

**BHARATHIAR UNIVERSITY – COIMBATORE : 641046**  
**B.Sc. Garment Designing & Production Degree Course**  
**(For` the students admitted during the academic year 2017-2018 Batch onwards)**

**SCHEME OF EXAMINATION – CBCS Pattern**

Part	Study Components	Course Title	Hours per week	Examination				Credit
				Dur.Hrs	CIA	MARKS	TOTAL MARKS	
<b>Semester – I</b>								
I	Language I		6	3	25	75	100	4
II	English I		6	3	25	75	100	4
III	Core Paper I - Basic Textile Studies		4	3	20	55	75	3
	Core Paper II - Fashion Studies		4	3	20	55	75	3
	Core Paper III - Practical I - Fashion & Art Design		4	3	40	60	100	4
	Allied Paper I - Practical II -Computer Application		4	3	<b>40</b>	<b>60</b>	<b>100</b>	4
IV	Environmental Studies #		2	3	-	50	50	2
<b>Semester – II</b>								
I	Language II		6	3	25	75	100	4
II	English II		6	3	25	75	100	4
III	Core Paper IV – Woven Fabric & Designs		4	3	20	55	75	3
	Core Paper V - Garment Machines & Clothing Construction		4	3	20	55	75	3
	Core Paper VI - Practical III - Woven Fabric Analysis & Textile CAD		4	4	40	60	100	4
	Allied Paper II - Practical IV - Basic Apparel Production		4	3	40	60	100	4
IV	Value Education – Human Rights #		2	3	-	50	50	2
<b>Semester III</b>								
III	Core Paper VII - Knit Fabric Studies		4	3	20	55	75	3
	Core Paper VIII - Textile Coloration Technology		4	3	20	55	75	3
	Core Paper IX -Practical V - Textile Coloration		6	3	40	60	100	4
	Core Paper X - Practical VI - Knit Fabric Analysis		4	3	40	60	100	4
	Allied Paper III - Practical VII - Pattern Making and Garment Production for kids wear		6	3	40	60	100	4
	Skill based Subject I – Textile & Garment Finishing Technology		4	3	20	55	75	3
IV	Tamil @ / Advanced Tamil# (OR) Non-major elective - I (Yoga for Human Excellence)# / Women`s Rights#		2	3	50		50	2

<b>Semester IV</b>							
III	Core Paper XI - Apparel Production Management	4	3	20	55	75	3
	Core Paper XII – Apparel Quality Assurance	4	4	20	55	75	3
	Core Paper XIII - Apparel Merchandising	4	3	20	55	75	3
	Core Paper XIV - Practical VIII Apparel Testing & Quality Assurance	4	3	<b>30</b>	<b>45</b>	<b>75</b>	3
	Allied Paper IV - Practical IX - Pattern Making & Garment Production for Women’s Wear	6	3	40	60	100	4
	Skill based Subject II - Practical X - Computer Aided Designing	6	3	40	60	100	4
IV	Tamil @ /Advanced Tamil # (OR) Non-major elective - II (General Awareness #)	2	3	-	50	50	2
<b>Semester V</b>							
III	Core Paper XV – Apparel Costing	4	3	20	55	75	3
	Core Paper XVI - Apparel Industrial Engineering	5	3	25	75	100	4
	Core Paper XVII - Practical XI- Pattern Making & Garment Production for Men’s Wear	6	3	40	60	100	4
	Core Paper XVIII - Total Quality Management	4	3	20	55	75	3
	Elective Paper I -	5	3	25	75	100	4
IV	Skill based Subject III - Practical XII - Textile & Garment Surface Embellishments	6	3	40	60	100	4
<b>Semester VI</b>							
III	Core Paper XIX – International Trade Documentation	4	3	20	55	75	3
	Core Paper XX – Entrepreneurship and Small Business Development	4	3	20	55	75	3
	Core Paper XXI - ERP in Apparel Industry	4	3	20	55	75	3
	Elective Paper II	4	3	20	55	75	3
	Elective Paper III	4	3	20	55	75	3
IV	Skill based Subject IV – Project Work & Viva Voce*	10	-	-	-	200	8
V	Extension Activities @	-	-	50	-	50	2
<b>Total</b>						<b>3500</b>	<b>140</b>

@ No University Examinations. Only Continuous Internal Assessment (CIA)

# No Continuous Internal Assessment (CIA). Only University Examinations.

\*For Project Work 80% Marks and Viva Voce 20% Mark

List of Elective papers (Colleges can choose any one of the paper as electives)		
Elective – I	A	Fashion Accessories & Trims
	B	Technical Textiles
	C	Surface Ornamentation
Elective – II	A	Fashion Communication & Retailing
	B	Non Wovens & Specialty Textiles
	C	Visual Merchandising
Elective - III	A	Clothing Science
	B	Clothing Care
	C	Home Textiles

## **Semester – I Core Paper I - Basic Textile Studies**

### **Unit 1 : Natural Fiber**

Introduction- Classification of textile fibres - Properties of textile fibres. Cotton : Grading of cotton - Properties of cotton fibre - Production, morphological structure, properties and end uses of: Flax – Jute. Introduction to protein fiber - Production of silk - Morphological structure of silk - Properties of silk - varieties of silk - Morphological structure of wool - Composition of wool fibres – Properties of wool fibres – Woollen Vs Worsted Yarns

### **Unit 2: Regenerated fiber**

Introduction -Manufacturing sequence of viscose fibre - Viscose fibre properties, Introduction of cuprammonium rayon- Introduction of cellulose acetate rayon - Introduction of Modal,Llyocell & Bamboo fibres. Filament Spinning Techniques.

### **Unit 3: Synthetic Fiber**

Introduction to Polymer – Types of Polymer & Polymerization. Fibre manufacturing & Properties of Polyester, Nylon, Acrylic & Spandex fibres - Brief study about micro fibre, Aramid fibres.

### **Unit 4 : Yarn Formation**

Introduction to yarn classification – Staple spinning system – Production sequence for cotton yarn – Comparison of carded and combed yarn – Yarn winding – waxing – Study of yarn quality parameters – Various yarn package defects – Introduction to blended textiles – types and benefits– Double yarn production.

### **Unit 5 : Latest trends in textile fibers and yarns**

Introduction to organic cotton & specialty natural fibers such as, banana, pineapple, spider Silk – Brief study about OE & Airjet Spinning. Study about Fancy yarns and sewing threads , properties and end uses – Introduction to fibers and yarns used in technical textiles.

### **Reference Books:**

1. W.E. Morton & J.W.S. Hearle, Physical properties of textile fibres, Textile Institute, U.K.
2. Progress in textiles: Science and technology Vol.-2 By Dr. V.K. Kothari, I.I.T. Delhi.
3. Hand book of textile fibres by J.Gordon Cook
4. Manufactured fibre technology by V.B. Gupta & V.K. Kothari
5. Essential fibre chemistry by M.E. Cartor
6. Synthetic fibres by Fournel 184. New fibre by T.Hongu, G.O. Phillips, Woodhead publications.
7. Fibre chemistry by M. Lewin, E.M. Pearce, Marcel & Dekkan Inc.
8. Regenerated Cellulosic fibres by C. Wooding, Woodhead publishing Ltd.
9. The technology of short-shape staple spinning – W. Klein
10. Cotton spinning – Taggart
11. Spun yarn technology – Oxtoby
12. New Spinning Technology Vol. 4 & 5 –W.Klien

## Core Paper II – Fashion Studies

### Unit I - Introduction to fashion

Fashion Definition – Fashion terminologies – Classification of fashion – Fashion cycle – Fashion forecasting – Factors influencing in fashion – Role and responsibilities of a fashion designers – Types of fashion designers.

### Unit II - Elements of design

Introduction to design – Types of design – Elements and their importance in a design – Line – Types – Application of line in a garment – Influence of line in various illusion - Shape – Types – Importance of shape in garment design – Texture – Determinants of texture – Effect of texture on color & physical proportion

### Unit III - Color & Color theory

Introduction to color theories – Dimensions of color – Color systems – Warm and cool colors – color schemes – Application of color in fashion design – Visual impact of color in a garment – Importance of color psychology

### Unit IV - Principles of design

Importance of principles of design in fashion – Balance and its types – Proportion and its application in garment design – Emphasis – Creating emphasis in a garment using various techniques – Harmony and its impact in garment design – Rhythm – Application of rhythm in garment design

### Unit V - Introduction to fashion style details and various garments

Importance of details in apparel design – Various types of neck, collar & sleeve – Different types of waist & hem lines – Types of plackets, Pockets- Garments for men, women and kids – Unisex garments – Intimate , active and functional garments

### References

1. *Injoo Kim & Mykyung Uh*, Apparel Making in Fashion Design, Fairchild Publications, New York (2002).
2. *Bride M. Whelan*, Colour Harmony – A Guide To Creative Colour Combinations, Rockport Publishers, USA (1997).
3. *James Stockton*, Color, Chronicle Book Publishers, San Francisco (1984).
4. *Axel Venn*, Color Kaleidoscope, Mode... Information Group (1997).
5. *Sumathi.G.J*, Elements of Fashion and Apparel Design, New Age International (P) Ltd, New Delhi (2002).
6. *Patric John Ireland*, Fashion Design Drawing and Presentation, B.T.Batsfort Ltd, London (1982).
7. *Jenny Davis*, A Complete Guide to Fashion Designing, Bharat Bhushan Abhishek Publication (2006).
8. *Kathryn Mckelvey & Janine Munslow*, Fashion Source Book, Blackwell Publication (2006).
9. *Kathryn Mckelvey & Janine Munslow*, Fashion Design, Blackwell Publication (2003).
10. *Patric John Ireland*, Encyclopedia of Fashion Details, Prentice Hall, NJ (1987).

### **Core Paper III - Practical I- Fashion & Art design – P**

#### **A. Fabric drapes and Rendering Practice :**

1. Rendering different fabrics to study their fall, fold & drape
2. Rendering different fabrics to study their texture such as Woven, Knits & Non Wovens
3. Rendering different fabrics to study their color such as plain , Prints, Checks, embroidery

#### **B. Practice on Line drawing of design details and garments**

1. Various commercial necklines & Collars
2. Various commercial Sleeves & Cuffs
3. Skirts
4. Pants
5. Dresses
6. Blouses
7. Jackets
8. Shirts
9. Sports wear

#### **C. Drawing practices on accessories for men & Women**

1. Bags,
2. Belts,
3. Footwear,
4. Hats,
5. Gloves
6. Jewelries

### **Allied Paper I – Practical II -Computer Application**

#### **MS Office**

1. Prepare an interview call letter and send using mail merge in MS Word.
2. Design the given advertisement using in MS word. Apply various fonts and pictures.
3. Create line, bar and pie charts for the given data using MS Excel.
4. Prepare students mark statement with the following fields Roll No, Name, Sub1, Sub2, Sub3, Sub4, Sub5. Calculate Total, Average, Result and Grade. Apply Conditional formatting.
5. Prepare employee salary list with fields Employee No, Employee Name, Experience, Basic Pay, HRA,DA,LIC,PF. Calculate Gross Salary & Net Salary based on the following conditions

Experience	HRA	DA	LIC	PF
5 Years & Above	30%	15%	3%	700
Less than 5 Years	15%	5%	3%	700

6. Prepare a power point presentation about a product. Apply animation and slide timing.
7. Create an EMail ID and use various mail features.

#### **HTML**

8. Design five web pages with hyperlinks linking all pages

## Semester II - Core Paper IV – Woven Fabrics & Designs

### Unit – I

Classification of fabric forming methods – Weaving preparatory processes - Objects of winding process – Winding types – Passage of material through high speed automatic cone winding machine – Passage of material through precision winding machine – Winding terminologies, open wind and close wind – Winding defects, causes & remedies. Pirn winding – Objects - Passage of material through an automatic high speed pirn winder.

### Unit – II

Objects of warping – Types of warping – Passage of material through high speed modern beam warping machine & sectional warping machine – Warping defects, Causes & remedies. Objects of sizing – comparison of two cylinder, multi cylinder & hot air sizing machines – Sizing ingredients & their functions – Size paste preparation – Sizing defects, causes & remedies.

### Unit – III

Passage of material through a plain power loom – Basic mechanisms of a loom – Primary, secondary & auxiliary motions – Tappet shedding – Cone over pick & under pick mechanisms – Beat up mechanism – Types of let off & take up mechanisms – Fabric defects, causes & remedies.

### Unit – IV

Introduction to weaves – Weave diagram – Plain weave & derivatives – Twill weave & derivatives – Satin & sateen weaves – Honeycomb – Huck a back. Objects of dobby & jacquard mechanisms – Types of dobby & jacquard – Study of negative & positive dobbies – Study of single cylinder & double cylinder jacquard mechanisms.

### Unit – V

Shuttle less looms: Introduction - Advantages - Types of shuttle less looms. Introduction to non wovens – Production methods - Applications.

### References:

1. *R.Marks, A.T.C. Robinson*, Principles of Weaving, The Textile Institute, Manchester (1976).
2. *B.Hasmukhrai*, Fabric Forming, SSM ITT Co operative stores Ltd, Komarapalayam (1996).
3. *Prof.N.N.Banerjee*, Weaving Mechanism, Vol. I & Vol. II, Published by Smt.Tandra Banerjee, West Bengal (1999).
4. *Prof.J.L.Chakravorty*, Mechanism of Weaving Machines,Smt.B.Chakravorty, Serampore, W.B. (1984).
5. *Sabit Adanur*, Handbook of Weaving, Technomic Publishing Company, Inc, USA (2001).
6. *Peter Schwartz*, Trevor Rhodes, Mansour Mohamed, Fabric Forming Systems, Mahajan Book Distributors, Ahmedabad (1996).
7. *K.T.Aswani*, Fancy Weaving Mechanism, Mahajan Book Distributors, Ahmedabad (1990).
8. *N.Gokarneshan*, Fabric Structure and Design, New Age International Publishers, New Delhi (2004).
9. *Z.Grosicki*, Watson's Textile Design and Color and Advanced Textile Design and Color , Newnes – Butter Worth, Universal Publishing Corporation, Bombay (1988).
10. *Blinov.I, Belay.S*, Design of Woven Fabrics, MIR Publishers, Moscow (1988).

## **Core Paper V - Garment Machines & Clothing Construction**

### **Unit I**

Introduction to Spreading machines: Types and working procedures. Marker making – Features and duplicating methods. Cutting machines: Types of cutting machines and its application – Detailed study on band knife, straight knife, round knife, drills & notches.

### **Unit II**

Introduction to sewing Needles: Types, size, selection and their application - Sewing Machine-parts, functions .Classification of sewing machine and its functions –SNLS, DNLS, overlock, flatlock - button fixing and button hole, Button sew – Bar tack machine.

Sewing machine shapes - Sewing machine bed types-Description and application of each bed – Flat bed - Cylinder bed - Post bed – Applications.

### **Unit III**

Introduction to Fusing – principles, fusing machines and its working principle; Pressing - Principles and classification of pressing. Garment folding-types Packaging-types, materials, method and equipments. Selection of packaging design. Packaging-Types of package forms-Types of packaging materials.

### **Unit IV**

STITCHES – definition, classification of stitch classes. SEAMS – definition, types of seams and seam finishes. FULLNESS - Definition; Methods of introducing fullness in garments – darts, pleats, tucks, gathers, flares, flounces and smocking – its construction principle and application on various parts of a garment.

### **UNIT V**

COLLARS: Definition, classification, Neckline Finishes: facing and binding- definition, types of POCKETS : YOKES AND PLACKETS: Yokes - Definition, importance, selection of yoke design, types, Plackets - Definition, standards of good placket, types. SLEEVES AND CUFFS: Classification of sleeves,; Cuff: definition, types, Hem finishes.

### **REFERENCES:**

1. Solinger Jacob, “Apparel Manufacturing Analysis”, Columbia Boblin Media, 1988.
2. Harold Carr and Barbara Lathon, “The Technology of Clothing Manufacture”, Blackwell Sciences, 1996.
3. Alison Beazley and Terry Bond, “Computer Aided Pattern Design and Product Development”, Blackwell Publishing, UK, 2004.
4. Technical Advisory Committee of AAMA, “A new look at Apparel Mechanization”, 1978.
5. Laing R M and Webster J, “Stitches and seams”, The Textile Institute, 1998.
6. Sigmon D M, Grady P L and Winchester S C, “Computer Integrated Manufacturing & Total Quality Management”, Textile Institute Publication, 1998.
7. Patty Brown, Janett Rice, “Ready To Wear Apparel Analysis”, Prentice Hall, 1998.
8. Patrick Taylor J and Marti ShobenM, “Grading for the Fashion Industry”, Stanley Thomas (Publishers) Ltd., 1990.
9. Glock R E and Kunz G I, “Apparel Manufacturing: sewn product analysis”, Prentice Hall, second edition, 1995.
10. Connie Amaden Crawford, “A Guide to Fashion Sewing”, Fairchild Publications, New York, 1999.

## **Core Paper VI - Woven Fabric Analysis and Textile CAD -Practical**

### **Part A**

- Woven structural analysis –Plain, Twill, Satin, Sateen, Honeycomb, Velvet, Extra thread figuring fabrics: Design, draft, peg plan, denting plan.
- Warp particulars: Material of warp - ends per length - count, direction of twist, Crimp percentage, cover factor, warp pattern.
- Weft particulars: Material of weft - picks per unit length- count, direction of twist, twist per length, Crimp percentage, cover factor and warp pattern.
- Fabric particulars: Total Cover factor, Weight of fabric and thickness.
- Loom requirements: Shedding mechanism, heald count, and count.

### **Part B**

1. Basics of Raster and vector images, types, image formats and colour concepts.
2. Development of dobby designs(part –I) based on interactiveness of weave.
3. Development of dobby designs (part –II) based on interactiveness of weave and colour order.
4. Development of motifs.
5. Development of jacquard designs (part –I) using - colour and weave selection concepts – shade and thread balance.
6. Development of jacquard designs (part –II) Spot figuring – Drop.
7. Development of jacquard designs – Ogee base.
8. Development of jacquard designs – Diamond base.
9. Development of jacquard designs – Sateen base.
10. Multi layer design- extra warp/ weft design concepts.
11. Double cloth and stitching concepts.

## **Semester II – Allied Paper I –Practical IV - Basic Apparel Production**

### **I. Draft the paper pattern for the following:**

1. Bodice
2. Collars –flat, roll, standing and shirt
3. Pockets- patch, bound and side seam
4. Yokes – simple, with fullness, releasing fullness, partial and midriff
5. Cuffs – basic, two piece, and contoured
6. Sleeves – set in, with bodice and sleeveless

### **II. Construct the following:**

1. Seams – super imposed, lapped, bound and flat.
2. Fullness - darts, pleats, gathers and godets.
3. Collars – flat, roll, standing and shirt.
4. Pockets- patch, bound and side seam.
5. Yokes – simple, with fullness, releasing fullness, partial and midriff.
6. Plackets – one piece, two piece, and tailors.
7. Sleeves and Cuffs – set in, with bodice and sleeveless; cuffs: basic, two piece, and contoured



## Semester III - Core Paper VII –Knit Fabric Studies

### Unit – I

Different fabric forming methods-Comparison of weaving and knitting-Principles of weft and warp knitting – Comparison of weft and warp knitting – Classification of knitting machines - Yarn passage diagram of a circular knitting machine – Knitting machine elements and description - Knitting cycle of latch needle with sinker.

### Unit-II

Knitting terms and definitions - Principal weft knit stitches - Knit, tuck and miss stitch formation and properties - Representation of weft knit stitches – Study of Basic weft knit structures - Needle gating - Description of circular Rib & Interlock knitting machine – Characteristics of basic weft knit structures – Circular knitting GSM and production calculations.

### Unit-III

Jacquard knitting - Needle selection techniques – Pattern jack, Pattern wheel , Pattern drum and Computerized jacquard knitting machines – Brief study on specialty weft knit structures – Auto stripe yarn programming – Elastomeric yarn insertion and effects – Knitted fabric faults – Causes and Remedies

### Unit-IV

Flat Knitting – Yarn passage diagram of a flat knitting machine – Mechanical type Flat knitting machine - Needle bed assembly – Racking, Carriage and Cam box arrangement - Transfer Stitch and Drop Stitch – Thread diagram, effects and applications – Introduction to computer controlled Flat knitting machine. Concept of fully-fashioned machines and seamless knitwears.

### Unit-V

Introduction to warp knitting – Warp knitting terminologies – Open lap and closed lap. Basic lapping variations - Detailed study of knitting elements of Tricot and Raschel machines. Knitting action of Tricot and Raschel machines. Comparison of Tricot and Raschel machine. Study of standard two bar warp knit structures and their properties – Lock knit, Satin, Reverse lock knit, Loop raised, Sharkskin and Queens cord.

### References:

1. *D.B. Ajgaonkar*, Knitting Technology
2. *David .J.Spencer*, Knitting Technology
3. *Chandrasekara Iyer et al.*, Circular knitting technology
4. *Dr.Samuel Raz* , Flat Knitting
5. *Dr.S.Raz*, Warp Knitting Technology
6. *Peter Lord et al.*, Fabric forming systems

## Core Paper VIII - Textile Coloration Technology

### Unit – I – Singeing, Desizing & Scouring

Water: water hardness – types - softening process: ion exchange –Lime Soda Process. Preparatory process sequence for Woven & Knitted fabrics. Preparatory process: Singeing – objectives, principles and methods - yarn and fabric singeing machines - assessment of singed fabrics. Desizing methods - hydrolytic and oxidative methods., Scouring: saponification – emulsification - Assessment of desized and scoured fabrics – scouring of coloured fabrics. Wool scouring and carbonizing – Silk Degumming

### Unit – II - Bleaching & Mercerization

Bleaching: Mechanism - hypochlorite and hydrogen peroxide bleaching – - sodium chlorite bleaching – bleaching of blends. Fluorescent brightening agents. Evaluation of bleached materials. Mercerization: – principles and methods – Mercerization of blends. Assessment of mercerized samples. Liquid ammonia treatment.

### Unit – III. Dyeing

Colour: Electromagnetic spectrum, classification of dyes – Theory of dyeing: substantivity and affinity. applications and post treatment of direct – reactive – vat - sulphur and azoic dyes - acid and disperse dyes. Dyeing of blended textiles. Features and working principles of loose stock, hank and package processing machines - kier, J-box - jigger – winch - jet and soft-over-flow machines. Padding mangles: expression - pick up. Garment Dyeing Machines

### Unit – IV - Printing

Printing - methods of printing – screen preparation. Styles of printing – direct, resist, discharge. Print paste ingredients –Printing with Direct – Reactive – Acid – Disperse - Vat dyes and Pigments. After treatments for printed textiles. Garment printing : flock , HiDensity, Foil, Plastisol, foam, khadi – burnout printing. Digital printing.

### Unit V –Machines & Effluent Treatment

Application of enzymes in textile processing. Pollution - Treatment of Textile Effluents. Techniques for Effluent treatment – physical, chemical and biological methods. Study about Jigger, Beam, Cheese , Soft flow, Air flow dyeing machines. Colour fastness and its importance. Various defects in Dyeing & Printing.

### References:

1. Technology of textile processing (vol 1-2), Sevak Publications – V.A.Shenai
2. Dyeing and chemical technology of textile fibres, Charles Griffin & Co – E.R.Trotman
3. Technology of Bleaching and Dyeing of Textile Fibres Vol.1, Part-I,1979, Mahajan Book Publishers, - Chakravarthy RR And Trivedi S.S
4. The Bleaching and Dyeing of Cotton Material 1983, Weaver's Service Cent Prayag R.S.,
5. Chemical Processing of Synthetic Fibres and Blends 1982, John Wiley & Sons, New York. Datye K.V and Vaidhay A.A.,
6. Processing of Manmade Fibres 1975, MIR Publishers, Moscow.- Usenko V,
7. Colour for Textiles: A User's Handbook, Society of Dyers and Colourists(1993) - Wilfred Ingamells,
8. Cellulosics Dyeing, Society of Dyers and Colourists(1995) - John Shore,
9. Wool Dyeing, Society of Dyers and Colourists(1992) - Lewis.D.M.,
10. Textile Coloration and Finishing, Carolina Academic Press, Durham, North Carolina (1996) - Warren.S.Perkins,

### **Core Paper IX - Practical V - Textile Coloration**

1. Estimation of water hardness by EDTA method.
2. Combined Scouring & Bleaching of grey cotton knitted fabrics and estimation of loss percentage.
3. Dye the given cotton sample with natural dyes.
4. Dye the given cotton sample with hot brand reactive dyes & H-E dyes.
5. Dye the given Silk material with acid / basic dyes.
6. Dye the given Acrylic material with basic dyes.
7. Dye the given polyester sample using carriers.
8. Dye the given fabric for the given pattern using Tie & Dye Technique.
9. Develop a batik motif and print on the given sample.
10. Prepare the print paste with pigment colour and print on the given fabric.
11. Print the given fabric with reactive dyes by Resist Style.
12. Prepare the print paste with reactive dyes and print on the given fabric by discharge style

### **Core Paper X- Practical VI - Knit Fabric Analysis**

1. Draft the different cam diagrams used in conventional knitting machine
2. Draw the various cams in advanced knitting machine along with different type of stitches.
3. Determine the knitted fabric GSM using various methods
4. Development of the following samples:
  1. Plain
  2. Pique
  3. Pearl
  4. Lacoste
  5. Twill
  6. Cross miss
  7. Two thread fleece
  8. Mini jacquard design
  9. Auto striper
  10. Rib waffle
  11. Flat back rib
  12. Interlock
  13. Ottoman rib
  14. Electronic Jacquard motif
5. Analyze the given knitted fabric sample for the following particulars:
  - A) Course and Wale Density
  - B) Loop length
  - C) Areal Density (GSM)
  - D) Tightness Factor
  - E) Technical graph
  - F) Cam order
  - G) Needle order

## **Allied Paper III - Practical VII – Pattern Making and Garment Production for Kids wear**

I. Draft the pattern , grade and construct the following garments for boys

1. Bib
2. Jabla
3. Knicker
4. Romper
5. Sun suit
6. Night wear

II. Draft the pattern , grade and construct the following garments for girls

1. A-Line frock
2. Yoke frock
3. Pinafore
4. Skirt and Tops
5. Night Wear

### **Skill Based Subject I - Textile & Garment Finishing Technology**

#### **Unit – I – Mechanical Finishing**

Introduction to finishing- objectives- mechanical and chemical finishing, Durable and Temporary finishes. Raising and Shearing: Types and methods – Sueding - Napping. Anti Shrink Finish: Theory of shrinkage–Compressive - Relaxed shrinkage – Compacting – Calendaring. **Heat Setting & Stentering**- Sanforizing

#### **Unit II - Chemical Finishing**

Chemical finish: wrinkle free finish– softeners – anti microbial finish– fire retardant finish. Wash Down Effects on garments - Stone Wash,- Enzyme Wash-, Bio-Polishing -, Acid Wash -, Sand Blasting, - UV Protective finish.

#### **Unit III - Garment Dyeing**

Introduction to garment dyeing- factors to be consider for garment dyeing-selection of dyes for garments dyeing-garment dyeing machine-value added dyeing methods-limitation of garment dyeing-brief study on garment accessories dyeing.

#### **Unit IV - ECO STANDARDS**

Need For Eco-Standards – Eco Labels & Norms – Need For Eco-Testing – Testing Of Formaldehyde–. Tonicity Of Dyes And Chemicals. Discussion Of Azo Testing. organic cotton and certification process. chemical to be avoid for eco norms

#### **UNIT-V - ENERGY CONSERVTION**

Low Liquor Ratio Machines Recipe Monitoring, Low Temperature Dyeing Methods. Rapid Inverse Dyeing Of P/C Blends. Introduction to computer colour matching system

And its application on textiles-dyes dispensing system .recent develoment on pigments and dyes .a brief study on nano based products in chemical finishing..

#### **References**

1. NIIR Board of Consultants and Engineers – Natural Dyes and Pigments – Asia Pacific Business Press Delhi.
2. Gulrajani – Dyeing and Printing with natural Dyes – NCUTE Publication – IIT Delhi – 2001 Edition.
3. Prof. K.B.Krishna Kumar – Pollution in Textile Industry – SSm I.TT. Komarapalayam

## **Semester – IV Core Paper XI – Apparel Production Management**

### **Unit – 1**

Introduction To Garment Industry Plant Location – Location Economics – Plant Layout – Process Layout – Product Layout – Combination Layout – Introduction To Balancing Theory – Balance Control – Balancing Exercises For Garment Industry.

### **Unit – 2**

Materials Management: classification of materials – importance and objectives of Materials Management. Inventory – classification – inventory control models- factors influencing inventory control – ABC analysis - EOQ. MRP: introduction – concepts and advantages-factors influencing the requirements of inventory. CRP : types- measurement & determination of capacity – CRP inputs & outputs. optimum level of production.

### **Unit – 3**

Concept And Need – Method Study And Work Measurement – Techniques – Process Chart Symbol – Process Flow Chart – Flow Diagrams – String Diagrams – Multiple Activity Chart – Principles Of Motion Economy – SIMO Chart – Time Study Methods – Standard Time Data – Ergonomics With Special Reference To Garment Industry.

### **Unit – 4**

Methods of Production Systems – Job, Mass & Batch – Section Systems, Progressive Bundle System & „Synchro“ System – Conveyor Systems – Unit Production System – Quick Response. Productivity Concepts – Measurement Of Productivity – “Man Machine Material” – Criteria For Increasing Productivity.

### **Unit – 5**

Function, Qualitative And Quantitative Analysis Of Production - Coordinating Departmental Activities - Flow Process And Charts For Garment - Scheduling Calculations - Assigning Operators Optimally - Setting Up Complete Balanced Production Lines To Produce Given Amount Of Garments

### **References:**

1. Technology Of Clothing Manufacture – *Carr & Latham*
2. Apparel Manufacturers Handbook – *Jacob Solinger*
3. Introduction To Clothing Manufacture – *Gerry Cooklin*
4. Introduction To Production Management – *A. J. Chuter*
5. Personal Management And Industrial Relations – *Tripathi*
6. Industrial Engineering And Management – *OP. Khanna*

## Core XII – Apparel Quality Assurance

### Unit I

Importance of Quality. Quality terminologies. Testing: Objectives of Testing - Standardization of testing - sampling - measurement – types of error - repeatability & reproducibility -atmospheric conditions for testing lab. Brief study on fibre properties – FQI. – Identification of textile fibres.

### Unit II

Yarn numbering systems – Determination of yarn count: wrap reel, electronic yarn count balance, quadrant balance, beesley balance - count calculations. Yarn strength: Lea strength tester and CSP. Yarn evenness: Brief study on uster unevenness. Yarn twist: Terms - Electronic twist tester. Hairiness measurement.

### Unit III

Knitted fabric specifications - Bursting strength testing -- testing of fabric resistance to snagging, abrasion & pilling - fabric handle - drape and stiffness - Dimensional stability of knitted fabric – spirality -. Testing of color fastness to washing, rubbing, perspiration & light - Grey scales and ratings - Reasons for poor color fastness - Seam strength & seam slippage. Brief study about testing of woven fabric.

### Unit IV

Meaning – Definition - Types of Inspection – Study on Incoming materials inspection: fabric inspection systems & Testing of zippers, Buttons, Waistbands, Sewing thread.

### Unit V

In process inspection and its significance in apparel quality. Final inspection – Risks involved – AQL – MIL STD. Garment appearance after washing – package quality testing – care labels. Brief study about Testing Standards. Brief study about Oeko-Tex Standards.

### References

1. *J.E. Booth*, Principles of Textile Testing
2. *Elliot b. Grover & D.S. Hamby* -Hand book of textile Testing & Quality Control
3. *B.P.Saville* Physical testing of Textiles
4. *P. Angappan & R. Gopalakrishnan*, Textile testing
2. *Pradeep V Metha & Satish k. Bhardwaj*, Managing Quality in Apparel Industries
3. ISI standards [BIS] / AATCC / ASTM – Technical manuals

## Core XIII – Apparel Merchandising

### Unit I

Merchandising: Introduction, Meaning- Apparel Merchandising – Concepts of „Six Rights“ – Organisation structure of an apparel industry – Classification of Exporters - Rating or Grading of export houses – Classification of buyers – Export merchandising and retail merchandising – Company profile and its contents. Types of merchandiser - Functions of a merchandiser – Essential requisites of a good merchandiser – Vendor sourcing, evaluation and development – Global sourcing – Vendor nomination by buyers – Reasons for vendor nomination.

### Unit II

Process flow in apparel industry – Buyer sourcing & communication – Enquiry – Order confirmation – order review and its importance – Planning & programming: Master planning, Scheduling or route card – Factors for route card - programming for yarn, knitting, dyeing, stitching, sampling, accessories – Samples: Meaning & importance – Types of samples – expedition of samples

### Unit III

Inspection and its types – Testing – Check points before cutting - Pilot run or trial run and its importance – Approvals - Types of approvals – Shipping marks – Final inspection procedures – Self, Second and Third party inspection - Effective expedition procedures.

### Unit IV

Order sheet and its contents – Packing list and its contents – Document formats: order sheet, packing list, invoice, inspection and testing reports etc., - Assortment and its types. Documents recording and maintenance – Claims and reasons for claims - Factory audits – Buyer’s code of conducts.

### Unit V

Advertising- scope, importance, types, merits & demerits; sales promotion, personal selling. Retail management. Export associations – Apparel Export Promotion Council – Journals and magazines related to apparel and textiles –Trade shows and Fairs – Participation in trade shows – Advantages of trade shows and fairs - Apparel & Textile Trade shows and fairs in India.

### References

- 1., Building Buyer Relationships, *Daragho' Reilly, Jullian J. Gibbs*
- 2 Inside the Fashion Business, Mc Millan Publishing Co.,.
3. Fashion Merchandising, *Elian Stone*,
4. Apparel Merchanidising, An integrated Approach, Krishnakumar, M, 2010, Abishek Publications
5. Apparel Merchanidising, *Robin Mathew*, Book Enclave Publishers, Jaipur
6. Apparel Merchanidising, *Jerry A & Rosenau*, Fairchild Publications, London

### **Core-XIV –Practical VIII – Apparel Testing & Quality Assurance**

1. Determination of count of yarn using wrap reel & weighing scale.
2. Determination of lea strength & CSP using lea strength tester.
3. Determination of yarn count from fabric swatch using beesley balance.
4. Determination of twist of single yarn using electronic twist tester.
5. Fabric Analysis for determining Weight, CPI, WPI, SL, CL & Yarn Count.
6. Identification of Fibre using microscope and by chemical test.
7. Analysis of Blend composition of given fabrics.
8. Determination of thickness of fabric using fabric thickness gauge.
9. Determination of CRA of fabric using crease recover tester.
10. Determination of Fabric Pilling Using ICI Pill Box
11. Determination of Fabric Bursting Strength.
12. Determination of color fastness of given sample to washing by using launderometer.
13. Determination of color fastness of given sample to rubbing by using crockmeter
14. Determination of color fastness of given sample to perspiration by using perspirometer
15. Determination of dimensional stability % of a given fabric / garment to washing.

### **Allied Paper IV – Practical IX– Pattern Making & Garment Production for Women’s Wear**

- I. Draft the pattern , grade and construct the following garments
  1. Sari blouse,
  2. Choli blouse,
  3. Katori blouse
  4. Varoious back neck treatment
  5. Salwar and kameez – basic
  6. Umberlla tops & churidhars
  7. Night wear
  8. Ladies suit
  9. Skirt blouse – various neck and placket details
  10. Skirts – Straight, circular, tired etc.
  11. Trousers & Pants

### **Skill based Subject II – Practical X- Computer Aided Designing**

1. Introduction to softwares of Fashion CAD Laboratory.
2. Computer aided embroidery designs.
3. Logo designing.
4. Digital designing of different styles of necklines, sleeves, skirts and collars.
5. Designing different styles of apparel for men.
6. Designing different styles of apparel for women.
7. Designing different styles of apparel for children.
8. Designing different types of accessories.
9. Develop a Tech Pack design for basic garment styles.



## **Semester V Core XV – Apparel Costing**

### **Unit – I**

Principles of costing - requirements of good costing system - cost unit - types of costs - Elements of cost - direct material cost - direct expenses - direct wages - indirect materials - indirect expenses - indirect labour - overheads - - prime cost - work cost - cost of production - total cost. INCO terms & its relationship with costing

### **Unit – II**

Budgeting: The budgeting process: Budgeting principles for the apparel industry- Fixed vs.variable budget - Master budget-laminations of budgets- any justification effort -Planned Vs Actual Cost.

### **Unit III**

Cost estimation of yarn, knitted fabric, dyeing, printing & finishing. Woven Fabric Costing: fabric types, yarn consumption, weaving price Cost estimation for cutting, stitching, checking, packing, forwarding, shipping, and insurance.

### **Unit – IV**

Estimation of factory cost for Woven & Knitted - vest, briefs , shorts, t-shirts, pajamas, children’s wear, ladies wear, Woven Shirt, Woven Tops & Bottom. Various factors to be considered in costing for domestic products & international products

### **Unit – V**

Determining Pricing of apparel products: Price elasticity of demand and supply, sample costing-marginal revenue and marginal cost, cost plus pricing methods;, Full cost pricing, conversion cost pricing, differential cost pricing ,variable cost pricing, direct cost pricing derivation of cost of apparel products-woven/knits.

### **References**

1. *S.P.Jain and KL. Narang*, "Cost Accounting", Kalyani Publishers,New Delhi.Edn.2005
2. *R.S.N. Pillai and V. Bagavathi*, "Cost Accounting",S. Chand and Company Ltd., New Delhi.Edn.2004.
3. Apparel Costing, A functional Approach – *Krishnakumar, M*, Abishek Publications, Chandigarh, 2012

## Core XVI – Apparel Industrial Engineering

### Unit I

Introduction: Definition, purpose, available techniques, Aspects, physical facilities & operating facilities, scientific management, resources productivity. Work Study: Definition, objectives, Techniques, method study, work measurement, Purpose of work study, steps, different phases,

### Unit II

Method Study: Definition, Steps, Selection of problems, Collection of facts and consideration about objectives, Recording techniques, Elements of a process analysis, Operation process chart, Different process charts, Critical examination.

### Unit III

Work Measurement :Definition ,Uses, Techniques, Time Study, Measuring Instruments, Elements in time study, factors, alignment chart, Performance rating methods, observed time & normal time , allowances, Standard time, Work sampling Predetermined Motion Time study, Motion time data for assembly operations, Work factor system, method time measurement.

### Unit IV

Job Evaluation: definition, Aspects, Uses, different methods of job ,Ranking system, Grade description system, point method, Factor comparison method. Wage Incentive Plans: Unit of measurement, Various methods, Characteristics of wage, Incentive schemes, relationship between productivity, wages & cost. different wage incentive plans , relationship between indirect labour , direct labour & total plant productivity . Plant Maintenance: Introduction, Systems of maintenance, break down, Planned, Corrective and Preventive maintenance, maintenance schedule

### Unit V

Operations Research: Introduction, concept of optimization, methods of operations research, linear programming , distribution methods, Assignment models, queuing theory, Sequencing problems, Network Analysis, Game theory, Replacement analysis, depreciation.

### References

1. Industrial Engineering and Management by *O. P. Khanna*,
2. Textile Mill Management by *Ormerod* ,
3. Engineering Economics by *Kleinfeld*,
4. Managerial Economics by *M.V.Palyee, K.C. Sankaranarayan & J.T. Payyappilly*,
5. Essentials of Engineering Economics by *Kasner*,
6. Management in a Global Perspective by *K'oonze & Wehrich.*,
7. Quantitative Approach to Management by *Levin, Rubin, et. al.*,

## Core XVII –Practical XI -Pattern Making & Garment Production for Men's Wear

I. Draft the pattern , grade and construct the following garments

- |                      |                    |
|----------------------|--------------------|
| 1. Half sleeve Shirt | 7. Nehru kurtha    |
| 2. Full sleeve shirt | 8. SB coats        |
| 3. Pleated pant      | 9. Cargos          |
| 4. Zippers pant      | 10. Sherwani       |
| 5. Bell bottom       | 11. Hooded Jackets |
| 6. Kalidhar Kurtha   |                    |

## Core Paper XVIII – Total Quality Management

### Unit I

Quality – Evolution of Quality management – Quality Function and Quality Planning – Basic concepts of Total Quality Management (TQM) – Principles of TQM – Important Phases of TQM – Quality Trilogy – Four pillars of TQM – PDCA cycle & PDSA cycle – Kaizan concept – 5“S Philosophy – Quality Circles

### Unit II

Statistical Quality Control (SQC) : Definition – SQC techniques – Frequency distributions: Discrete and Continuous – Measures of Central tendency: Mean, Median & Mode – Measures of dispersion: Range, Mean Range, Mean Deviation, Percentage Mean Deviation, Standard Deviation, Coefficient of Variation – Normal distribution – Binomial distribution – Poisson distribution

### Unit III

Control charts: concepts and uses – Control limits – Control charts for Variables and Attributes: X Charts – R chart – P chart – NP chart – C chart – Acceptance sampling – Types of sampling plans: Single, Double and Multiple Sampling plans – OC curves – AQL and LTPD – Sampling errors and sampling risks – Producer’s risk and Consumer’s risk

### Unit IV

ISO 9000 Standards: Meaning & Definition – ISO 9000 family of standards – Elements of ISO – Benefits– Study on ISO 9001:2008 Guidelines and Standard Clauses – Implementation Procedures and requirements for ISO 9001:2008 system – Quality Manual and its contents – Accreditation and Certification agencies – Quality audit – Types of quality audit – Audit procedure – Requirements and characteristic of a Quality auditor

### Unit V

Environmental Management System (EMS) – Meaning & Definition – Elements of EMS – Benefits of EMS – Environmental Policies – Implementation of ISO 14000 – Study on other management systems : SA8000, OHSAS 18000, WRAP.

### References

1. *Dr. S.P.Gupta*, “Statistical Methods”
2. *J.M. Juran*, “Quality Control Handbook”
3. *V.K.Kapoor*, “Statistics”
4. Total Quality Management – *Bhaskar, S* - Anuradha Publications, Kumbakonam.
5. Total Quality Management – *Shridhara Bhat, K* -, Himalaya Publishing Corporation New Delhi
6. Handbook of Total Quality Management - *Armstrong* , Jaico Publications, New Delhi.

### **Skill Based Subject –III - Practical XII– Textile & Garment Surface Embellishment**

1. Development of samples with various printing techniques
  - Block
  - Stencil
  - Screen
  - Tie and Dye
  - Batik
  - Fabric painting
2. Developing fabric texture using various craft techniques
  - Drawn thread
  - Counted thread
  - Crochet
3. Garment Embellishments
  - Smocking
  - Applique
  - Patchwork
  - Quilting
  - Pleats and tucks
4. Embroidery
  - Basic stitches - Includes hand & machine to form different natural & geometric forms such as, border stitches, outline stitches, filling stitches etc

## **Semester VI - Core Paper XIX International Trade & Documentation**

### **Unit – I**

Firm establishment: introduction – export promotion councils and their role – registration formalities - rmc –IE code – RBI code – garment classification and categories for various countries – quota – quota distribution methods – quota transfer

### **Unit – II**

Foreign trade documents: need, rationale and types of documents relating to goods – invoice – packing note and list – certificate of origin – certificate relating to shipments – mate receipt – shipping bill – caret ticket – certificate of measurement – bill of lading – air way bill – documents relating to payment – letter of credit – types of l/c - bill of exchange – letter of hypothecation – bank certificate for payment – document relating to inspection – certificate of inspection – gp and other forms.

### **Unit – III**

Import procedure : import license – procedure for import license – import trade control regulation procedure – special schemes – replenishment license – advance license – split up license – spares for after sales service license – code number – bill of entry.

### **Unit – IV**

Shipment and customs: preshipment inspection and quality control – foreign exchange formalities – preshipment documents - documentation terms - excise and customs clearance of export cargo – shipment of goods and port procedures – customs clearance of import cargo. Post – shipment formalities and procedures – claiming duty drawback and other benefits.

### **Unit – V**

Payment and deliveries: terms of delivery – INCO terms – EXW – FCA – FOB – CFR – CIF – CPT – DAF – DDP – DDU. Terms of payment – open account – cheque – cash payment against documents – bank payment against documents (LC) – security and cost of various payment terms – assessing the risk in payment – role of ECGC and standard policy.

### **References:**

1. Govt. Of India : Hand Book Of Import And Export Procedures.
2. *Bose. A.* : Streamline Your Export Paper Work., International Trade Form, Oct – Dec 1965.
3. How To Start Export.
4. CBI Booklets – Netherland
5. ECG C Services And Guidelines
6. AEPC Booklets

## **Core Paper XX Entrepreneurship and Small Business Development**

### **Unit I**

Entrepreneurship: Concept and Definitions; Entrepreneurship and Economic Development; Classification and Types of Entrepreneurs; Entrepreneurial Competencies; Factor Affecting Entrepreneurial Growth – Economic, Non-Economic Factors; EDP Programmes; Entrepreneurial Training; Traits/Qualities of an Entrepreneurs; Entrepreneur; Manager Vs. Entrepreneur.

### **Unit II**

Opportunity / Identification and Product Selection: Entrepreneurial Opportunity Search and Identification; Criteria to Select a Product; Conducting Feasibility Studies; Project Finalization; Sources of Information.

### **Unit III**

Small Enterprises and Enterprise Launching Formalities : Definition of Small Scale; Rationale; Objective; Scope; Role of SSI in Economic Development of India; SSI; Registration; NOC from Pollution Board; Machinery and Equipment Selection; Project Report Preparation; Specimen of Project Report; Project Planning and Scheduling using Networking Techniques of PERT / CPM; Methods of Project Appraisal.

### **Unit IV**

Role of Support Institutions and Management of Small Business : Director of Industries; DIC; SIDO; SIDBI; Small Industries Development Corporation (SIDC); SISI; NSIC; NISBUD; State Financial Corporation SIC; Marketing Management; Production Management; Finance Management; Human Resource Management; Export Marketing; Case Studies.

### **Unit V**

Incentives and subsidies – Subsidied services – subsidy for market. Transport – seed capital assistance – Taxation benefit to SSI role of entrepreneur in export promotion and import substitution.

### **References**

1. *Desai, Vasant* (2003). Small-Scale Industries and Entrepreneurship. Himalaya Publishing House, Delhi.
2. *Kaulgud, Aruna* (2003). Entrepreneurship Management. Vikas Publishing House, Delhi.
3. *Cynthia, L. Greene* (2004). Entrepreneurship Ideas in Action. Thomson Asia Pvt. Ltd., Singapore.
4. *Chandra, Ravi* (2003). Entrepreneurial Success: A Psychological Study. Sterling Publication Pvt. Ltd., New Delhi.
5. *Balaraju, Theduri* (2004). Entrepreneurship Development: An Analytical Study. Akansh aPublishing House, Uttam Nagar, New Delhi.
6. *David, Otes* (2004). A Guide to Entrepreneurship. Jaico Books Publishing House, Delhi.
7. *Taneja* (2004). Entrepreneurship. Galgotia Publishers.

## Core Paper XXI ERP in Apparel Industry

### Unit 1

Introduction: ERP: An Overview, enterprise – an overview, types of Enterprises, need for ERP, benefits of ERP, ERP and related technologies, Business Process Reengineering (BPR), Benefits of BPR

### Unit II

Implementation of ERP: ERP implementation lifecycle, implementation methodology, hidden costs, organizing the implementation, vendors, consultants and users, contracts with vendors, consultants and employees, project management and monitoring

### Unit III

The Business Modules: Business modules in an ERP package - finance, manufacturing, human resources, plant maintenance, materials management, quality management, sales and distribution. Significance and advantages of each of the modules

### Unit IV

ERP in apparel industry: Production resource planning – principles and management of and demand chain analysis– quick response strategy - material management for „Quick Response“ – „Just in Time (JIT) Technology“; Production planning, costing and merchandising software

### Unit V

Computer Applications: Management Information System in garment industry – EDI in garment technology; Use of Computers in Designing, Pattern making, computerized production systems, communicating with vendors and buyers; Telephone, fax, video conferencing, intranet, internet, etc; Export documentation, retailing; Methods of communicating with consumers

### References

1. *Alexis Leon*, “ERP Demystified”, Tata McGraw Hill, New Delhi, 2000
2. *Glock Ruth E. and Kunz Grace I.*, "Apparel Manufacturing - Sewn Product Analysis", Blackwell Scientific Publications, 1996
3. *Joseph A. Brady, Ellen F. Monk, Bret Wagner*, “Concepts in Enterprise Resource Planning”, Thompson Course Technology, USA, 2001
4. *Garg Vinod Kumar and Venkitakrishnan N. K.*, “Enterprise Resource Planning – Concepts and Practice”, PHI, New Delhi, 2003
5. *Enterprise Resource Planning, Theory & Practice – Rahul Altekar , V.*, Printice Hall of India, New Delhi, 2005
6. *Enterprise Resource Planning– Leon , V.*, Diamond Publications, New Delhi.
7. *Enterprise Resource Planning – Mary Sumner*, Diamond Publications, New Delhi, 2001

## **Skill Based Subject IV – Project Work & Viva Voce**

Students have to undertake project in the areas of Knitting / Weaving/ Processing /Garment Manufacturing industry. A Team consisting of Internal & External Experts will evaluate the Project Report. The Viva-Voce will be conducted.

### **Elective I – A - Fashion Accessories & Trims**

#### **Unit I**

Accessory and its importance – the concept – the difference between accessories and trims – specifications – standards pertaining to accessory – types of accessories and trims. sourcing of accessory – single sourcing – multiple sourcing – advantages and disadvantages of sourcing – vendor evaluation – rating – vendor based rationalization

#### **Unit II**

Sewing threads and its applications – quality control in sewing thread – types of thread packages – embroidery threads – quality requirements – appliqué works – sequence works, beads, crystals & stones

#### **Unit III**

Functions and application of accessories and trims – zippers – quality parameters and testing procedures – buttons – types – testing procedures – lace – elastic, draw strings – velcro – snap fastness – hooks performance and properties of components and trims.

#### **Unit IV**

Labels and its types – testing procedures – tags and its types – quality parameters and testing procedures – lining – interlining – poly bags - master poly bags – hangers – cartons – wrappers – pouches for inner wear.

#### **Unit V**

Trends in accessory and trims – forecasting procedure –innovation in accessory industry – costing procedure in accessory and trims – sample collections – presentation – possible defects and remedies.

#### **References:**

1. Technology of clothing manufacture – *Carr & Latham*
2. Apparel manufacturers handbook – *Jacob Solinger*
3. Introduction to clothing manufacture – *Gerry Cooklin*
4. Know your Fashion Accessories – *Celia Stall Meaooows*, Fairchild Publications, New York, 2004
5. Singer creating Fashion Accessories – *Cy. De Cosse Incorporated*, IAFL Publications



## **Elective I – B - Technical Textiles**

### **Unit I Fibres, Yarns and Fabrics**

Introduction to technical textiles – Scopes and classification. Technical fibres – High strength, modulus and performance fibres. Technical yarns – Methods of production. Technical fabric structures: Woven – Knitted - Nonwoven fabrics - Finishes.

### **Unit II Medical Textiles**

Tissue response to implants – Inflammation - Cellular response to repair and implants. Soft tissue: Repair - Replacement – Sutures – Tapes – Percutaneous, skin implants. Blood interfacing implants – Blood compatibility and non-thrombogenic surfaces – Vascular, heart valve, implants. Hard tissue repair and replacement: Bone repair – Replacement - joints - Teeth replacements. Wound, health care and hygiene products.

### **Unit III Defence Textiles**

Requirements – Combat clothing – Water vapour permeable clothing – Breathable clothing. Camouflage systems - Deceptions - Decoys – Types and methods – Colour and patterns, Camouflage for UV, IR, antiradar and multiple spectral camouflages. Ballistic protective armours and accessories – fabrics and materials. Accessories: Cap – Helmet – Boots – Gloves. Aerospace Textiles: Scopes – Application – Gsuit – Multilayered garments. Fabrics for nuclear, biological and chemical protection.

### **Unit IV Textiles in Construction, Filtration and Sports**

Geotextiles – Requirements – Properties – Functions - Applications – Assessment methods. Filtration Textiles: Requirements - Dust collection - Solid-liquid separation - Filtration efficiency. Architectural fabrics – Building structure - Roofing materials - Awnings and Canopies - Flags. Textile materials in agricultural applications. Textile materials in sports and recreations: Scopes – Applications. Mathematical modeling for durability of Road related Geo textiles. Generic mathematical model for fluid flow with layered forour Textile materials.

### **Unit V Textiles in Transportation and Composites**

Transportation Textiles: Tyres – Airbags - Seat belts - Trims and covers. Textile materials in rail transport, aircrafts and marine applications. Textile Reinforced Composites (TRC): Fibres – Filaments - Woven fabrics - Braided fabrics - Stitched - Knitted fabric reinforcements. Filament winding: Method – Applications - Preforms - Prepegs.

#### **Textbooks:**

1. Horrocks A. R., Anand S.C., “Handbook of Technical Textiles”, Woodhead Publishing, Cambridge, 2000
2. Adanur S., “Handbook of Industrial Textiles”, Technomic Publication, Lancaster, 2001

#### **References:**

1. Kanna M.C., Hearle, O Hear., Design and manufacture of Textile Composites, Textile process , Textile Institute, Manchester, April 2004.
2. Scott, Textile for production, Textile process , Textile Institute, Manchester, Oct. 2005.
3. Shishoo, Textile in spot, Textile process, Textile Institute, Manchester, Aug. 2005

## **Elective I – C – Surface Ornamentation**

### **Unit I - Introduction to Surface Ornamentation**

Importance of surface ornamentation, various of methods of surface ornamentation – embroidery and surface ornamentation, general rules for hand and machine embroidery, attachments of sewing machines for embroidery – selection of needle, threads and fabrics for embroidery.

### **Unit II - Hand Embroidery**

Running, Couching, Button hole, Satin, Long & Short, Wheat, Chain, Stem, Herringbone, Cross stitch, Knotted stitches, Fish bone, Fly stitch, Braids, Back, Hem, Seed, Needle weaving, Whip stitches. Traditional Embroideries of India – Phulkari, Kasuti, Kashmiri embroidery, Kutch work, Chikkankari, Kantha, Tribal Embroideries – stitches, designs, colours and materials used.

### **Unit III - Machine Embroidery**

Eyelet work, Cutwork, Richelieu work, Lace work, drawn thread and fabric work, patch work, Mirror work, Appliqué, Shaded embroidery, Shadow work, Badla work, Bead and Sequins work, Couching thread embroidery, Satin stitch, Vermicelli, Zigzag, Wavy stitch, Granite stitch, Bobbin thread embroidery, Types of presser foot, types of frames, purpose of backing materials..

### **Unit IV - Computerised Embroidery Machines**

Concept of design and development, software used in embroidery machines, process of designing, method and types of stitch application, punching and digitizing. Types of embroidery machines and their working – multi-head computer controlled embroidery machines – special attachments in embroidery machines.

### **Unit V - Care of Embroidered Apparel**

Care and maintenance of embroidered articles – care and maintenance methods for embroidered apparel, pressing embroidery articles, cost estimation, marketing of finished embroidered goods.

### **Textbooks**

1. Sheila Paine, “Embroidered Textiles”, Thames and Hudson Publisher, UK, 1990.
2. Gail Lawther, “Inspirational Ideas for Embroidery on Clothes & Accessories”, Search Press Ltd, UK, 1993.

### **References**

1. Jacqueline Farrell Needlework: Hand & Machine Embroidery (Needlework), Hamlyn, UK, 2000.
2. Shailaja D.Naik, “Traditional Embroideries of India”, P.H. Publishing Corporation, New Delhi, 1996.
3. Sharon Jankowicz, Kristin Jankowicz, “Embroidery to Embellish Everything: 30 New Hand-Stitched Designs” Creative Publishing International, USA, 2006.
4. Dorothy Wood, “Step-by-Step Embroidery Stitches: Hand and Machine Embroidery Techniques Made Simple with 300 Colour Photographs and Diagrams”, Southwater Publishing, UK, 2008.

## **Elective II – A – Fashion Communication & Retailing**

### **Unit – I**

Retailing - Fashion Retailing - Scope of Retailing – Classifications - Retail Store Functions  
- Retail Marketing Channels - Retail Strategy Development - Retail Adaptation

### **Unit - II**

Retail Environment - Retailing and Economy - Political and Social Influences - Retailing  
Structures - Department Stores, Specialty stores and Discount Retailers - General  
Merchandise Chains - Classic Shopping Malls

### **Unit - III**

Visual Merchandising – Introduction – Visual Merchandising Environment – Elements - Store  
Design – Store Image - Global Retailing – Retail Competition – E – Retailing – Criteria for  
Global Success in Global Retailing – Factors.

### **Unit - IV**

Online Marketing Communication – Strategies of Fashion Communication – Individual and  
Group Influences on Consumer Behaviors – Impact of Technology on Fashion Communication

### **Unit - V**

Objectives of Fashion Retail Promotion - Promotion – Mix – Retail Sales Promotion – Publicity  
– Public Relation – Personal Selling – Advertising – Advertising Agencies – Fashion Shows  
and its types.

### **References:**

1. Fashion Advertising and Promotion, *Jay and Ellen Diamond*, Fair Child Publishers, New York, 1999.
2. Retailing Principles, *Lynda Gamans Poloian*, Fair Child Publishers Inc., New York, 2003.

## **Elective II – B – NonWovens & Specialty Textiles**

### **Unit I - Introduction**

Definition - Classification - Nonwoven manufacturing processes. Raw materials - Binders. Web forming - Lay process. Extrusion nonwovens-spun laying, spun bonding. Dry and wet lay process - Types - Raw materials - Fibre preparation - Process variables - Properties.

### **Unit II - Bonding**

**Needling Punching:** Principle - Needle characteristics - Process variables – Needled-fabric properties. Loop formation processes - Types - Process variables - fabric properties. Hydro-entanglement process - Principle – Process variables - Fabric properties. Drying - Hot air bonding - Heat setting - **Thermal calender bonding - Melt Blowing Technique** - Ultrasound bonding. Chemical bonding - Saturation bonding, Print bonding, Foam bonding and Spray bonding. - Nonwoven composites

### **Unit III - Finishing**

Mechanical finishing: Shrinking - Compacting and creping, glazing – Calendering – Pressing – Perforating – Slitting – Breaking – Emerising – Raising – Shearing – Singeing – Sewing - Quilting and welding. Chemical finishing washing – Dyeing – Printing – Finishing - Softening - Special effects, coating, laminating and flocking Testing . Sampling and statistics - Testing conditions - Standards and specifications. Testing of raw materials and finished nonwoven fabrics. Quality control aspects in nonwoven production.

### **Unit IV - Applications**

Nonwovens for hygiene, medicine – safety, cleaning, household products, home textiles - apparels and technical applications. Re-utllization of nonwovens Product Development Concepts and definitions - Product development for garments, decorative fabrics, home textiles and technical textiles. Costing of nonwoven products. Techno economics

### **Unit V - Narrow Fabrics**

Introduction - yarn and fibre types, fabrics. Preparation for narrow fabric production-winding, warping, sizing, looming, Narrow Fabric Production Woven narrow fabrics and their constructions - structure of narrow fabrics woven on shuttleless looms. Conventional shuttle looms, unconventional shuttle looms and shuttle less looms for narrow fabrics Special Fabrics. Elasticated fabrics, zip - fastener tapes, curtain - heading tapes, ladder tapes, trimmings, braids, labels, nets, laces, flocked fabrics – Coated and laminated textiles. 3D fabrics. Carpets Non-pile carpet weaves and their looms. Pile surfaced carpet weaves and their looms. Needle felt floor coverings.

### **Textbooks:**

1. Wilhelm Albrecht etal., " Nonwoven fabrics", WILEY - VCH Verlag Gmbh & Company, Germany, 2003.
2. Russel.S, "Handbook of Nonwovens", The Textile Institute Publication, 2007.

## **Elective II – C – Visual Merchandising**

### **Unit I**

Introduction :Visual merchandising-introduction, concepts and role, importance in store planning andutilizing basic visual merchandising techniques; Role of atmosphere in garment retailing – immediate effects and simulation types, visual merchandisers in garment retailing

### **Unit II**

Store Exterior And Interior: Store exterior – marquee, facade, exterior display, surrounding stores and displays; Store interior – store atmospheric, aesthetic, execution of store lay out - selection of display locations, lifts, staircase, elevators, utilization of store space; Display composition: Elements and principles of design, tools and materials

### **Unit III**

Store layout: Factors considered in organizing effective display – balance, rhythm, proportion, texture, harmony and emphasis. Store layout planning- grid, race track, freeform – direction of flow and planogram; Design elements to create mood and impression – colour, angle, motion, simplicity, and repetition

### **Unit IV**

Display: Seasonal and trend decision for point of emphasis – creativity in display; Planning of assortment, theme, ensemble, racks, shelves, bins, etc. and balance of display in a show room. Wall as retail selling tool – types of materials used merchandise display and effective wall planning. Application of colour schemes, colour psychology, creating mood by colour

### **Unit V**

Fashion Retailing: Lightings - Lights types, selection, advantages and disadvantages, music.Using effective Graphics and sinages for theme, campaign and promotional aspects - safety and security; Theme, interior and exterior displays used in garment retail outlet, boutique and haute couture, accessories show rooms, mannequins, fabric and paper displays.

### **References**

1. *Swapna Pradhan*, “Retailing Management”, 2nd Edition, Tata McGraw Hill Publishing Company Ltd, 2007
2. *Vedhamani and Gibson. G.*, “Retail Management:Functional Principles and Practices” Jaico Publishing House, 2007
3. *Bajaj Chetan, Tuli Rajesh, and Srivastava Nidhi V.*, “Retailing Management” Oxford University Press, New Delhi, 2007
4. *Lamba.A.J.*, “The Art of Retailing” Tata McGraw-Hill Companies, Inc, 2003
5. *Berman Barry and Evans Joel R.* “Retail Management: A Strategic Approach”
6. Prentice-Hill of India, 2002
7. *Uma Sekaran* , “ Organisational Behaviour
8. Industrial Psychology
9. *Aswethappa. K.* “Principles of Business Law”
10. *Bulchandani. K.R.* “Business Law”

## **Elective III – A – Clothing Science**

### **Unit I - Transmission Characteristics**

Air permeability - Heat transmission - Thermal resistance - Light permeability - Moisture transmission - Water permeability, wicking. Radio activity transmission

### **Unit II - Transformation Characteristics**

Crease resistance Recovery, Crock resistance - Dimensional stability - Hygral expansion - Relaxation shrinkage - Swelling shrinkage and felting shrinkage. Pilling - Scorching, Soiling - Flame retardance - Fusing, Mildew resistance Aesthetics: Subjective and objective evaluation – Drape - Colour, colour fastness - Shade variation and measurement.

### **Unit III - Fabric Handle and Comfort**

Bending –Compression- Tensile – Shear Friction – Bias extension – Formability - Tailorability – Objective evaluation of fabric handle by KES and FAST Fabric parameters and its influence on fabric comfort – Garment fit and size on comfort.

### **Unit IV - Design Logic of Apparel Product**

Classification of textile products – Components – Material – Specification – Properties - Technology of constituent fibres, yarns, fabrics and apparels

### **Unit V - Development of Apparels for Specific End Use.**

Sports - Casual - Swim - Winter - Summer wear and inner wear. Protective wear - Bullet proof, - UV production - Functional and quality requirements.

### **References:**

1. Slater.K., "Comfort Properties of Textiles", Textile Institute, Manchester, Vol 9, No.4, 1997.
2. Saville B.P, Physical Testing of Textiles, The Textile Institute, Wood head publishing limited, Cambridge,1999.
4. PradipV, Metha, " An Introduction to Quality Control for the Apparel Industry", ASQC Quality Press, Marcel Dekker Inc" New York, 1992,
5. Wngate loB, and Mohler J.F. "Textile fabrics and their selection", Prentice -HallInc, New Jersey, 1984.
6. Ed Postle R., Kawabata.S and Niwa M., "Objective Evaluation of Fabrics", Textile Machinery Society, Japan, Osaka, 1983
7. Miller "Textiles: Properties and Behaviors in Clothing use", Textile Institute, 1998.
8. Mastudaira T, and Suresh M.N., "Design Logic of Textile Products", Textile Progress, Textile Institute, Manchester, 1997.
9. 10. 11. 12.

## **Elective III – B – Clothing Care**

### **Unit I**

Finishing Equipments: Study of finishing room equipments - steam iron - steam busters - vacuum ironing tables - form finishing equipments - trouser topper, shirt press, collar/cuff press, form finisher for jackets and coats - study of boiler and related equipment for finishing room; fusing machines for interlinings; water treatment plant -soft water -hard water - methods of softening water

### **Unit II**

Laundry equipment and reagents: Study of laundry equipment and laundry reagents - soaps - detergents - cleaning action of soaps, indigenous cleaning agents - rita nut - shikakai - green gram - bran solution – study of modern and industrial cleaning agents

### **Unit III**

Stiffening Agents: Study of stiffening agents –purpose of stiffening-classification of stiffening agents-preparation and uses of stiffeners- natural and commercial starches - preparation of starch for use - bleaching agents - blueing and tinting agents and their application – optical whiteners

### **Unit IV**

Stain Removal: Principles of laundering - stain removal - various solvents for stain removing blood, tea, rust; oil/grease etc. – different methods of washing - application of friction by hand rubbing - scribing - tumble wash

### **Unit V**

Washing Machine And Care Labels: Study of different types of house hold/industrial washing machines- rotary -swirling - pressure - tumble wash etc; the various systems of care labelling-washing instruction. bleaching instruction-drying instruction-ironing instruction-dry cleaning instruction. placement of labels on garments.

### **References**

1. *Dantiyagi S.*, “Fundamentals of Textile and Their Care”, Oriental Longmans Ltd, New Delhi, 1996
2. *Denlkar*, “Household Textiles and Laundry Work”, Atma Ram and Sons, Delhi, 1993
3. *Neomi D’Souza*, “Fabric Care”, New Age International Publisher, 1998
4. *Davis*, “Laundry and Clothing Care”, Drama Book Publishers, 1995
5. *Mary Schenck Woolman*, “Clothing: Choice, Care, Cost” Kessinger Publishing,
6. Clothing care & Repair – *Singer*, IAFL Publications, Delhi, 2000

## **Elective III – C – Home Textiles**

### **Unit I**

Introduction To Textile Furnishings; Definition - Different types of furnishings materials Woven and nonwoven - factors affecting selection of home furnishings.

### **Unit II**

Floor Coverings: Hard floor coverings, resilient floor coverings, soft floor coverings, rugs, cushion and pads - Use and care. Wall Coverings: Types- Use and care.

### **Unit III**

Home Decoration: Draperies - Choice of fabrics - Calculating the amount of material needed - Different types of doors and windows - Their applications - Curtains - Types of curtains. Method of finishing draperies Tucks or pleats. Uses of drapery rods, hooks, tape rings and pins.

### **Unit IV**

Living Room Furnishings: Sofa covers - Wall hangers - Cushion - Cushion covers - Upholsteries Bolster and bolster covers. Bed Linens: Definitions - Different types of bed linen - Sheets - Blankets - Blanket covers - Comforts - Comfort covers - Bed spreads - Mattress and mattress covers - Pads - Pillows and pillow covers – Their uses and care.

### **Unit V**

Kitchen Linens: Definitions - Types of kitchen linens - Dish cloth - Hand towels - Fridge cover - Fridge .handle cover - Mixie cover - Grinder cover - Their use and care. Table Linen: Definitions, types - Table linens - Table mats - Table cloth - Hand towels - Selection – Use and care. Recent Trends In Home Furnishings.

### **Reference**

- 1.Alexander,N.G., "Designing Interior Environment", Mas Court Brace Covanorich,Inc.,New York, 4th edition 1996.
- 2.Donserkery,K.G. "Interior decoration in India", D.B. Taraporeval sons and co. Pvt.Lts., 3rd edition 1996.