and repair. (9)

Total L: 45

TEXT BOOKS:

1. Satsangi S S & Jai Prakash, Parmar M S , "Denim — A fabric for all", NITRA, Ahmedabad, 1996.
2. Li Y , "Denim Apparel Design, Manufacture and Finishing", CRC, UK, 2005.

REFERENCES:

1. Michael Harris , "Jeans of the Old West- A History", SCHIFFER, 2010.
2. Paul Trynka & June Marsh, Graham Marsh , "Denim: From Cowboys to Catwalks: A History of the World's Most Legendary Fabric", SAMURAI, 2005.
3. Emily Current & Meritt Elliott , "A Denim Story- Inspirations from bellbottoms to boyfriends", Fairchild, 2014.

19H006 SPECIALTY FABRICS AND TECHNOLOGY

3 0 0 3

SPECIALITY TEXTILES : Scope, fibres, yarns and fabric selection for manufacturing of speciality textiles. Fancy yarns: manufacturing concept, properties & applications - spun, spiral, diamond, gimp, chenille, cloud, knop, loop, snarl, spiral stripe. coloured yarns: solid shades, mixture shades, mixing in drawing. (9)

NARROW WIDTH FABRICS : Narrow width fabrics: material used, process of manufacture of narrow width fabrics using crochet machines, needle loom and double needle bed warp knitting machines- narrow width products: different types of tapes, laces, elastic, ribbons, labels and its properties. speciality colored yarns: twist shades, single marl, half marl and double marl. (9)

KNITTED & BRAIDED FABRICS : Weft knits: fleecy fabrics, plush structures and high pile fabrics. Warp knits: directionally oriented structures — weft insertion, co-we-knit. String vests, waffle fabrics. Braided Fabrics: classification – circular and flat braids – production techniques, properties and applications. (9)

INTERLININGS : Woven, knitted and non-woven interlinings-Interlinings for shape and support, stabilizing/stiffening, providing bulk. Requirements of fusing interlinings to garments, factors determining the properties of the fused laminate; the base fabric of the interlining, the type of fusible resin, method of applying resin to base cloth, the means of fusing (time, temperature and pressure), fusing equipment, methods of fusing, quality control in fusing. (9)

COATING TECHNOLOGY : Coating by direct method - foam finishing - foamed and crushed foam coating - transfer coating - coagulated polyurethane coating - ball licking roller technique - hot melt extrusion coating - calendar coating - rotary screen coating - fabric impregnation method. (9)

Total L: 45

TEXT BOOKS:

1. Russel.S , "Handbook of Nonwovens", 1st Edition, The Textile Institute Publication, Manchester, 2004.
2. McKenn H A, Hearle J W S, Hear NO , "Handbook of fibre rope technology", 1st Edition, Wood head publishing, Cambridge, 2004.

REFERENCES:

1. Walter Fung , "Coated and Laminated Textiles", 1st Edition, Wood head publishing Limited, Cambridge, 2000.
2. Harold Carr, Barbara Latham , "The Technology of Clothing Manufacture", 1st Edition, Blackwell Science, Oxford, 2002.

19H007 LEAN MANUFACTURING OF APPARELS

3 0 0 3

LEAN MANUFACTURE : Objectives, key principles and implications, traditional manufacturing Vs lean manufacturing, benefits. Concepts - Value creation and elimination of waste, pull production, continuous improvement , standard work. Group Technology:Production flow analysis, cellular manufacturing system. (9)

TOOLS & METHODOLOGIES : Visual controls, 5S principles, total quality management (TQM) , total productive maintenance (TPM), preventive maintenance, overall equipment effectiveness (OEE), mistake proofing, root cause analysis — fishbone diagram, takt time, 5 M's and 5 whys techniques, quick changeover/set-up time reduction, line balancing, kanban, lean six sigma. Case studies. (9)

VALUE STREAM MAPPING : Definition, purpose, symbols, current state map, and the future state map, steps involved in implementation process — goal setting, team formation, selection of process, data collection and current state map, analysis of current state map, mapping future state, creation of action plan and deployment, measurement of benefits. Case studies. (9)

JUST IN TIME MANUFACTURING : Concept, history and philosophy, main elements, characteristics, JIT-Demand pull logic, traditional systems vs JIT, benefits, steps involved in implementation process — top management commitment, steering committee, education programme, pilot project planning, employee training, pilot implementation, evaluation of the results, feedback to steering committee. Case studies. (9)

IMPLEMENTATION : Road map, senior management involvement, barriers, challenges, strategies, lean implementation process—cultural change, evaluation of the present state, educational evaluation, documentation of current conditions, redesign to reduce wastes, determination of goals, kaizen implementation and evaluation, best practices in apparel industry -case studies. (9)

Total L: 45

TEXT BOOKS:

1. Askin R G and Goldberg J B , "Design and Analysis of Lean Production Systems", John Wiley and Sons Inc, US, 2003.
2. Micheal Wader , "Lean Tools: A Pocket guide to Implementing Lean Practices", Productivity and Quality Publishing Pvt Ltd, Chennai, 2002.

REFERENCES:

1. Joseph A De Feo, William W Bearnard , "Juran Institute's Six Sigma Break Through and Beyond", Tata McGraw- Hill, New Delhi, 2004.
2. Colovic.G , "Management of technology systems in garment industry", Woodhead Publishing, India, Pvt Ltd, New Delhi, 2010.
3. John.W.Davis , "Lean manufacturing: implementation strategies that work: a roadmap to quick and lasting success", Industrial Press Inc, New York, 2009.
4. Bill Carreira , "Lean Manufacturing That Works: Power Tools For Dramatically Reducing Waste and Maximizing Profits", Prentice Hall of India, New Delhi, 2007.

19H008 APPAREL SIZE AND FIT ANALYSIS

3 0 0 3

HUMAN ANTHROPOMETRICS : Ergonomics in design of clothing. Anthropometry - selection of anthropometric data for clothing design, errors and variability in anthropometric data, selection of anthropometric design approach. Anthropometric methods - traditional and 3 dimensional methods, International standards, land marking, body measurement devices and techniques. Bodyscanning – operations, applications. (9)

ANALYSIS OF SIZING AND SHAPE REQUIREMENTS : Body shape analysis - classification of body shapes, characteristic figure differences, posture types, figure types- vertical and horizontal. Sizing and shape requirements children, male, female, old age, pregnant, footwear and intimate wears. (9)

SIZING SYSTEMS AND SIZE STANDARDISATION : Existing sizing systems- strength and weakness. Size categories - men's, women's and children's wear. Sizing system development- importance, size and shape surveys, anthropometric analysis, size analysis, key or control measurements, developing and validating sizing system, statistics used in sizing system development, apparel size designation and labeling. (9)

TESTING AND EVALUATION OF FIT : Fit -Definition, importance, standards, influences of clothing fit. Methods of testing fit- fit models, fitting futures, measured methods, pinned pattern / tissue methods, trial garment, guide to fitting problems. Evaluating fit - subjective, objective, rating scales, subjective fitting guide. Objective method- moiré optics, algebraic evaluation of clothing fit, clothing waveform, pressure evaluation of clothing fit , 3D modeling of pressure fit. Alternative methods for evaluating fit- using structural line, grain line, wrinkles, pinch test, inside measurement. (9)

INFLUENCE OF MATERIAL AND MOVEMENT ON FIT : Human performance in clothing system, wearing comfort — interaction between body motion and clothing as a shell, fit and allowance for comfort and wearability, thermal aspects of fit, effect of materials on fit and sizing, non stretch materials, stretch materials, fit assessment. (9)

Total L: 45

TEXT BOOKS:

1. Deepti gupta, Norsaadah Zakaria , "Anthropometry, sizing and design", Wood head Publishing Limited, England, 2019.
2. FanJ, YuW, Hunter L , "Clothing Appearance and Fit", Wood head Publishing Limited, England, 2004.

REFERENCES:

1. Lynn Macintyre, Mary Tilton , "Easy Guide to sewing", Taunton press, USA, 2009.
2. Sandra Betzina , "Fast Fit-Easy pattern alterations for every figure", The Taunton Press, Singapore, 2003.
3. Ashdown S P , "Sizing in clothing-Developing effective sizing system for ready to wear", Wood head Publishing Limited, England, 2007.
4. Elizabeth Liechty, Judith Rasband, Della Pottberg-Steineckert , "Fitting & pattern alteration - a multi method approach to the art of style selection, fitting and alteration", II, Fairchild books, New York, 2010.

19H009 ADVANCED WEFT KNIT DESIGN TECHNOLOGY

3 0 0 3

JACQUARD KNITTING : Weft knit patterning — objective, techniques. Jacquard- classification, weft knit pattern — needle selection devices, variable butt length needle, circular knitting machine - multi cam track; design selection for repeat - arrangement of selection area; pattern wheel — distribution of design. Electronic jacquard — pattern preparation systems. (9)

JACQUARD STRUCTURES : Single jersey — hopsack inlay, patterned structures — single jersey - one cam track structures, two cam track structures, three cam track structures, four cam track designs. Double jersey — tunnel inlay. Jacquard fabrics — two colour - hounds tooth; three colour motif creation. Rib jacquard - color jacquard; stripped backing — horizontal and vertical - two colour, three colour. Bird's eye backing - two and three colour. (9)

SPECIAL WEFT KNIT STRUCTURES : Single jersey: fleecy —three thread fleecy— knitting action, 1:1, 3:1, 2:2, double fleecy; single jersey plush - knitting action, terry - single side and double side plush. Drop stitches — one needle, two needle. Double jersey: double jersey fleecy. Rib fabrics- pleated fabrics, blister fabric. Racking- striped design, checked design. Cable stitch — design creation, aran stitch-design creation. (9)

KNITWEAR TECHNIQUE : Knitwear production - classification, stitch shaped cut, fully fashioned; integral knitting - techniques: shape generation - widening and narrowing — types. Loop transfer — objectives - techniques. Welt — types. Fully fashioned blank production in flat knitting — cardigan, slip over - knitting plan. 3D shape production techniques. (9)

ADVANCED KNITTING : Seamless knitting - applications. Intarsia stitch. Plaited fabrics - requirements, weft laying- in, 3D spacer fabrics - production principle — circular, flat knitting. Digital patterning: CAD, basic stitches – plain stitch, float stitch, tuck stitch, transfer stitch. Basic structure — plain jersey, rib, interlock and purl. (9)

Total L: 45

TEXT BOOKS:

1. David J. Spencer , "Knitting Technology - A comprehensive handbook and practical guide", Third edition, Pergamon Bros., Oxford, 2001..
2. Sadhan Chandra Ray , "Fundamentals and Advances in Knitting Technology", Second Edition, Woodhead Publishing India Pvt. Ltd, New Delhi, India, 2012.

REFERENCES:

1. Ajgaonkar D B , "Knitting Technology", Universal publishing corporation, Mumbai, 1998.
2. Anbumani N , "Knitting—Fundamentals, Machines Structures and Developments", New age International publishers, India, 2006.

19H010 APPAREL WORK STUDY

3 0 0 3

WORK STUDY : Definition, procedure, techniques, data needed: raw material data, equipment data, job condition and working condition. Importance of work study application in apparel manufacture. (9)

PROCESS ANALYSIS : Purpose, procedure, various types of process charts and diagrams-application areas in apparel manufacture, development of standard operating procedure (SOP), case studies. Operation analysis: Objectives, procedure, operation chart, check sheet, case studies. (9)

MOTION ANALYSIS : Purpose, principles of motion economy — application areas in apparel manufacture, two handed process chart- procedure, examples from sewing operations. Micro motion analysis: Therbligs, equipments, procedure, development of SIMO chart for sewing operations. Evaluation of motion study data, principles for improving operation method — cutting, sewing, pressing and packing. Scientific method of training, learning curve. (9)

WORK MEASUREMENT : Definition, procedure, techniques - time study , work sampling, predetermined time standards, standard data—general sewing data (GSD). Comparison between work measurement techniques. (9)

STANDARD TIME ESTABLISHMENT& APPLICATIONS : Calculation of standard allowed minute (SAM) in apparel manufacture : Time study technique– cutting, sewing, pressing and packing operations; PMTS technique - sewing operations; Work sampling- sewing operations and Standard data - general sewing data (GSD). Applications of work measurement in apparel manufacture. (9)

Total L: 45

TEXT BOOKS:

1. Ralph M. Barnes , "Motion and Time Study Design and Measurement of work", John Wiley & Sons, Inc, New York, 2002.
2. Jacob Solinger , "Apparel Manufacturing Handbook, Analysis, Principles and Practice", Boblin Media Corp, Columbia, 2000.

REFERENCES:

1. George Kanawaty, ILO , "Introduction to Work study", Universal Publishing Corporation, Mumbai, 2005..
2. Chuter A J , "Introduction to Clothing Production Management", Blackwell Publishing, Oxford, UK, 2007.
3. V.Ramesh babu , "Industrial engineering in apparel production", Woodhead publishing India Pvt Ltd, New Delhi, 2011.
4. Kiell. B.Zandin , "Maynard's "Industrial Engineering Hand Book", Mc Graw Hill, Inc, New York, 2001.

19H011 DRY PROCESSES FOR TEXTILE AND APPAREL INDUSTRY

3 0 0 3

DRY PROCESSES: Need and significance, problems in conventional wet processing, importance in current scenario, Dry technologies: Classification, application, outcomes and challenges, techno-economic benefits, availability of commercial scale of dry technologies in processing, merits and limitations. (9)

WATER-FREE DYEING: Need and scope of supercritical carbon-di-oxide dyeing, microwave and foam dyeing techniques. Supercritical carbon-di-oxide dyeing: Working principle, process parameters, salient features, influencing factors, energy saving techniques, techno economic benefits. Concepts related to foam dyeing techniques, micro-wave and ultrasonic assisted dyeing processes. (9)

DRY FINISHES FOR DENIMS: Scrapping, Use of laser in denim: Design development by laser fading, laser cutting and torn effect. Whiskering: Thigh, knee and hip, Tacking & grinding, patch and repairs along with bleach parts, 3D effects using laser techniques and light PP spray. (9)

NANO TECHNOLOGIES: Significance, various methods of manufacturing nano materials and their characterization, Nano-finishes - Super hydrophobicity and lotus effect, self cleaning, UV protection, Antimicrobial finishing, modern application of nano-technology in textile and apparel industry, economic and environmental benefits of nano-technology in textile processing. (9)

PLASMA TECHNOLOGIES: Types of plasma and their generation, Plasma treatment of textile for water and oil repellency, plasma dyeing techniques: Principle, merits and application. Interfacial engineering of functional textiles for biomedical applications, plasma modification of wool, plasma modification of natural cellulosic fibers, characterization of plasma treated textiles, Effect of plasma treatment on different fabric surface, plasma treatments for synthetics. (9)

Total L: 45

TEXT BOOKS:

1. Panda H, Modern Technology of textile dyes and pigments, NIIR Project Consultancy Services, 2016.
2. Clark M, "Handbook of textile and industrial dyeing –Principles, Processes and Types of Dyes", Woodhead Publishing Ltd, UK, 2011.

REFERENCES:

1. Parthiban M., Srikrishnan M.R. & Kandhavadvivu P., "Sustainability in Fashion and Apparels- Challenges and Solutions", WoodHead Publishing India (P) Ltd, 2017.
2. Tobler –Rohr M I, "Handbook of Sustainable Textile Production", Woodhead Publishing Ltd, UK, 2011.
3. Padma S Vankar, "Handbook on Natural Dyes for Industrial Applications", NIIR Project Consultancy Services, 2011.
4. Subramaniam Senthilkannan Muthu, "Handbook of Sustainable Apparel Production", Woodhead Publishing Ltd, UK, 2015.

19H012ARTIFICIAL INTELLIGENCE & INTERNET OF THINGS IN TEXTILES AND FASHION

3 003

INTERNET OF THINGS & ARTIFICIAL INTELLIGENCE:IoT – Introduction, Components and protocols, Difference between AI and IoT, Need and scope of AI & IoT in textile and apparel industry. Building blocks of Internet of Things: IoT devices, interfacing tools, sensing, actuation and communication, networking components, internet protocols, Data capturing systems, IoT application layers. Artificial Intelligence: Definition of AI , Blocks and Architecture of AI, Types of AI, Importance of AI in textile and fashion industry , Prediction analysis, Textile and Apparel Industries using AI and Ethics in AI. *Self study-Types of Sensors and actuators* (9)

ROLE OF INTERNET OF THINGS IN TEXTILES: Internet of Things for spinning, weaving and processing. Manufacturing execution systems for Textiles. Scope of IoT innovations: E-Textiles, Automated monitoring and streamlined operations using IoT for textile factories, Equipment maintenance, Weaving and embroidery machines efficiency and exiting loading of products, Challenges and future scope. (9)

ROLE OF INTERNET OF THINGS IN APPARELS: Virtual sampling tools for apparel product development, Digital and 3D printing, E-commerce, Virtual Reality, Challenges and opportunities in context of open manufacturing and industrial internet of things in apparel industry, Sustainable and flexible industrial human machine interfaces to support adaptable applications in the industry 4.0 paradigm, IoT based smart wearable garments (9)

Self Study: Application of Garment IO's cloud based software training and assessment

ARTIFICIAL INTELLIGENCE(AI) FOR TEXTILE MANUFACTURING: 3D fibre-yarn models, AI based fabric pattern inspection systems, Defect identification systems for yarns and fabrics: weaving, knitting, braiding, finishing and printing, AI tolerance for fabric color matching, AI P/F procedure for dyed samples, novel method of fabric wrinkle measurement based on image processing, future trends. (9)

Self Study: Mini projects using AI systems

ARTIFICIAL INTELLIGENCE FOR APPAREL INDUSTRY: AI algorithms for analyzing design, patterns based on styles, AI in fashion designing, AI for fashion forecasting, Automation in garment production: Process control and online monitoring: spreading, cutting, sewing and material handling, ANN for conceptualization, design development, PPC, spreading, cutting, bundling, sewing, pressing, and packaging. AI in fashion manufacturing, supply chain & fashion Store, AI in fashion retailing, AI in fast fashion, AI Fashion Stylist, Visual search model and AI for customized applications (9)

Self Study: Mini projects using AI systems

Total L: 45

TEXT BOOKS:

1. Amita Kapoor, "Hands-On Artificial Intelligence for IoT", Paperback Publications, Jan 2019.
2. Rajkishore Nayak and Rajiv Padhye, "Automation in Garment Manufacturing", Elsevier Publications, Kindle Edition, 2017.

REFERENCES

1. Artificial Intelligence on fashion and Textiles, Proceedings of the Artificial Intelligence on Fashion and Textiles (AIFT) Conference 2018, Hong Kong, July 2018
2. Bruce Sinclair, "How to Use IoT to win in the Outcome Economy", IoT Incorporation, May 2017.
3. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, —IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017.
4. ArshdeepBahga, Vijay Madiseti, Internet of Things – A hands-on approach, Universities Press, 2015.
5. Jan Ho` Iler, VlasiosTsiatsis , Catherine Mulligan, Stamatias , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence", Elsevier, 2014.

19H021 FASHION PHOTOGRAPHY**3 0 0 3**

PHOTOGRAPHY : Camera - history, parts and types. Photography tools - lens, filters, monopods, tripods, light meter, flash, power packs, camera bag, digital storage and accessories. Camera modes: manual settings - aperture, shutter speed and ISO; rule of thirds, compositions in photography, angle of view, shooting modes, white balance, depth of the field, Panning techniques (9)

LIGHTING: Lighting- direction and behaviours — front, side, back and top lights. Lighting — types of sources, type of lights - Key light, fill light, rim light, hair light, back light. Light direction and control techniques- direct light, diffused light, reflected lights. Tools in lighting — diffuser, umbrellas, soft boxes, snoots, barn doors, grids, flags, beauty dish, cobos and gels. Hard and soft lights, lighting ratio and its effects. Lighting styles — split light, catch light, loop light, rembrandt lighting, butterfly, broad, short, high and low key lighting. (9)

INDOOR & OUTDOOR PHOTOGRAPHY : Techniques and equipments, light set ups - single light, two, three, four and five point setups. Studio fashion shoots with models. Outdoor fashion shoot - technical issues. Outdoor photography: techniques and equipments, types and uses of sun lights- natural light, available light, methods of light modification on location. Shooting in direct sunlight, open shade, deep shade, use of flash and technical issues. (9)

PHOTO MANIPULATION TECHNIQUES : Technical retouching. Photo editing software - tools and their applications. Removal of skin blemishes, wrinkles, skin smoothening, eye colour change, hair colour change, teeth whitening, object colour change, background change. Creative retouching – methods, applications. (9)

PHOTOGRAPHIC STYLES : Importance of face shapes, body shapes. Posing and styling, body language — women, men, taking up space, standing poses, sitting poses, lying poses. Styling for fashion photography, difficult features and lighting. Photographic styles - High dynamic range, time laps, macro, multiple exposure, abstract, vintage, tilt- shift. (9)

Total L: 45**TEXT BOOKS:**

1. Michael Langford , "Starting Photography", Focal Press, India, 2007.
2. Jeff Rojas , "Photographing Women - posing, lighting, and shooting techniques for portrait and fashion photograph", Rocky Nook Inc, CA, USA, 2016.

REFERENCES:

1. Eugénie Shinkle , ""Fashion as photograph: viewing and reviewing images of fashion", Palgrave Macmillan, England, 2008.
2. Olivier Gerval Richmond Hill , "Fashion: concept to catwalk", FireflyBooks, USA, 2010.

19H022 GARMENT TRIMS AND ACCESSORIES**3 0 0 3**

DECORATIVE TRIMS : Importance, classification, factors affecting choice of trims and accessories. Decorative trims: types, functions, material, cost, manufacturers and suppliers- appliques, laces, ribbons, tapes, webbings, cords, garment labels. (9)

CLOSURE TRIMS : Types, functions, material, cost, manufacturers and suppliers- buttons, buckles, clips, elastics, grommets, hook and eye, hook and loop, eyelets, frogs, rivets, snaps, velcro and zippers. Manufacturing techniques- synthetic buttons, zipper, velcro. (9)

SUPPORT TRIMS : Types, functions, material, cost, manufacturers and suppliers- collar stays, corsets, interfacing, interlining, linings, shoulder pads, sleeve heads, suspenders, underwire and waistbands (9)

CASUAL WEAR ACCESSORIES : Footwear, Belt, Handbag — types, materials, component parts, concept to construction, judging the fit, care instruction, brand and cost analysis. Jewellery — types, stone settings, production techniques. (9)

FUNCTIONAL ACCESSORIES : Eyewear – types and materials of frames and lens, cost. Scarves – material, types, cost. Gloves - component parts, construction, types. Hat — types, material, basic hat construction. Hosiery — material, types, application (9)

Total L: 45

TEXT BOOKS:

1. Jay Diamond and Ellen Diamond , "Fashion Apparel, Accessories and Home Furnishings", Pearson Prentice Hall, New Jersey, 2007.
2. Elaine Stone , "The Dynamics of Fashion", Fairchild Publications, New York, 2001.

REFERENCES:

1. Jennette A. Jarnow , "Inside the Fashion Business", Macmillan publishing, New York, 1999.
2. Gini Stephen Frings , "Fashion Concept to Consumer", Prentice Hall, New Jersey, 2004.
3. Harrold Carr and Barbara Latham , "Technology of Clothing Manufacture", Blackwell Scientific Publications, UK, 2000.

19H023 FASHION PORTFOLIO DEVELOPMENT

3 0 0 3

INSPIRATION, IDENTIFICATION AND CONCEPTUALISATION : Research, choosing a theme or concept, sources of inspiration, compiling the research - sketchbook, drawing, collage, juxtaposition, deconstruction, cross- referencing, analysis of research, conceptualizing the collection - mood board, story board and concept boards, the layout and composition, target market, trend analysis, silhouette, colour and texture. (9)

EXPLORATION : Researching textiles, designing textiles, textiles into production, materials - fibres and yarns, fabric construction — weave, knit and other forms of construction, non-fabric textiles, future fabrics, dyeing, finishing methods, surface treatments — print, embroidery and fabric manipulation, embellishments, colour and trend prediction, creating own fabric, designing custom textiles, tradeshow. (9)

DEFINITION/MODELING : Developing a collection –genre, line planning and range building, collections and their influences, types of collection, sketching and design drawing, drawing media for fashion, layout and composition, understanding the fashion figure, technical drawings, fashion rendering, CAD for fashion. (9)

CONCEPT TO PROTOTYPE : Sizing and measurements, pattern making, draping, construction — tools, equipments and techniques, toile, fittings and finishing, prototype sample, costing and pricing, fashion studio. (9)

COMMUNICATION : Fashion portfolio - introduction to portfolio building, idea storage bank, focused portfolios, specialized portfolios, digital and web-based portfolio, professional practice and presentation techniques. (9)

Total L: 45

TEXT BOOKS:

1. Karl Aspelund , "The Design Process", 3rd Edition, Fairchild Books, 2015.
2. Erin Cadigan , "Sourcing and Selecting Textiles for Fashion,", Fairchild books, 2013.

REFERENCES:

1. Simon Seivewright , "Basics Fashion Design 01: Research and Design", Fairchild Books, 2007.
2. John Hopkins , "Fashion Design: The Complete Guide", Fairchild Books, 2012.
3. Suzanne G Marshall, Hazel O Jackson , "Individuality in Clothing and Personal Appearance", Prentice Hall, New Jersey, 2000.
4. Harold Carr, John Pomeroy , "Fashion Design and Product Development", John Wiley and Sons Inc., New York, 1992.

19H024 FASHION DRAPING

3 0 0 3

GARMENT DRAPING : Preparation of dummies and muslin for draping, padding, taping, balanced draping, COWLS: Deep cowl with bustier, pleated cowls, draped cowls from style lines, arm hole cowls. SKIRTS: Circular skirt with off set circle, wrapped skirt with asymmetric drape, side cowl skirt. PANTS: Baggy pant, jump suit, leotard. SLEEVES: Basic kimono, basic raglan sleeve, drop shoulder sleeve, yoke in one with sleeve, princess in one with the sleeve (9)

DRESS FOUNDATION AND DESIGNS : Draping and construction of basic shift and empire line dresses, princess dress, princess slip dress, panel dress, Basic tent foundation, tent with added flare. Bias cut dresses: Slip dress, bias dress with a twist top, knot — tie bias dress, criss cross bias dress, Halter style lines- halter with V neck line, torso halter, surplice, off shoulder designs (9)

STRAPLESS DRESS FOUNDATIONS : Draping and construction of princess dresses, bustier designs, gathered overlays, Strapless princess bodice, empire bra top torso, under garment construction, bustier/corset / waspie foundations, Gown with radiating drapery, Contour draping. (9)

TAILORED GARMENTS : Preparation of dress form, draping and construction of basic shirt, basic jacket, princess jacket, classic notched lapel jacket, double breasted jacket, Jacket with shawl collar. DRAPING OF KNITS: Draping and construction of Basic knit bodice, knit halter, knit leotard, Knit body suit, knit panties (9)

DRAPED STYLES : Twists, Bias cut dresses , peplum styles, cascade styles, Styles developed from extension beyond outer edges, slashing and lowering the grain, slashing and gathering, tying extensions into knots and bows, draping using geometric shapes. Vionnet, faux, draped tops, wrap and drape styles, draped party wears (9)

Total L: 45

TEXT BOOKS:

1. Joseph-Armstrong, Helen , "Draping for Fashion Design", Fairchild Publications, New York,,2000.
2. Janice Mee and Michael Purdy , "Modeling on the dress stand", BSP Professional Books, Oxford University Press, 1999..

REFERENCES:

1. Connie Amaden Crawford , "The Art of Fashion Draping", Fairchild Publications, New York, 2005.
2. Shaeffer, Claire , "Sewing for the Apparel Industry", Prentice-Hall Inc, New Jersey, 2001.
3. Dawn Cloake , "Cutting and Draping Special Occasion Clothes,Bath Press", BT Bats ford Ltd, London, 1998.

19H025 TRADITIONAL INDIAN TEXTILES

3 0 0 3

TRADITIONAL SARIS : Historical significance, colour, motif and manufacturing techniques - Kota sari, Banaras brocades , Baluchari saris , Jamdani saris , Paithani saris ,Kanjeevaram saris ,Chanderi saris , Maheshwari saris. (9)

TRADITIONAL EMBROIDERIES : Traditional influence, techniques, types of stitches, fabrics, threads, motif and colour combination of traditional embroideries : Embroideries of Gujarat — kutch, sindhi & kathiawar, phulkari of Punjab, kantha of Bengal, kasuti of Karnataka, kashida of Kashmir, chamba rumal of Himachala Pradesh, chikankari of Uttar Pradesh. (9)

TRADITIONAL DYEING & PRINTING TECHNIQUES : Historical significance, styles, colour, motif and dyeing process : resist dyeing of yarn- patola of Gujarat, bandhas of Odissa and Pochampalli, resist dyeing of fabric - tie & dye techniques : bandhani of Gujarat and lehariya of Rajasthan. Printed textiles: batik printing, block printing -sanganer and bagru prints. (9)

TRADITIONAL PAINTING TECHNIQUES & SHAWLS : Historical significance, styles, colour, motif and process of traditional fabric painting –kalamkari, madhubani. Traditional shawls: Kashmir Shawls - pashmina, do-salla, nammda and gubba, kullu shawls of Himachal Pradesh. (9)

TRADITIONAL COSTUMES OF INDIA : Traditional clothing, draping styles, color and accessories: Punjab, Rajasthan, Gujarat, Madhya Pradesh, Uttar Pradesh, North-East, Maharashtra, West Bengal, Kerala, Tamilnadu, Goa, Andhra Pradesh, Karnataka, Orissa, Bihar. (9)

Total L: 45

TEXT BOOKS:

1. Lynton Linda , "The Sari", Thames & Hadson, 2002.
2. John Gillow and Nicholas Barnard , "Traditional Indian Textiles", Thames and Hudson Ltd, 1993.

REFERENCES:

1. Parul Bhatnagar , "Traditional Indian Costumes and Textiles", Abhishek Publications, Chandigarh, 2004.
2. Shailaja D. Naik , "Traditional Embroideries of India", A.P.H Publishing Corporation, New Delhi, 1996.

19H026 INTIMATE APPARELS

3 0 0 3

INTIMATE APPAREL : Types- whole body, upper body and lower body. Classification of kid's, women's and men's intimates. Quality requirements- fibers, fabrics, designs. Physical and physiological health effects of intimate apparel, comfort in intimate apparel. Fit issues in intimate apparel. (9)

MEN'S WEAR: Design and development, measurements, drafting procedure and construction sequence — long johns, tank top, tanga, boy shorts, knickers, bikini underwear, thong, boxer briefs, boxer shorts and jockstrap. (9)

WOMEN'S LINGERIE: Design and development, measurements, drafting procedure and construction sequence - petticoats, panties, camisoles, spaghetti top, tube top, bikini. Brassiere - technology, innovations, bio-mechanical engineering of bra, basic block of bra pattern. Intimate apparel with special functions - sports bra, pantyhose, swimwear, mastectomy bra and maternity underwear. (9)

INNOVATIONS OF GIRDLES & NIGHT WEAR: Introduction, historical development of girdles, classification of modern girdles, innovations of shape-up girdles, inventions of health promoting girdles, materials for girdles, fabric properties in girdle design. Design and development, measurements, drafting procedure and construction sequence - night gown, pajamas, negligee, peignoir and baby doll. (9)

INTIMATE APPAREL PRODUCTION & EVALUATION PROCESS: Principles, methods, technical aspects, controls of lamination, production-molding and welding. Accessories: Bra wire, hook & eye tape, ring & slider, buckle, plastic bone, elastics and threads. Performance evaluation of knitted underwear (9)

Total L: 45

TEXT BOOKS:

1. W Yu, J Fan, S-P Ng, S Harlock, "Innovation and Technology of Women's Intimate Apparel", Woodhead Publishing Limited, England, 2006.
2. Ann Hagger, "Pattern Cutting For Lingerie, Beach Wear And Leisure Wear", Black Well Science Limited, France, 2001.

REFERENCES:

1. Lynn Nottage, "Intimate Apparel / Fabulation", Theatre Communications Group, USA, 2006.
2. Stokes Terry, "Intimate Apparel", Brooklyn: Release Press, USA, 1980..
3. Singer, "Sewing Lingerie", Cy Decosse Incorporated, Mexico, 1991.

19H027 DESIGN OF SPORTS WEAR

3 0 0 3

SPORTS WEAR: Current sportswear market, key trends in sportswear design, design considerations in sportswear and footwear, sportswear and comfort, injury protection, fibres and fabrics performance requirements for sports wear, sports footwear industry. Sports wear manufacturers and brands, styles of sports wear. (9)

TYPES OF SPORTS WEAR: Types, design feature, fibre selection, fabric structure, fabric parameters, types of seams, stitches, sewing thread selection, accessories used in design and construction of sports wear, knitted sports garments, seamless technologies in sports wear design, joining techniques for sports wear, cold weather sports clothing, sportswear for snow sports. Developments in fibres, textile materials and manufacturing techniques for sports wear. (9)

PERFORMANCE SPORTSWEAR: Key trends in performance sports wear design, material requirements, layering, evolution of layering, external influences, innovative fibres and fabrics in sport - high performance and high-functional textiles, smart and intelligent textiles, coated and laminated textiles, designing sportswear for comfort - physiological comfort, aspects of wear comfort, measurement of physiological comfort. (9)

FUNCTIONAL SPORT FOOTWEAR: Human foot, foot wear, foot and footwear interface. Sports footwear - functional design, functional fit, functional materials and components. Sports bra - designing and material selection. Design of compression stockings - elastic textiles, freedom of movement, enhanced performance, recovery and wellbeing. (9)

PROTECTION: Types of protective devices, protection against impact using clothing and personal equipment, impact protection through protective clothing and equipment, quality standards and evaluation techniques. Design of sportswear for impact protection, effects of protective clothing and equipment on human performance. (9)

Total L: 45

TEXT BOOKS:

1. Shishoo.R, "Textiles in Sports", Wood head publishing Limited, England, 2005.
2. Y.Li, A S W Wong, "Clothing biosensory engineering", Wood head publishing Limited, England, 2006.

REFERENCES:

1. Richard A Scott, "Textiles for protection", Wood Head Publishing Limited, England, 2005.
2. Somenath Ganguly, "Comprehensive Footwear Technology", Indian Leather Technologists' Association, India, 2005.
3. John Peacock, "Shoes: The Complete Sourcebook", Thames & Hudson, UK, 2005.
4. Tim Skyrme, "Bespoke Shoemaking, A Comprehensive Guide to Handmade Footwear", Artzand Publications, UK, 2006.

19H028 COLOUR AND FASHION

3 0 0 3

COLOUR KNOWLEDGE, PSYCHOLOGY AND LANGUAGE : Colour and light, organizing colours, colour and vision, colour illusions — colour constancy, simultaneous contrast, locality of contrast, assimilation, colour psychology and language, emotional effects of colour perception, colour preferences, colour and subjective feeling of warmth, sex differences in colour preference, age differences in the development of colour preferences, psychological effects of background and illumination colours - warm vs cool colours. (9)

COLOUR PHYSICS : Light, light sources and light interactions, nature of colours, types of colorants and observers, illuminants and sources, measurement of colour, systems of standardized tristimulus values, instrumental colour measuring system, digital imaging systems, computation of colour coordinates, colour order systems, colour difference. (9)

COLOUR IN DESIGN : Colour characteristics, context colour management, colour complexity, colour influence — contrasting colour characteristics, simultaneous contrast, scale and placement, colour and depth perception — colour strength, advancing and receding colours, applying colour to a surface — subtractive colour, additive colour, colour definition, alternative colour rendition. (9)

COLOUR TREND FORECASTING : Definition, factors influencing, trends and fads, colour trend research-life cycle of colour trends, identification and recognition of colour trends, colour research process — starting point and finishing line, research into colour trends, colour forecasting — definition, necessary tools, assimilation by different cultures, importance, life-cycle, colour associations. (9)

COLOUR APPLICATION : Colour in interior designing - colour concept creation, colour psychology, colour language, factors influencing. Colour in visual merchandising - colour in public and commercial space. Colour in websites - effective colours, colour harmony, colours for special users. Colour in art - art and collectables. Colour in cars, limitations in colour application. (9)

Total L: 45

TEXT BOOKS:

1. Jose M.Parramon , "Colour Theory", Watson Guptill, New York,2012.
2. David Hornung , "Colour-Workshop for Artists and Designers", Laurence King Publishing, London, 2012.

REFERENCES:

1. Kate Scully, Debra Johnson Cobh , "Colour forecasting for fashion", Laurence King Publishing, London, 2010.
2. Tracy Diane, Tom Cassidy , "Colour Forecasting", Blackwell Publishing, US, 2005.
3. Evelyn L. Brannon , "Fashion Forecasting", Fairchild Books, UK,2011.
4. M. L. Gulrajani (Editor) , "Colour Measurement: Principles, Advances and Industrial Applications", Wood head Publishing Limited, England, 2010.

19H029 VISUAL MERCHANDISING

3 0 0 3

FUNDAMENTALS OF VISUAL MERCHANDISING : Visual merchandising- Definition, purpose and evolution. Designing a customer experience, role of a merchandiser, visual merchandising - department store, multiple chain stores, retail outlets, Visual merchandising of different brands (9)

ELEMENTS AND PRINCIPLES OF DESIGN IN VISUAL MERCHANDISE: Design elements- line, color, texture, shape and form — concept and application in visual merchandising. Principles - balance, emphasis, proportion, rhythm, repetition — application in visual merchandising, virtual visual merchandising. (9)

STORE DESIGNS : Customer attraction - importance, factors influencing and making strategies. planning store layout — counter store, forced path layout, grid layout, free form layout, boutique layout, star layout, arena layout. Merchandise placement — shelf zones; Store orientation — signage systems, colour coding, directional signs, in- store displays, trend areas, point of purchase, add-on sales, ; Store atmosphere; fixtures, wall fixtures, product handling, Mannequins – types, dressing and grouping. Lighting – types, impact and lighting chart. (9)

WINDOW SETTINGS : Planning window display, themes and schemes, budgeting, props. Designing a window display — types, colour, window prepping, lighting, signage, window calendar, window standards and maintenance. Types of window in store front - the angled front, the arcade front, the corner, display, closed back, open-back, island, shadow boxes, elevated, deep, tall. (9)

RESEARCH AND FUTURE OF VISUAL MERCHANDISING : Visual design development, model making and experimentation, concept development, presentation and communication of design development, Future of visual merchandising — shopping trends and innovations, technology and digital visual merchandising, sustainability, internationalization (9)

Total L: 45

TEXT BOOKS:

1. Sarah Bailey and Jonathan Baker , "1. Visual Merchandising for Fashion", Fairchild Books, London, 2014.

2. Tony Morgan, Laurence , "Visual Merchandising - Window and in-store displays for retail", King Publishing, 2011.

REFERENCES:

1. Diamond , "Contemporary visual merchandising and environmental design", Prentice Hall, New Jersey, 2006.
1. Gini Stephen Frings , "Fashion Concept to Consumer", Prentice Hall, New Jersey, 2004.
2. Laine stone, Jean Samples , "Fashion Merchandising — An Introduction", McGraw Hill Book Co, New york, 2001.
3. Diamond J , "Fashion Retailing - A Multi — Channel Approach", Prentice Hall, New Jersey, 2000.

19H030 FASHION STYLING

3 0 0 3

INTRODUCTION TO FASHION STYLIST : Qualities and roles of fashion stylist, Scope- fashion stylist, celebrity stylist, personal stylist. Career path of stylist: editorial styling, commercial styling, newspaper styling, freelance stylists. (7)

STYLING CONSULTANT : Technical skills- elements and principles of design, fabric selection, types of outfit, characteristics of colors-color combinations, colors in fashion, personal colours, becoming and non becoming colours. Steps of successful consultant-Consultation process, photographing, choosing appropriate silhouette, telling a story, defining the components of outfits, creating mood board/story board. (9)

FIGURE TYPES : Body and its features-rules of proportions, figure shape identification, Body shape variations - vertical figure type, horizontal figure type, dominant and subordinate shapes, becoming and non becoming design features. **FACE SHAPES:** Types — oval, oblong, rectangle, square, triangle, diamond, trapezoid, combination. Becoming and non becoming necklines, accessories, hairstyles. (10)

STYLES OF GARMENTS : Classic styles, trendy styles, basic classics, garment shapes, optical illusions of line and shape, becoming and non becoming design features — silhouettes, shapes, Women's styling- Body and face shape-selection of suitable outfit for different occasion and profession, hairstyle, make-up, accessories, female styling mistakes. Men's styling- Body and face shape-selection of suitable outfit for different occasion and profession, hairstyle, accessories, male styling mistakes. (10)

POWER OF APPEARANCE : Art and science of first impression. lifestyle evaluation, professional style scale- tailored design elements, soft design elements, Design elements and its influence on personality, figure direction instruction, defining figure direction, styling by situation, runway to real way, dressing 20's 30's 40's, mood styling, styling for shoot. (9)

Total L: 45

TEXT BOOKS:

1. Lisa Armstrong and Meenal Mistry , "Harper's Bazaar Fashion: Your Guide to Personal Style", Aurum Press Ltd, London, 2010.
2. Jo Dingemans , "Mastering Fashion Styling", Trans-Atlantic Publications, United Kingdom, 1999.

REFERENCES:

1. Marilyn Revell DeLong , "The Way We Look: Dress and Aesthetics", Bloomsbury Academic, USA, 1998.
2. Kaiser and Susan B , "The Social and Psychology of Clothing; Symbolic Appearances in Context", Fairchild Books, USA, 1996.
3. Marian L Davis , "Visual Design and Dress", Prentice Hall, New Jersey, 1996.
4. Suzanne G Marshall and Hazel O Jackson , "Individuality in Clothing and Personal Appearance", Prentice Hall, New Jersey, 2000.

19H031 INTERIOR DESIGNING

3 0 0 3

BASICS OF INTERIOR DESIGN: Influencing factors. Elements of art –Line, form, texture, colour. Principles of design – proportion, balance, emphasis, harmony, rhythm: applications, Design – types – structural, decorative, importance in interiors. (9)

COLOUR AND LIGHT:Types, qualities of colour, advancing/cool & receding colours/warm colours, colour interactions, psychological impact of colour, effect on different interiors. **Light:** natural light-daylight factor, day light factors for interiors. Artificial light – types- lighting arrangement. (9)

INTERIOR ACCESSORIES AND DESIGN: Classification – functional, decorative, both: selection, collection. Accessories - fixtures – types, selection, mounting, framing, hanging; antiques – definition, procurement process; plants, flowers. Design:Paraline and perspective drawing- perspective basics – one point perspective, two-point perspective, three point perspective drawings. CAD application. (9)

FLORAL ARRANGEMENTS:Types- importance; basic principles - line, line mass, mass arrangement; basic shapes, styles. Ikebana- history, materials required, general rules, basic styles. Dry arrangement - preservation of plant materials, foliage, flowers. (9)

INTERIOR FURNISHINGS: Furnishings materials: types - woven, non-woven, knit; floor coverings – carpet and rugs; window dressings – curtain and drapery; wall covering; furniture – types and selection factors. Ergonomic principles in interiors. acoustics: Sound- properties of sound- sound in interiors. (9)

Total L: 45

TEXT BOOKS:

1. Simon Dodsworth, Stephen Anderson, "The Fundamentals of Interior Design", Bloomsbury Academic, London, 2019
2. Rowe T, "Interior Textiles: Design and Developments", Woodhead Publishing Series in Textiles, UK, 2009

REFERENCES:

1. Pratap rao M, "Interior Design", Standard Publishers distributors, India, 2010.
2. Dennis and Lorigreen "Interior Design" Allworth press, New York, USA, 2010.
3. Taschen and Angelika "Interiors Now" Taschen America llc, USA, 2010.
4. Maureen Mitton "Interior design visual presentation", John wiley& sons inc, New Jersey, 2004

19H041 DIGITAL FASHION MARKETING

3 0 0 3

INTRODUCTION TO E-MARKETING : E-marketing objectives, introduction to e-strategy, digital marketing platforms, approaches to marketing mix: 4Ps, 5Is, 4Cs and 7 Ps. Adding digital value to product, QR codes, new pricing approaches, pricing under pressure. (9)

E MODELS AND E CUSTOMERS : Introduction to e models, online revenue models, attribution, communication model, customer information processing model, customer buying model, social media models. Introduction to e customers, motivations, fears and phobias, online information processing, online buying process, online relationship and loyalty, researching online customers. (9)

SOCIAL MEDIA MARKETING : Importance, media platforms, review business goals for social media, strategy for managing social media, social media optimisation. Site design - Objectives , online value proposition, different aspects of aesthetic design- graphics , colour, style, layout and typography, navigation and structure, mobile site design. (9)

TRAFFIC BUILDING & E-CRM : Key aspects of traffic building, Search Engine Optimisation (SEO), pay per click search marketing, managing Pay Per Click (PPC), Online partnerships, interactive advertising, viral marketing. E- CRM: Introduction to relationship marketing, database marketing, profiling,- approaches to profiling, control issues in E CRM. (9)

MANAGING DIGITAL MARKETING : Budgeting for digital marketing, selecting the best communications mix, selecting the right suppliers for digital marketing, change management for digital transformation, measuring and optimizing digital marketing with digital analytics, E-business security. (9)

Total L: 45

TEXT BOOKS:

1. Dave Chaffey and PR Smith , "E marketing Excellence - Planning and optimizing your digital marketing", Taylor & Francis., London, 2013..
2. Will Rowan , "Digital Marketing: Using New Technologies to Get Closer to Your Customers", Kogan Page Limited, UK,, 2002..

REFERENCES:

1. Damian Ryan and Calvin Jones , "The Best Digital Marketing Campaigns in the World", Kogan Page Limited,, UK, 2011..
2. Rick Mathieson , "The On-Demand Brand", American Management Association,, New York, USA,, 2010.

19H042 BRAND MANAGEMENT AND ADVERTISING

3 0 0 3

BRAND ELEMENTS AND BRAND BUILDING : Elements of branding — Brand identity, brand image, brand personality, brand communication, brand awareness, brand positioning and brand equity. Building brand - Product vs Brand, steps in building brands, consumer based brand equity pyramid, corporate brand building and retail brand building. Case studies on high profile Indian brands. (9)

BRAND STRATEGY AND CONCEPTS : Functional brands, symbolic brands, experiential brands, product branding, line branding and umbrella branding. Concepts - brand extension, brand revitalisation, brand repositioning, brand recall and brand elimination. Case studies on branding strategies. (9)

GLOBAL BRANDING AND LATEST TRENDS : Global Brands, sources of opportunities for global brand, consumers and globalisation, barriers to globalisation, global brand leadership, scope of glocalization. Case studies on managing global brands. Fast fashion branding and luxury branding - Scope, Customer behaviour. Case studies on fast fashion and luxury branding. (9)

ADVERTISING BUSINESS : Nature and role of advertising in modern business world. Advertising and marketing mix - advertising objectives, benefits, economic aspects and ethics in advertising. Role of advertising manager, agency, advertising plan, organisation of advertising agency, basic principles, agency compensation and public relations. Case studies on advertising. (9)

ADVERTISING BUDGET, MEDIA AND APPEALS : Budget- methods of advertisement budgeting and administering the budget. Media overview — types of media, media selection and media scheduling. Appeals - Basis for appeals, buying motives, appeals and advertising message, types of appeals, essentials of an advertisement appeal. (9)

Total L: 45

TEXT BOOKS:

1. Mahim Sagar, Deepali Singh, DP Agrawal, Achintya Gupta , "Brand management", Ane books, New Delhi, 2009.
2. Gordon T Kendall , "Fashion Brand Merchandising", Fairchild publications, New York, 2009.

REFERENCES:

1. A Chunawalla, KC Sethia , "Foundations of Advertising - Theory and Practice", Himalaya publishing house, Mumbai, 2009.
2. Brad Van Auken , "Branding", Jaico publishing house, New Delhi, 2007.
3. Harsh V Verma , "Brand Management", Excel books, New Delhi, 2006.
4. George E Belch, Michael A Belch , "Introduction to Advertising and Promotion", Irwin publishers, Toronto, 1995.

19H043 APPAREL 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 - customer service, supply chain management issues, efficient consumer response (ECR), quick and accurate consumer response. Inbound and outbound logistics. Pull, push and push-pull strategy. (9)

STRATEGIC SUPPLY CHAIN MANAGEMENT AND DISTRIBUTION PLANNING : Activities, decisions, supply alliances, supplier quality management, supply chain re-engineering. Organising for global markets: Globalisation - Stages to global SCM, global tendering and criticalities. Distribution planning - Factors influencing distribution network design, Location strategy — plant location, distribution problem, ware house location, retail facility location, Logistics planning, Vessel booking. (9)

COST AND PERFORMANCE MEASUREMENT IN SUPPLY CHAIN MANAGEMENT : 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. Demand management. Bull whip effect. (9)

INFORMATION SERVICES IN LOGISTICS AND SUPPLY CHAIN : Importance, applications, information requirements. Intelligence information system — materials requirement planning, manufacturing resource planning and enterprise resource planning, electronic data interchange, SCM software packages - tools for managing SCM. (9)

EMERGING TRENDS IN SUPPLY CHAIN MANAGEMENT : Collaborative strategies, vendor managed inventory (VMI), third and fourth party logistics, green supply chain, reverse logistics, proximity sourcing, IoT and Artificial intelligence. Case studies and discussion on leading apparel supply chains. Introduction to quantitative models — List of techniques and usage in SCM, Usage of supply chain analytics. (9)

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, New Delhi, 2005.
2. DK Agrawal , "Textbook of Logistics and Supply Chain Management", Macmillan publishers, Kolkata, 2010.
3. Janat Shah , "Supply Chain Management", Pearson education, India, 2009.

19H044 LUXURY BRAND MANAGEMENT

3 0 0 3

UNDERSTANDING LUXURY : History and the luxury goods industry, definition, premium vs luxury, types of luxury goods,

major operators in the luxury industry, scope of luxury brands in Indian market, SWOT analysis of high profile Indian luxury brands, major luxury sectors, key to success of luxury goods. (9)

LUXURY BRANDING ANALYSIS : Luxury brand character and brand value, luxury brands and its signs, luxury brand lifecycle, identity, ethics and aesthetics, luxury brand stretching, building luxury brands using consumer based brand equity pyramid. (9)

LUXURY CLIENTS AND CUSTOMER BEHAVIOUR : Market size, client profiling, types of luxury clients, customer behaviour of luxury clients, luxury clients vs mass market shoppers, risk study, luxury and India. luxury and world, luxury goods vs consumer behaviour. (9)

DISTRIBUTION STRATEGY : Distribution systems, international distribution, luxury and digital distribution, luxury brand distribution strategy, distribution strategies of leading luxury brands. (9)

ADVERTISING AND RETAILING : Advertising in luxury — strategies, concepts, advertising mix, licensing procedures, duty free operations. Retailing in luxury, retail vs wholesale in luxury, entry and exit in luxury sector, communication in luxury, depth of communication, communication tools in luxury, E-tailing, internet and luxury. (9)

Total L: 45

TEXT BOOKS:

1. M Chevalier, G Mazzalovo, "Luxury brand management: A world of privilege", John Wiley and sons, London, 2012.
2. Gordon T Kendall, "Fashion Brand Merchandising", Fairchild publications, New York, 2006.

REFERENCES:

1. J Kapferer, V Bastien, "The luxury strategy: Break the rules of Marketing to build luxury brands", Kogan, Philadelphia, 2012.
2. Brad Van Auken, "Branding", Jaico publishing house, New Delhi, 2007.
3. Harsh V Verma, "Brand management", Excel books, New Delhi, 2006.

19H045 ENTERPRISE RESOURCE PLANNING IN APPAREL INDUSTRY

3 0 0 3

INTRODUCTION TO ENTERPRISE RESOURCE PLANNING : Evolution, basics, needs, benefits, vendors — classification based on functional expertise, industry expertise, tier classification, market share. Growth and lifecycle of enterprise resource planning. Case studies on the benefits and needs for ERP. (9)

TECHNOLOGY AND ERP FUNCTIONING : Technology — components of the ERP system — client, server, user interface, back-end, cloud computing, system security. Desktop based vs web based vs cloud based ERP. Functioning — MTR concept, login procedure. Workflow and notifications. (9)

MODULES IN ERP : Modules classification — technical, commercial, working options in ERP, module functions — functions, related masters, transactions and reports. (9)

ERP FOR APPAREL INDUSTRY : Role and process flow in ERP for apparel vertical, apparel specific masters, transactions, reports— types, usage and role in decision making. (9)

IMPLEMENTING ERP AND ITS BENEFITS : Evaluating and selecting the right ERP, business process study, implementation — process, implementer capabilities, challenges, pitfalls, post implementation process. Benefits of ERP. Workflow and notification usage for apparel vertical. Latest developments. Case studies on success and failures of ERP usage. Careers in ERP. (9)

Total L: 45

TEXT BOOKS:

1. R Surjit, R Rathinamoorthy, KJ Vishnu Vardhini, "ERP for Textiles and Apparel Industry", Woodhead publishing, New Delhi, 2016.
2. Alexis Leon, "Enterprise Resource Planning", Tata Mcgraw Hill publishing, India, 2007.

REFERENCES:

1. Parag Diwan, Sunil Sharma, "Enterprise Resource Planning", Pentagon Press, India, 2001.
2. Jagan Nathan Vaman, "ERP in Practice", Tata Mcgraw Hill publishing, India, 2006.

19H046 APPAREL ENTREPRENEURSHIP

3 0 0 3

ENTREPRENEURSHIP - CONCEPT AND FUNCTION: : Entrepreneurship - concepts, functions, need and importance, myths about entrepreneurship, entrepreneurial competencies, process of entrepreneurship, types of entrepreneurs, intrapreneur — importance. Ethics, values and social responsibility — ethics and business decisions (9)

ENTREPRENEURIAL JOURNEY : Self assessment of qualities, skills, resources and dreams, generation of ideas , feasibility study, opportunity assessment in fashion and related fields, business plan preparation for starting a boutique /garment manufacturing unit , role of society and family in the growth of an entrepreneur, challenges faced by women in entrepreneurship (9)

CONCEPT OF MARKET : Market - traditional and e-commerce, concept and role. Types of business: manufacturing, trading and services. Industry Analysis — competitor analysis. Marketing Research for the new venture, defining the purpose or objectives, gathering data from secondary and primary sources , result analysis and interpretation. Managing growth of new ventures: Challenges of growth , strategies for firm growth - internal and external growth strategies. (9)

BUSINESS FINANCE: Record keeping, unit of sale, unit price and unit cost— for single product or service, types of costs — start up, variable and fixed, financial statements — P&L, balance sheet, fund flow. break even analysis — for single product or service, ratio analysis, taxes. (9)

INNOVATION AND PROBLEM SOLVING : Approach to problem solving, social entrepreneurship-concept and importance, risk taking -concept ; types of business risks, barriers to entrepreneurship, support structure for promoting entrepreneurship. IPR: Types of copyright, ownership and duration of copyright, design right, registered designs, topography rights, patenting process (9)

Total L: 45

TEXT BOOKS:

1. Robert D Hisrich, Michael P Peters and Dean Shepherd , "Entrepreneurship", , Tata McGraw Hill,, Noida,, 2007..
2. Prasanna Chandra , "Fundamental Financial Management", Tata McGRaw Hill Publications, India, 2005.

REFERENCES:

1. Vasant Desai , "Dynamics of Entrepreneurial Development and Management", Himalaya Publication House, 2001.
2. Bruee R Barringer and Duane Ireland , "Entrepreneurship — Successfully Launching New Ventures", Pearson— Prentice Hall, India, 2006.

19H047 GLOBAL TRADE MANAGEMENT

3 0 0 3

INTRODUCTION TO INTERNATIONAL TRADE : Need, basis of international trade, apparel exports, WTO, trade blocks — EU, ASEAN and NAFTA regional economic groups. International trade statistics on textiles and apparel, trends in India's foreign trade, prospects for Indian apparel exports, SWOT analysis. (9)

EXPORT BUSINESS : Setting up of export business, export marketing organisation, product planning for export markets, identifying foreign markets, export pricing and costing, INCO terms 2020, export correspondence, negotiations for export business. (9)

GOVERNMENT SUPPORT AND INITIATIVES : High lights of 2015-2020 EXIM policy, various schemes — duty drawback, duty exemption , duty remission, EOU , free trade zones, SEZ, market access initiative, market development assistance, TUFs, TMTT. Focus of 12th five year plan on apparel and textile sector, trading house, export houses, warehousing zones, foreign exchange management act. Outward and inward FDI regulations. (9)

EXPORT FINANCE : Nature of export finance, terms of credit in export — payment by documentary credit, advance payment, cash against document, document on acceptance, consignment basis, packing credit and its formalities, post shipment finance — short, medium and long terms financing. export-import bank of India, forfeiting, ECGC — purpose, policies and financial guarantees. (9)

EXPORT AND IMPORT PROCEDURE, DOCUMENTATION : Export procedure — receipt of confirmed order, production and clearance of products for exports, shipment negotiation of documents and realisation of export proceeds, incentives. pre-import procedure — steps in import procedure — customs formalities for imports — warehousing of imported goods. Export documentation — commercial documents, regulatory documents and import documents. (9)

Total L: 45

TEXT BOOKS:

1. S Subramaniam, TAS Balagopal , "Export Marketing", Himalayan publishing house, Mumbai, 2010.
2. RL Varshney, B Bhattacharya , "International Marketing Management - An Indian Perspective", Sultan Chand and sons, New Delhi, 2009.

REFERENCES:

1. Palle Krishna Rao , "WTO-Text and Cases", Excel books, New Delhi, 2005.
2. JWS Hearle, T Hines, M Suh , "Global Marketing of Textiles", Journal of Textile Institute, Manchester, 1997.
3. MI Mahajan , "Import-Do It Yourself", Snow White publications, New Delhi, 2015.

19H048 FASHION FORECASTING

3 0 0 3

FASHION FORECASTING: Importance and steps in fashion forecasting. Fashion cycle, Fashion theories. Long term and short term forecasting. Analysis of trends in leading apparel and accessory brands. (9)

TREND FORECASTING PROCESS: Objectives, strategy and tools, resources for environmental scanning – news, forecasting services, shopping the market and observing street fashion. Positioning in the process calendar. (9)

COLOUR FORECASTING: Consumers and the psychology of colour. Forecasting with colour cycles – colour matrix and seasonal barometer. Colour research – sources for colour ideas and palettes. (9)

MATERIAL FORECASTING: Material direction for men, women, kids, sports, intimates/swim, footwear/accessories and denim. Sources of innovation in textile development. Fabric fairs and trade shows. Trends in prints, design detail and silhouettes. (9)

LINE DEVELOPMENT: Introduction to line development and mood/trend board. Understanding past trends, Prediction of future trends. Translation of findings to apparel collections targeting varied customer markets. Customer preferences with ethnicity, gender and income. Fashion shows – advantages and types. (9)

Total L:45

TEXT BOOKS:

1. Lorynn Divita, "Fashion Forecasting", Fairchild Publications, Canada, 2019.
2. Gwyneth Holland, Rae Jones, "Fashion Trend Forecasting", Laurence King Publishing, UK, 2017

REFERENCES:

1. Eundeok Kim, Ann Marie Fiore, Hyejeong Kim, "Fashion Trends – Analysis and Forecasting", Berg Publishers, UK, 2013.
2. Elinor Renfrew and Colin Renfrew, "Basics Fashion Design: Developing a Collection", AVA Publishings SA, UK, 2009.
3. Marks and Andrea, "Writing for Visual Thinkers: A Guide for Artists and Designers, Peachpit Press, Berkeley 2009.

ONE-CREDIT COURSES

19HF01 EFFLUENT TREATMENT IN TEXTILE PROCESSING

1 0 0 1

EFFLUENT TREATMENT : Introduction, sources of effluents and their characteristics. Waste water treatment: objectives, methods and implementation considerations. (3)

EFFLUENT TREATMENT TECHNOLOGIES : Wastewater treatment by wet air oxidation, adsorption. Membrane filtration techniques: micro-filtration, ultra-filtration, nano-filtration and reverse osmosis. Photo chemical process, ion exchange process, advanced oxidation processes. Recycling of effluents. (8)

ANALYSIS OF EFFLUENTS : Determination of color, BOD, COD, pH, odor, TDS, TSS, total alkalinity, chlorides and metal contents, tolerance limits for effluents. (4)

Total L: 15

REFERENCES:

1. Adel Al- Kadsy, Azni Idris, Katayon Saed , "Treatment of Textile Wastewater by Advanced Oxidation Processes — A Review", Global Nest: The Int. J, 2004.
2. Vandevivere P C, Bianchi R, Verstraete W , "Treatment and Reuse of Wastewater from the Textile Wet Processing Industry: Review of Emerging Technology", J Chem Techno Biotechnol, 1998.

19HF02 COMPUTERIZED MACHINE EMBROIDERY

0 0 2 1

EXPERIMENTS ON MACHINE EMBROIDERY :

1. Computerized embroidery machine –parts, functions, threading, and fabric preparation
2. Computerized embroidery machine-Mechanism and settings
3. Practise on Wilcom embroidery software
4. Practise on design punching
5. Embroidery fabric sample development

Total P: 30

REFERENCES:

1. Doreen Curran , "Magic of free machine embroidery", Search Press, Ltd, UK, 2003.
2. Maggie Gery , "Raising the Surface with Machine Embroidery", BT.Batsford Ltd, London, 2003.

19HF03 FASHION RENDERING

1 0 0 1

MATERIALS USED IN DESIGNING : Types and its application - Drawing papers, brushes, mediums – graphite pencils, pastels, water soluble coloured pencils, felt-tip pens, markers, inks, gouache, acrylics. (5)

DEPICTING COLOUR AND TEXTURE OF FABRIC : Mixing of colour, simplification of texture, depicting embroidery, lace, knits, wool, silk and shiny fabrics, leather, fur, transparent, denim, and corduroy fabrics. Developing patterns repetition of a design, shading the pattern, stripes, contrast and harmony of colour in pattern. (5)

STUDYING THE CLOTHED FIGURE : Silhouettes, Dressing the body — from flat to three-dimensional clothes, relation between fabric and body, the hang of the garment, fit of garment. Folds and drapes — drawing darts, gathers, pleats, drapes; fabric characteristics and creases, draping on a table, stiffness or softening of the folds, drawing folds, falls and creases. (5)

Total L: 15

REFERENCES:

1. Karl Aspelund , "The Design Process", 3rd Edition, Fairchild Books, USA, 2015.
2. Simon Seivewright , "Basics Fashion Design 01: Research and Design", Fairchild Books, USA, 2007.
3. John Hopkins , "Fashion Design: The Complete Guide", Fairchild Books, USA, 2012.
4. Ranjana Singhal , "Fashion Rendering", Om books International, New Delhi, 2011.

19HF04 DIGITAL FASHION DESIGNING & E - PORTFOLIO DEVELOPMENT

0 0 2 1

FLAT GARMENT(SILHOUETTES) DEVELOPMENT :

Using raster / vector / Physical reference garment by corel draw/illustrator (6)

GRAPHIC DESIGN DEVELOPMENT :

Editing vector image & tracing bitmap image using coral draw/illustrator/photoshop (6)

COLOUR COMBINATION :

Matching or merging base colour with graphic & All over print based on colour forecast. (6)

TEXTURE MAPPING TECHNIQUES :

All over print / checks design development & fabric texture mapping. (6)

RASTER & VECTOR IMAGES :

Image resolution, size & formats. (6)

Total P: 30

REFERENCE:

1. Marianne Center Frances Vereker , "Fashion Designer's Handbook for Adobe Illustrator", Blackwell Scientific Publications, London, 2007.

19HF05 FASHION SHOW PRODUCTION

1 0 0 1

FASHION SHOW : History, Business — advertising, branding, promotion, fashion shows and community, technology, production and location. (3)

CATEGORIES OF FASHION SHOWS : Types, categories — production shows, formal runway shows and informal shows, role of the producer/coordinator, production team. (4)

FASHION SHOW PREPARATION : Production services — technical, clothing, merchandising, backstage, model, talents and agencies, creating the show concept - storyboards, pitching the theme or concept and preview, show planning. (4)

FASHION SHOW PROMOTION AND FRAMEWORK : Promotion - PR and marketing, press release. Framework — the front of the house and the backroom (2)

FASHION SHOW EVENT : Day of event timeline, Scripts and contingency plan — show length, choreography, opening, closing and cancelling shows. (2)

Total L: 15

REFERENCES:

1. C Reed , "The Fashion Shows", Artists International Media, North Carolina, 2012.
2. JC Everett, KK Swanson , "Guide to Producing a Fashion Show", 2nd Edition, Fairchild books, New York, 2004.

19HF06 SEAMLESS GARMENTS

1 0 0 1

KNITTING AND KNIT CAD : Analysis of important knitted structures, knit CAD, seamless and 3D knitting technology. (5)

SEAMLESS KNITTING: Basic concept — mechanism in seamless knitting, advantages & limitations. (3)

SEAMLESS KNITTING MACHINERY : Seamless knitting machines: single jersey, double jersey and warp seamless (sock machine / hosiery machinery / panty hose /seamless machinery) for the production of underwear, outerwear, nightwear, swimwear, beach wear, sanitary garment, and sportswear - electronic circular knitting machines for seamless wear. (7)

Total L: 15

REFERENCES:

1. Ajgaonkar D B , "Knitting Technology", Universal publishing corporation, Mumbai, 1998.
2. David J. Spencer , "Knitting Technology - A comprehensive handbook and practical guide Third edition", Oxford: Pergamon Bros., 2001.

19HF07 MARKET RESEARCH AND ANALYSIS

1 0 0 1

INTRODUCTION TO MARKET RESEARCH: : Purpose of market research and the research process. (3)

RESEARCH DESIGN FORMULATION : Exploratory design - Secondary data, Interviews, focus groups, projective techniques
Descriptive Design - Survey design, sampling considerations, observation. Explanatory design - Experimental and statistical designs. (3)

MEASUREMENT AND SCALING: : Types: Comparative and non comparative, levels of scaling — Nominal, ordinal, interval and ratio. (3)

QUESTIONNAIRE DESIGN : Dos and Don'ts. Pilot survey. (3)

IT TOOLS IN MARKET RESEARCH : : Report Preparation And Presentation. Softwares for data analysis. (3)

Total L: 15

REFERENCES:

1. Naresh Malhotra , "Marketing Research: an Applied Orientation", Sixth Edition,, Pearson Prentice Hall,, 2012..
2. Chisnall P M , "Marketing Research:Analysis And Measurement", Mcgraw-Hill, Inc,2010.

19HF08 PLANT LAYOUT AND FACILITY PLANNING

1 0 0 1

PLANT LAYOUT : Objectives , Principles, types of plant layout used in apparel industry - merits and demerits, flow patterns. (2)

FACILITY PLANNING : Steps in facility design — Nature of apparel manufacturing business, product analysis, manufacturing system used in apparel manufacture, level of technology, location. (2)

SPACE DETERMINATION AND AREA ALLOCATION : Factors for consideration in space planning, receiving, storage, production- spreading, cutting, bundling, sewing ,pressing, packing; shipping, other auxiliary service actions. Establishing total space requirement, area allocation factors to be considered, expansion, flexibility, aisles column and area allocation procedure. (6)

COMPUTER AIDED LAYOUT PLANNING : Computer aided layout planning — AutoCAD software tools and their application . Method of constructing the layout using AutoCAD for apparel industry. Evaluation of layout, implementing layout. (5)

Total L: 15

REFERENCES:

1. Thompkins. J A and White, J. A, "Facilities Planning", John Wiley & Sons Inc, US, 2010.
2. Francis, R.L., Leon F.McGinnis, Jr, White, J.A, "Facility layout and Location –An analytical approach", Phi learning, New Delhi, 2006.
3. Sunderesh Heragu , "Facilities Design", PWS Publishing Company, Boston, 1997.
4. James MApple , "Plant Layout and Material handling", John, Wiely and Sons, Newyork, 1977.

5. James M Moore , "Plant Layout Design", Mac Millon Co, New York, 1962.

19HF09 SOURCING FOR APPAREL MANUFACTURING

1 0 0 1

SOURCING : Apparel manufacturing design to retail flow. sourcing flow process. significance of time & action plan (TNA) in apparel manufacturing. various fabric selections as per seasons and categories. commercial fabrics quality and specifications, yarn dyed, piece dyed and printed. fabric, accessories and trims sourcing hubs. international and domestic sourcing zones. (5)

FABRIC SOURCING : Denim and non-denim fabric quality and its specifications for various end uses, shirting, suiting's and wool fabric qualities for apparel, various fabric manufacturing hubs and its commercial price. market study, fabric development, lab dips, sample docket preparation, trims development, sample development, proto sample, pre-cost closure, final costing, risk analysis & caveat, order confirmation, fabric dispatch to garment vendor (5)

SOURCING APPROVALS : Vendor planning, analysis of samples and approvals. fabric and garment package testing, follow up activities in bulk production and validation of test reports, merchandise retail flow. (5)

Total L: 15

REFERENCES:

1. Vijayan , "Fabric sourcing and selection In: Garment Manufacturing Technology", 1st Edition, Woodhead Publishing, England, 2015.
2. Jeremy A Rosenau , "Apparel Merchandising – The line starts here", 1st Edition, Fairchild publications, New York, 2007.

19HF10 TECH PACK DEVELOPMENT AND INTERPRETATION

1 0 0 1

INTRODUCTION TO MERCHANDISING : Department activities, roles and responsibilities. Technical specification sheet: introduction, steps in order receiving, order sheet interpretation, development of TNA plan - individual order, multiple order. (3)

GARMENT TO TECH PACK : Garment analysis, analysis of buyer sample, tech pack development. (3)

TECH PACK DEVELOPMENT : GSM calculation, fabric and thread consumption, size wise, colour wise quantity estimation, quality instruction, garment sketch, fabric, trims and accessory boards, finishing, packing details development (6)

INDUSTRIAL TECH PACK : Introduction, steps in interpretation, communications - buyer, factory. Case studies and discussion. (3)

Total L: 15

REFERENCES:

1. Jeremy A. Rosenau, David L. Wilson , "Apparel Merchandising — The line starts here", Fairchild publications, New York, 2007.
2. Grace Kunz , "Merchandising theory, principles and practice", Fair Child Books, New York, 2005.
3. R.Rathinamoorthy, R.Surjit. , "Apparel Merchandising ,", Woodhead Publication India Pvt Ltd, New Delhi, 2018.

19HF11 COMPUTER AIDED DESIGNING FOR HOME TEXTILES

0 0 2 1

COMPUTER AIDED HOME TEXTILES DESIGNING : Software and tools used in computer aided designing for home textile products. (3)

DEVELOPMENT OF HOME TEXTILE DESIGNS : Trend forecast analysis of home textiles for seasons. Development of woven fabric designs: Engineered stripe and checked effects, motif selection and pattern development, spot figuring, dobby designs, jacquard designs. Print designs for home textile products. (12)

DEVELOPMENT OF SURFACE ORNAMENTATION EFFECTS : Embroidery designs — Procedure for the development of computer aided embroidery design effects in home textiles. (6)

TEXTURE MAPPING & LAYOUT PLANNING : Concept of texture mapping, texture mapping of home textile products. Computer aided layout planning for home Interiors with home textile products. Tech pack development. (9)

Total L: 30

REFERENCES:

1. Grosicki Z.J , "Watson's Textile Design and colour", Newness- Butterworth and Co, London, 2005.
2. Grosicki Z.J , "Watson's Advanced Textile Design", Newness- Butterworth and Co, London, 2005.
3. Brian, D Coleman , "Luxurious Home Interiors", Gibbs Smith Publication, Hong Kong, 2004.
4. Premavathy Seetharaman and Parveen Pannu , "Interior Design and Decoration", CBS Publishers, New Delhi, 2005.
5. Jan Beaney and Jean Little John , "Complete Guide to Creative Embroidery: Design, Textures, Stitches", Bt Batsford, London, 2005.

19HF12 RETAIL ANALYTICS IN APPAREL BUSINESS

1 0 0 1

RETAIL ANALYTICS : Scope, trade area modelling, site selection modelling, competitor threat analytics, market basket analysis. (4)

RETAIL ANALYTICS IN APPAREL : Merchandise mix modelling, affinity merchandising, merchandise placement and presentation, retail data collection, ways for optimising marketing, operation and merchandising decision. (6)

ANALYTICS IN STORE OPERATIONS : Strategic use of data, labour forecasting, merchandise placement, pricing strategy. (5)

Total L: 15

REFERENCES:

1. Emmett Cox , "Retail Analytics: The Secret Weapon", John Wily and sons, New Jersey, 2011.
2. Chetan Bajaj, Rajnish Tuli, Nidhi V Srivastava , "Retail Management", 3rd Edition, Oxford University Press, New Delhi, 2005.
3. Michael Levy, Barton A Weitx, Dhruv Grewal , "Retailing Management", 9th Edition, McGraw Hill education, India, 2013.
4. Bernadette Tieman , "E-Tailing", Dearborn financial publishing, Chicago, 2000.

19HF13 PRODUCT LIFECYCLE MANAGEMENT (PLM) IN FASHION INDUSTRY

1 0 0 1

PLM IN FASHION INDUSTRY : Definition, scope and benefits of PLM, evolution of PLM, PLM platform Vs traditional product development approach. Analysis of PLM market in the fashion industry. Business case for PLM adoption. Business processes in PLM environment. (3)

PLM INITIATIVE: : Introduction to the PLM platform and its modules - Material management, sourcing, product specification, calendar management, merchandising management, quality management. Mobile apps and connectivity to other enterprise solutions. (8)

PLM CASE STUDIES: : Analysis of PLM implementation in the fashion industry. (4)

Total L: 15

REFERENCE:

1. John Stark , "Product Lifecycle Management (Volume 1) 21st Century Paradigm for Product Realisation", Springer, 2015.

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 advocacy of independence of Human will in Self-reliance - Harmony in Education-views of Bertrand 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.

190FA3 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.

190FA4 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

190FA5SOCIAL 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.