

B. Tech. (Carpet & Textile Technology)
Semester V

Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KCT-501	Textile Testing	3	1	0	30	20	50		100		150	4
2	KCT-502	Chemical Processing of Textiles II	3	1	0	30	20	50		100		150	4
3	KCT-503	Carpet Manufacture	3	1	0	30	20	50		100		150	4
4	KCT-051/KCT-052	Yarn Technology III/Fabric Technology III	3	0	0	30	20	50		100		150	3
5	KCT-053/KCT-054	Textile Design Concept/ Woven Textile Design	3	0	0	30	20	50		100		150	3
6	KCT-551	Textile Testing I LAB	0	0	2				25		25	50	1
7	KCT-552	Chemical Processing of Textiles II Lab	0	0	2				25		25	50	1
8	KCT-553	Carpet Manufacture Lab	0	0	2				25		25	50	1
9		Mini Project or Internship Assessment*	0	0	2				50			50	1
10	NC	Constitution of India / Essence of Indian Traditional Knowledge	2	0	0	15	10	25		50			
11		MOOCs (Essential for Hons. Degree)											
		Total	17	3	8							950	22

*The Mini Project or internship (4 weeks) conducted during summer break after IV semester and will be assessed during V semester.

SEMESTER- VI

Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KCT-601	Structural Properties of Fibres	3	1	0	30	20	50		100		150	4
2	KCT-602	Manmade Fibre Technology	3	1	0	30	20	50		100		150	4
3	KCT-603	Home Textile Technology	3	1	0	30	20	50		100		150	4
4	KCT-061/KCT-062	Chemical Processing of Textiles III/Knitting and Nonwovens	3	0	0	30	20	50		100		150	3
5		Idea to Business Model	3	0	0	30	20	50		100		150	3
6	KCT-651	Textile Testing II Lab	0	0	2				25		25	50	1
7	KCT-652	Carpet Testing & Analysis Lab	0	0	2				25		25	50	1
8	KCT-653	Home Textile Technology Lab	0	0	2				25		25	50	1
9	NC	Essence of Indian Traditional Knowledge/Constitution of India	2	0	0	15	10	25		50			
10		MOOCs (Essential for Hons. Degree)											
		Total	0	3	6							900	21

Semester V

KCT 501 Textile Testing (L-T-P 3-1-0) Total contact hours:-60 Credits = 4

Course Objectives

- i) To get aware of principles of sampling for fibre/yarn/fabric testing
- ii) To understand the importance of testing of environmental conditions with respect to textile materials
- iii) To understand the importance of fibre length and fibre fineness and their measurement techniques
- iv) To acquire knowledge on testing of yarn irregularities and yarn hairiness
- v) To understand the principles involved in mechanical strength testing of textiles
- vi) To get an understanding of the importance of functional properties, such as flame proofness & water proofness of textile materials and their measurement techniques
- vii) To acquire knowledge on serviceability and comfort aspects of textile materials

UNIT – I

Objectives of Testing, selection of samples for testing, Random and biased sampling, Principles of sampling for fibre/yarn/fabric testing, Effect of moisture on different fibre properties, moisture content & regain; measurement of atmospheric conditions, Brief description and working principle of moisture meter.

Contact hours required =10

UNIT – II

Importance of fibre length measurement, Concept of Baer Sorter Diagram, Analysis of effective length, modal length, Average length and short fibre% using Baer Sorter Diagram, Concept of span length and Uniformity ratio.

Importance of fibre fineness measurement, Determination of fibre fineness using air flow method, Fibre maturity: methods of determination of fibre maturity.

Salient features of modern testing instruments like HVI, AFIS, WIRA FDM.

Contact hours required =12

UNIT – III

Measurement of yarn hairiness, Type of irregularity and its expression; Index of irregularity; limit irregularity; Principles of measurement of Evenness Testing (Sliver, Rove & Yarn), nature of irregularity; periodic irregularity, random irregularity.

Contact hours required =10

UNIT – IV

Terms and definitions used in mechanical strength testing of textiles, Factors affecting the tensile properties of yarn, Classification of tensile strength testing machines based on operating principles (CRE, CRL & CRT): Brief Description and principle involved in working of a) Lea Strength tester b) Tensile Tester operating on Strain Gauge principle. Fabric tensile testing: Sample preparation – Strip Test & Grab Test, Tear and bursting strength testing

Contact hours required =14

UNIT V

Terms & definitions related to Air permeability of fabric, Measurement of Air permeability using Shirley Air Permeability Tester, Brief idea on thermal properties of fabric.

Terms & definitions related to Water proofing property of textile materials, Methods of testing: (i) Spray Test ii) Bundesman's Water repellency test iii) Drop penetration test, fabric wetting property, Wicking property, waterproof breathable fabrics.

Flammability testing: Terms and definitions related to flammability of textiles; Determination of flammability of fabric.

Serviceability, Wear and abrasion resistance testing: Principles of testing of abrasion resistance

testing; factors affecting abrasion resistance: Brief description of Martindale Abrasion Tester:

Pilling Tests: Assessment of pilling of fabric using ICI pilling box.

Salient features of FAST system, KESF system.

Contact hours required =14

References:

1. Principles of Textile Testing by J. E. Booth
2. Physical Testing of Textiles by Saville
3. Handbook of Textile Testing & Quality Control by Grover & Hamby
4. Physical Testing & Quality Control by K. Slater (Textile Institute)
5. Testing & Quality Management by V. K. Kothari

Course outcome

After completion of this course, students will be able to:

1. Appreciate the importance of Textile testing.
2. Understand the principles used for sampling of fibre/yarn/fabric during their testing
3. Appreciate the importance of environmental condition and its measurement techniques
4. Appreciate the importance of testing of length, fineness and maturity of fibre.
5. Understand the generation of yarn hairiness and yarn irregularities
6. Appreciate the importance of mechanical strength testing of textile materials.
7. Appreciate the importance of measurement of working life/ durability of textile articles.
8. Appreciate the importance of measurement of various functional properties of textile articles.

KCT 502 Chemical Processing of Textiles II (L-T-P: 3-1-0) CREDIT 4

Course Objectives:

1. To describe application process of azoic colours and sulphur dyes on textile materials.

2. To know chemistry of vat dyes and application process on textile materials.
3. To know chemistry of solubilised vat dyes and application process on textile materials.
4. To discuss chemistry and describe application of reactive dyes on cotton materials.
5. To explain and describe dyeing mechanism and application of disperse dyes on synthetic fibres.
6. To discuss and application process of chemical finishing on textiles.
7. To describe technical details and operation of various finishing machines for textiles.

UNIT I

Azoic Colour: Basic principle of application of Azoic Colour; Naphtholation process, role of additives and effect of process parameters on naphtholation process. Classification of naphthols based on substantivity. Basic chemistry in Diazotisation process, Procedure for diazotisation; Stabilization of diazonium salts. Development of Shades- Coupling, Basic Chemistry involved in coupling. Fastness properties of Azoic Colours.

Sulphur Dyes: Chemical nature of sulphur dyes; Classification of sulphur dyes, Process of application of sulphur dyes & mechanism of dyeing, Role of additives and process parameters in sulphur dyeing. Fastness properties of sulphur dyes.

**Total lectures required
= 12**

UNIT II

Vat Dyes: General formula of vat dyes, classification of vat dyes; Process of application of vat dyes, mechanism of vat dyeing; oxidation process; Role of additives and process parameters in vat dyeing.

Solubilised Vat dyes. Dyeing with solubilised vat dyes. Fastness properties of vat dyes.

Total lectures required = 12

UNIT III

Reactive Dyes: General formula of reactive dyes. Chemical nature of reactive dyes; Classification of reactive dyes; Process of application of various kind of reactive dyes & dyeing mechanism; Role of additive and effect of process parameter in reactive dyeing. General properties of reactive dyes.

Disperse Dyes: Chemical nature of disperse dyes, application of disperse dyes on polyester; dyeing mechanism; Role of additives & effect of process parameters on disperse dyeing.

Optical whitening agents, application to polyester and cotton.

Total lectures required = 12

UNIT IV

TEXTILE FINISHING

Purpose of finishing; Type of finishing, Permanent & Temporary; Mechanical & Chemical finishing. Chemical finishing- Anticrease finish (Using DMU & DMDHEU)

Total lectures required = 12

UNIT V

Flame retardant finish, Water repellent & Water proofing finish, Softening of fabric, Anti soiling finish.

Brief description of different type of finishing machine; Stenter, Sanforizing machine, Calendering machine etc.

Total lectures required = 12

REFERENCE BOOKS:

1. Dyeing & Chemical Technology of Textile fibres by E.R. Trotman.
2. Chemical Technology of fibrous material by F..Sadov.
3. Chemistry of Dyes and principles of Dyeing by Dr. V.A. Shenai.
4. Technology of Dyeing by Dr. V.A. Shenai
5. Chemical Processing of Synthetic fibres by Dr. K.V. Datye & A.A. Vaidya
6. The Dyeing of Cellulose fibres by Clifford Preston.
7. Technology of Finishing – Vol. X by Dr. V.A. Shenai.
8. Introduction to Textile finishing by J.T. Marsh

Course Outcomes:

At the end of the course students will be able to:

1. Apply azoic and sulphur dyes and illustrate the process of dyeing on textiles
2. Describe the chemistry of vat dyes and apply to textile fabrics.
3. Apply and illustrate disperse dyes on polyester materials.
4. Set up finishing machines and control the process.
5. Summarize and illustrate the application of chemical finishing on textiles.

KCT 503

CARPET MANUFACTURE

L:T:P::3:1:0

CREDIT 4

Course objectives

1. To get awareness about different types of carpets and yarns used in manufacture
2. To acquire knowledge about manufacturing and finishing of handknotted carpets
3. To give an indepth knowledge about handwoven carpets
4. To acquire knowledge about hand tufted carpets
5. To develop an understanding about machine made carpets

UNIT – I

Total lectures hours: 12

Classification of hand made carpets and brief description of each type. Yarn used in hand made carpet.

Brief introduction of Hand made carpet sector of India and abroad. Carpet export proceedings and Process control of hand made carpet sector.

Designing of hand made carpet- brief introduction of CAD for carpet.

UNIT – II

Total lectures hours: 12

Hand Knotted Carpet:

Terms and definitions, Persian, Turkish, tibetan and other type of knot structure and its quality parameters.

Manufacturing of various hand knotted carpets - Preparatory process, tools and equipments used for Persian, Tibetan, shaggy carpets.

Washing and other mechanical finishing for hand knotted carpets.

Hand made dhurry:

Techniques , Quality and other process parameter of Hand made flat carpet on horizontal / Vertical loom frame viz. panja dhurry, Shoumak , Chindi dhurry and other fancy products.

Defects in hand knotted carpets and their remedies.

UNIT – III

Total lectures hours: 12

Hand loom Carpets:

Flat carpet making – quality parameters, jacquard dhurry making and its finishing.

Pile carpet making - Preparatory process and weaving techniques for plain and Jacquard loom pile carpet.

UNIT –IV

Total lectures hours: 12

Tufted Carpets:

Structure of tufted carpet, backing cloth and quality parameters.

Hand tufting process - Preparatory process, tools and equipments , tufting frame, manual / electric hand tufting gun

Backing of hand made carpet, Natural latex, synthetic resin and its composition of backing solution for hand made carpet.

Finishing of hand tufted carpet.

Defects in hand made carpets and their remedies.

UNIT – V

Total lectures hours: 12

Introduction to machine made carpet. Brief introduction to Broad loom woven, tufted carpets and other types of carpet machines.

References:

1. Advances in Carpet Manufacture by K. K. Goswami, Woodhead Publishing
2. Journals & Magazines 3. Carpet-e-World
3. Carpet Manufacture by Crawshaw
4. Tufted Carpet by Von Moody
5. Process control in carpet manufacturing by K KGoswami, Abhishek Publishing, Chandigarh, India.

Course outcomes

1. After completing this course, the student will be able to
2. Understand different types of carpets, designing of carpets through CAD, terms used in the manufacture and procedures involved in the export of carpets
3. Understand the difference between different types of knots, tools and equipments used in all types of manufacture, preparatory process, washing and finishing of carpets and defects in the carpet
4. Understand the quality parameters, preparatory process and manufacturing of handloom carpets
5. Understand the manufacture of handtufted carpets, its finishing with different types of latex, defects and remedies
6. Understand the machine made carpets

KCT-051**Yarn Technology-III (L: T: P: 3:0:0)****CREDIT-3****Course Objectives:**

1. To describe the process sequence and mechanism involved in woolen and semi-worsted carding and opening.
2. To describe the process sequence and mechanism involved in worsted and semi-worsted gilling, rubbing frame and in woolen and semi-worsted ring spinning.
3. To discuss the process sequence and mechanism involved in rotor spinning and friction spinning.
4. To discuss the process sequence and mechanism involved in air-jet spinning, ply fill spinning, electrostatic spinning etc.
5. To describe the process sequence and mechanism involved in the formation of textured yarn.
6. To discuss about the requirement of carpet yarn in terms of Handmade and machine made carpet.

UNIT I**[12]**

Various systems of wool fibre spinning- woolen, worsted, semi worsted - Flow chart, Willow m/c, woolen and semi worsted cards, production calculations in woolen card.

UNIT II**[12]**

Gilling, Rubbing frame and ring frame-sequence of machines and operations, Comparison of above spinning systems, production calculations in these machines.

UNIT III [12]

Rotor Spinning: Principle of Operation, properties and applications of rotor yarn.

Friction Spinning: Principle of operation of DREF-II & DREF-III, properties and application of friction spun yarn

UNIT IV [12]

Air Jet Spinning: Principle of formation of yarn in Murata Air jet spinning, Properties of Air jet spun yarn & the factor influencing air jet spun yarn.

Brief discussion on Ply-fill spinning system, wrap spinning, electrostatic spinning etc.

UNIT V [12]

Textured yarn technology, various methods used for Texturing like Air-jet and False twist process.

Requirement of carpet yarn in regards to count, twist, and bulk for Handmade and machine made carpet. Faults in carpet yarn and their remedies.

References-

1. New spinning technology- W. Klein.
2. Worsted yarn technology-By Eric Oxtoby
3. C. Vickerman, Woollen Spinning, Abhishek Publications, Chandigarh-17 (India)
4. W S Simpson and G H Crawshaw, Wool: Science and Technology, Woodhead Publishing Limited, Cambridge, England
5. Miles Collins, Wollen and Worsted Spinning, Abhishek Publications, Chandigarh-17 (India)

Course Outcomes:

At the end of the course students will be able to

1. Describe knowledge in various wool spinning systems and carding process.
2. Illustrate the gilling, roving process and understand the woollen and semi-worsted ring spinning process.
3. Explain new spinning systems like rotor spinning, friction spinning, air-jet spinning, ply fill and electrostatic spinning etc.
4. Depict yarn texturing process like false twist and Air-jet types.
5. Do calculations related to all above process and understand the machine parameters.
6. To develop knowledge on various parameters of Hand made carpets.

KCT-052 FABRIC TECHNOLOGY-III (L-T-P 3-0-0) Credits = 3
Total contact hours:- 60

Course Objectives:

1. To learn about automatic loom mechanisms.
2. To get an idea on shuttles less weaving.
3. To study on projectile and rapier loom.
4. To get knowledge on air jet and water jet loom.
5. To develop idea on multiphase and triaxial weaving mechanism.
6. To teach various weaving mechanisms for terry and leno fabric

UNIT I

Total lectures required = 12

Automatic shuttle loom:

Features of automatic shuttle looms, type of automatic shuttle looms, Automatic cop change loom mechanism. Weft feeler and transfer mechanism, Mechanism of shuttle change looms, Introduction to bobbin loader and unifil loom winders.

UNIT II

Total lectures required = 12

Shuttle less weaving:

Advantages, Essential features - classification of shuttleless picking system, let off and take mechanism, matched cam beat up mechanism, Types of selvages- tucked, leno selvages.

UNIT III

Total lectures required = 12

Gripper loom:

Projectile Picking cycle, projectile, accumulator, and other essential parts of picking cycle. picking mechanism, technical specification of modern machines.

Rapier picking system - Classification of Rapier and brief description of each type, rapier head and Picking cycle of Dewas and gabler picking system, rapier drive. Technical specification of Modern machines.

UNIT IV

Total lectures required = 12

Jet Loom:

Air jet picking system, Requirement of air, Picking cycle - confusor, Nozzel, PMD, waste selvedge, suction device. Technical specification of Modern machines.

Water jet picking system, Requirement of water and pump, picking cycle, Nozzle, suction device. Technical specification of Modern machines.

UNIT V

Total lectures required = 12

Multiphase weaving: shedding, picking and beat up of M8300 loom,

Triaxial weaving principle and circular weaving.

Terry pile weaving – essential requirements, various terry mechanisms – loose reed, cloth control and variable sley sweep based terry mechanism, pile height adjustment.

Principle of Leno weaving – classes of leno structures, string and steel doup mechanisms.

Text Books & Recommended Books:-

1. Principles of weaving by Marks & Robinson
2. Weaving Mechanism by T. Fox
3. Weaving machine and mechanism by Talukdar, Azgaonkar and Sriramulu
4. Fancy Weaving By K T Ashwani.
5. Woven Fabric Production – I, II NCUTE Publications
6. ADAVANCETextile Design W Watson
7. Weaving machine, mechanism, management by Talukdar, Sriramulu, Ajgaonkar
8. Shuttleless Weaving Swaty

UNIT (4): Brief discussion on traditional carpet & floor covering: – [12]

Mir, Prayer rug, Abusson, Herati, Isfahan, Kirman, Kazak, Heriz, Kashan, Saroukh, Bidjar, Tabriz etc, Tufted, Tibbetan, Dhurries (Geometrical & Floral) – Killims, Different quality calculation.

UNIT (5): Use of Motifs in Carpet, Textile Design with Advance Features: – [12]

drawing of all designs studied in this module & creating different types of design, Modern look, traditional look of design by mixing/modifying different design styles, Introduction of Computer Aided Design (CAD), Importance & Advantage of CAD.

References:

1. Traditional Needle Arts Embroidery by Katrin Cargill, Great Britain.
2. Indian Embroidery by Kamala Devi Chartopadhyaya, Wiley Einstein Ltd., Delhi.
3. Saris of India by RTA Kapur & Amba Sanyal, Wiley Eastern Ltd., New Delhi
4. Hand book of textile design Jacquir Wilson, wood head publishing, UK.
5. Watson's Textile Design and Colour by Z Grosicki; Universal Publishing Corporation, Bombay (India)
6. Textile Design by Thames & Hudson
7. Persian Carpets by Dr. Seyed
8. Hand Crafted Indian Textile by Roli Books
9. Heritage by Design Point
10. Carpet Style by Phillips, Barty
11. Carpet Manufacture by Crawshaw, G.H.
12. Carpets and Textiles by Spuhler, Friedrich
13. Carpets: Techniques, Traditions and History by Anquetil, Jacques
14. History of Textile Design by Shenai, V.A.
15. The Indian Textile Journal (ITJ) [Periodical].
16. Ancient Indian Textile Designs - Part – I by Mishra, Jai Shankar
17. Positive Design - I Flower by Shoin, Kyoto
18. Rugs & Carpets from the Collection of Dildarian by Sotheby's
19. Floral patterns by Roojen, P.V.
20. Carpet and Textile Patterns by Purdon, Nicholas
21. Advance carpet Manufacturing, K K. goswami, wood head publisher UK.
22. Nedgraphics Texcelle Software Manual
23. Indian Carpet & Textile Software Manual

Course outcomes:

At the end of the course students will be able to:

1. Describe knowledge of design element which will help in textile Design creations.
2. Illustration of different type of textile, carpet, motif, composition through CAD.
3. Explanation of different type of modern and traditional design and printing knowledge will be easy to connect with new fashion.
4. Depict traditional knowledge of carpet can help in new innovation of design.
5. Represent knowledge color trend year wise combination, texture, different character of colour shade, which will help in market representation.
6. Explanation of different character according to buyers like Modern, Abstract, Contemporary Look, Traditional Modify different character.

KCT - 054 WOVEN TEXTILE DESIGN (L-T-P 3-0-0) Credits = 3

Total contact hours:- 60

Course Objective

- i) To understand design ornamentation through extra warp and extra weft.
- ii) To get knowledge on warp backed and weft backed fabric.
- iii) To study on principle and types of double cloth and treble cloth.
- iv) To know damask and brocade design.
- v) To get an idea on tapestry structures.

UNIT –I

Principle and objective of extra warp and extra weft designing loom requirements, methods of disposing surplus thread, difference between extra warp and extra weft designing, Swivel and lappet fabric designing. Principle and method of lappet weaving, principle and method of swivel weaving.

Total lectures required = 12

UNIT –II

Principle and objective of warp backed and weft backed fabric. Loom requirements, examples of each category, difference between warp backed and weft backed fabric.

Total lectures required = 12

UNIT –III

Double cloths: Introduction, classification, self stitched double cloths, centre stitched double cloth, interchanging double cloths. Example of each type.

Introduction of Treble cloth.

Total lectures required = 12

UNIT IV

Damask and brocade design. Methods of construction, self twilling jacquard. Study examples.

Total lectures required = 12

UNIT V

Tapestry structures- Introduction, simple weft face tapestries, combined warp & weft tapestries.

Total lectures required = 12

References:

1. Watson's Textile Design and Colour by Z Grosicki; Universal Publishing Corporation, Bombay (India)
2. Watson's Advance Textile Design
3. Grammer of Textile Design – Nisbet
4. Structural Fabric Design by – Kilby
5. Woven Structures and Design – Doris Goerner; British Textile Technology GroupWIRA, House, Leeds (UK)
6. Fibre to Fabric by Ghosh

Course outcome

At the end of the course students will be able to:

1. Develop ornamentation on fabric through extra warp and extra weft designing.
2. Explain and develop warp backed and weft backed fabric design.
3. Produce versatile design of double cloth.
4. Illustrate damask and brocade design.
5. Develop structures on tapestry construction.

KCT 551 Textile Testing I Lab L:T:P::0:0:2, Credits= 1

Course Objectives

- i) To get aware of principles of measurement of environmental conditions of testing lab.
 - ii) To develop an understanding of yarn count system using testing instruments
 - iii) To get an understanding of the principles of measurement of fibre length and fibre fineness
 - iv) To acquire knowledge on measurement of impurities present in raw fibre.
1. Measurement of Relative humidity of the testing laboratory.

2. Determination of count of a given yarn/sliver/roving in different counting system.
3. Determination of count of yarn using Quadrant Balance.
4. To study the principle of measurement of fibre length of cotton by means of Digital Fibrograph and determine:-
 - a. 2.5 % Span Length
 - b. 50 % Span Length
 - c. Uniformity
5. To study the principle of measurement of fibre length of wool fibre by means of W.I.R.A FDA.
6. To study the principle of measurement of fineness of wool fibre by laser scan
7. Determination of fineness of wool fibre by WIRA tester.
8. Determination of fineness and maturity of Cotton fibre.
9. Determination of % medullation of wool fibre using projection microscope.
10. Determination of trash content of cotton fibre by trash analyser.
11. Determination of wax & grease content of wool fibre by Soxhlet extraction method.

NOTE:

Experiments shall be decided on factors like:

- Facilities installed at Institute.
- Accessibility to Industry & nearby Institutes.
- Trend of Technological Developments in National & International perspective.

Course outcome

After completion of this course, students will be able to:

1. Appreciate the importance of measurement of environmental conditions of testing labs.
2. Measure the fibre length and fibre fineness using various instruments.
3. Quantify the impurities present in raw fibre.
4. Measure the count of Yarn/roving/sliver using various instruments.

KCT 552 Chemical Processing of Textiles II Lab (L-T-P: 0-0-2) CREDIT 1

COURSE OBJECTIVES

1. To synthesize and apply azo dyes by coupling reaction.
2. To apply vat dyes on cotton fabric/yarn.
3. To dye cotton fabric/yarn with remazol & procion dyes and sulphur dyes.
4. To operate HTHP machine and apply disperse dyes on polyester fabric/yarn.
5. To determine washing fastness of dyed textiles by standard (IS/ISO) method.
6. To determine light fastness of dyed textiles by standard (IS/ISO) method.

EXPERIMENTS

1. Development of dye by coupling method.
2. Dyeing of cotton yarn with vat dyes in sample pot dyeing machine.
3. Dyeing of cotton yarn with sulphur dyes
4. Dyeing of cotton yarn with Remazol dyes.
5. Dyeing of cotton yarn with Procion Dyes
6. Dyeing of cotton yarn with Bi-functional reactive Dyes

7. Dyeing of polyester yarn/fibre in laboratory HTHP machine.
8. Application of optical whitening agent on cotton.
9. Determination of washing fastness of dyed material.
10. Determination of washing fastness of dyed material.

COURSE OUTCOMES

At the end of the course students will be able to:

1. Develop azo dye by coupling method.
2. Apply vat dyes on cotton fabric/yarn.
3. Dye cotton fabric/yarn with remazol & procion dyes and sulphur dyes.
4. Operate HTHP machine and apply disperse dyes on polyester fabric/yarn.
5. Evaluate washing fastness of dyed textiles by standard (IS/ISO) method.

Evaluate light fastness of dyed textiles by standard (IS/ISO) method

KCT 553 CARPET MANUFACTURE LAB L:T:P::0:0:2 CREDIT 1

Course objectives

1. To get knowledge about various types of carpets and raw materials used in manufacture
 2. To acquire knowledge about dyeing of yarn used in carpets
 3. To give an in depth knowledge about knotting and tufting of carpets
 4. To acquire knowledge about machine made carpets
 5. To develop an understanding on carpet washing and finishing
 6. To familiarize about the testing equipments.
 7. To get knowledge about data collection
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1. Identify various type of carpet and raw material used
 2. seminar on carpet designing and quality of hand knotted carpet
 3. Demonstration of carpet yarn dyeing
 4. practice of hand knotted and tufted carpet manufacturing.
 5. demonstration on machine made carpet
 6. Demonstration of carpet washing and finishing
 7. Demonstration of various carpet testing instruments in the lab.
 8. Data collection of carpet export and report making

Course outcomes

After completing this course, the student will be able to

1. Understand about various types of carpets and raw materials used in manufacture
2. Understand the dyeing of yarn used in carpets
3. Understand the knotting and tufting of carpets
4. Understand the carpet washing and finishing
5. Understand the machine made carpets
6. Understand about the equipments used for testing and assessing the quality

Semester VI

KCT 601 Structural Properties of Fibres (L-T-P 3-1-0) Total contact hours:60 Credits:4 **Course Objectives**

- i) To understand the terminologies like crystalline region, amorphous region, molecular chain entanglements etc. related to the morphological structure of textile fibres.
- ii) To understand the concept of various thermal transitions occurring in fibres at molecular level and their characterization techniques.
- iii) To understand the relationship of morphological structure and moisture absorption behaviour of textile materials.
- iv) To understand the relationship of morphological structure and mechanical properties of textile materials.
- v) To acquire knowledge on various electrical, optical and frictional properties of fibres and their characterization techniques.

UNIT I

Amorphous and crystalline phases, molecular chain length, Glass Transition, Plasticization, Crystallization, Melting, factors affecting T_g & T_m , Role of molecular entanglement on fibre formation.

Contact hours required =12

UNIT II

Differential heat of sorption, integral heat of sorption, Moisture absorption, effect of hydrophilic groups, moisture absorption in crystalline and non crystalline region, directly and indirectly attached water, creasing behaviour in textiles.

Contact hours required =12

UNIT III

Basic definitions related to mechanical properties of textiles (tenacity elongation, modulus, work of rupture, Elastic recovery), Explanation of load-elongation and stress-strain curves related to textile fibres, Relation between structure and mechanical properties of fibres, time effects (Primary and secondary creep).

Contact hours required =12

UNIT IV

Thermal behaviour of textile fibres by DSC, TGA, Thermal Mechanical Analysis, Density Gradient Column, Preparation of density gradient column.

Contact hours required =12

UNIT V

Optical properties of fibres, Birefringence behaviour, dielectric properties, fibre friction, fibre friction measurement and static charge measurement.

Contact hours required =12

Reference Book:

1. Manufactured fibre technology by V.B. Gupta, V.K. Kothari
2. Physical properties of fibre by J.W.S. Hearle
3. Textile fibres by ATIRA
4. Principles of Textile Testing by J. E. Booth
5. Physical Testing of Textiles by Saville

Course outcome

After completion of this course, students will be able to:

1. Appreciate the importance of crystalline region, amorphous region, molecular chain entanglements etc. with respect to the morphological development of textile fibres.
2. Appreciate the role of morphological structure in moisture absorption behaviour of textile materials.
3. Appreciate the importance of morphological structure in development of mechanical properties in textile materials.
4. Understand the principles involved in characterization of various electrical, optical and frictional properties of fibres.
5. Understand the working principle of various sophisticated testing instruments such as DSC, TGA, DGC, DMA etc.

KCT 602 MAN MADE FIBRE TECHNOLOGY

L:T:P::3:1:0

CREDIT 4

Course objectives

1. To get awareness about different types of manmade fibres used in textile application
2. To acquire knowledge about production of PET

3. To give an in depth knowledge about polyamides
4. To acquire knowledge about dry spinning and wet spinning
5. To develop an understanding about drawing and texturising of fibres

Unit 1

Total lectures hours: 12

Classification of man made fibres, definition of regenerated and synthetic fibres, concepts of molecular weight, degree of polymerization, orientation and crystallinity, characteristics of fibre forming polymer.

Unit 2

Total lectures hours: 12

Introduction to fibre formation by melt spinning, Polyethylene terephthalate fibre (PET) – history of development, Polymer production by DMT & PTA route, Chips drying, physical & chemical properties of polyester fibres and its applications.

Unit 3:

Total lectures hours: 12

Polyamide Fibres – History of development, Different types of polyamide fibres, Nylon polymer production by continuous polymerization in VK Tube, Manufacturing of Nylon 6 fibre, Properties of nylon 6 fibre, Polymer production of Nylon 6 and Nylon 66, physical & chemical properties and their applications.

Unit 4:

Total lectures hours: 12

Introduction to fibre formation by dry spinning & wet spinning, Polyacrylonitrile fibres, physical and chemical properties of acrylic fibre & its applications, Manufacturing sequence of viscose fibre, wet spinning of viscose rayon, Introduction to Lyocell fibres and elastomeric fibres.

Unit 5:

Total lectures hours: 12

Concept of drawing, drawing unit, Factors influencing drawability, Influence of drawing on structure and properties of fibres. Drawing of as-spun fibres through neck formation. Concept of Heat setting, nature of heat set. Texturising: Objectives of texturising and their types,

References:

1. Textile Fibres – Vol.-I by V.A. Shenai, Sevak Publications, Bombay, 1971
2. Textile Fibres – H V S Murthy, Textile Association Publication, 1995
3. A Text book of Fibre Science and Technology by S.P. Mishra, New age International (p) limited, 2000

4. Hand book of Textile Fibres Vol. I & II by Gorden& Cook, Merrrow Publication Ltd, England
5. Man Made Fibres – R.W. Moncrieff, Heywood Books, London, 1998
6. Textured yarn technology by J.W.S.Hearle.
7. Hand book of Textile Fibres Vol. I & II by Gorden& Cook, Merrrow Publication Ltd, England

Course outcomes

After completing this course, the student will be able to

1. Understand different types of man made fibres used in the manufacture of textile applications, concept of molecular weight, terms like orientation and crystallinity
2. Understand the concept of melt spinning with the example of PET , production of PET through different routes
3. Understand the production of polyamides through melt spinning
4. Understand the concept of dry spinning and wet spinning with example of PAN and viscose. Concept of lyocell and elastomeric fibers is also given
5. Understand the concept of drawing and texturising of yarn.

KCT-603 Home Textile Technology L: T: P:: 3:1:0
Total contact hours:- 60

Course Objective

- i) To explain home textiles and its areas of applications.
- ii) To describe the manufacturing processes of home textiles.
- iii) To discuss various embellishment techniques for home textiles.
- iv) To design some home textile products.

UNIT I

Introduction to Home Textiles, Areas of Application, The Planning, Drawing and Reproduction of the Marker, the requirements of marker planning, Efficiency of the marker plan, Methods of Marker Planning and marker use. The Spreading of the Fabric to from a lay, The requirement of the Spreading process. Methods of Spreading, The Nature of Fabric Packages. The Cutting of Fabric: Objectives of cutting, Cutting Machines: Hand shears, straight knife, round knife, band knife etc.

Total lectures required = 12

UNIT II

Stitch, Stitch types, Sewing machine-parts and their function, sewing machine feed mechanisms, Seam, Seam types, Seam finishes.

Sewing machine needles: Functions, Parts, Selection of Sewing Needle.

Sewing Threads: Fibre Type, Construction, Thread Sizing and Thread Packages.

Associated work aids of Sewing Machines

Total lectures required = 12

UNIT III

Fullness: Definition, Darts, tucks, pleats. Flares, Godets, Gathers, Shirrs and Frills or Ruffles.

Placket finishes: Definition, classification continuous bound, bound and faced (two piece) plackets, zipper placket. tailored placket.

Embroidery: Introduction, Different types of Embroidery Stitches, Different materials/equipments used in embroidery, precautions during setting the fabric on embroidery frame, Darning.

Total lectures required = 12

UNIT IV

Patch Work: Definition, Different styles of Patchwork Techniques such as Pieced Patchwork, Shell Patchwork, Suffolk Puffs, Crazy Patchwork, Log Cabin Patchwork, Strip Patchwork, Seminole Patchwork, Folded Star Patchwork, Mayflower Patchwork and Pleated Patchwork.

Appliqué: Definition, Various Styles of Appliqué Techniques, Standard appliqué, Appliqué Perse, Reverse appliqué, Padded appliqué, folded appliqué, Shadow appliqué, Lace appliqué

Quilting: Definition, Various Styles of Quilting, Wadded Quilting, Padded Quilting, Corded Quilting, Shadow Quilting.

Total lectures required = 12

UNIT V

Curtains: - Definition, Various Styles, Choices of Fabrics, Calculating the amount of material needed, Manufacturing Steps of Curtains,

Bedspreads: Estimating yardage for a spread, bedspread types and its manufacturing: throw, flounced and tailored.

Pillows: Types of Pillows, Knife-edge Pillow, Box-edge Pillow, Basic Measurements, Constructing a Knife-edge Pillow Covers, Tufting Pillows, Pillow Shams, Ruffled Pillow,

Pillow Sham with flat self-border, Box-edge Pillow Cover: Rectangular box-edge cover, Boxed effect without boxing strip, Circular box-edge cover, Bolster and its covers: Round bolster and Wedge bolster.

Total lectures required = 12

Reference:

1. Introduction to clothing production management-second edition. A.J.Chuter, Blackwell science, New Delhi.
2. Garment technology for fashion designers-Gerry Cooklin, Blackwell science, New Delhi.
3. Introduction to clothing manufacture- Gerry Cooklin, Blackwell science, New Delhi.
4. Process control in home textiles manufacturing by K K Goswami, abhishek publishing Chandigarh, India.
5. Soft furnishing book by Kartin Cargill, Reed consumer books limited, London.
6. Soft furnishing by saarah Campbell and Hilary More, MacDonald books, QED publishers Limited London.
7. Simplicity's (1993) –Simply the best home decoration book, A fire side book as published by Simon and Schulster (New York). London. The simplicity pattern company Inc.
8. Home Fashion
9. Cloths line (Journal)
10. House & Garden (Journal)
11. Textiles Para El Hogar (Journal) Distribution & Suibscription – Ecuador, 75, entresuelo, 08029 Barcelona, Espane, e.mail: publica@publica.es, castellon@publica.es
12. Process control in home textiles manufacturing K K Goswami, Abhishek publishing ,Chandigarh.

Course outcome

At the end of this course students will be able to:

1. Explain home textiles and various products of home textiles.
2. Describe manufacturing techniques of home textiles i.e. pattern making, spreading, cutting, and sewing techniques.
3. Explain various embellishment techniques i.e. fullness, placket finishes, embroidery, patchwork, appliqué and quilting of home textiles.
4. Describe curtains, bedspreads and pillows home textile products.

KCT 061 Chemical Processing of Textiles III (L-T-P: 3-0-0) CREDIT 3

Course Objectives:

1. To understand the chemistry of dyes and intermediates and principle of dye synthesis.
2. To acquire knowledge of acid dyes, chrome dyes & metal complex dyes and application to various fibres.
3. To understand the principle of printing and chemistry of printing paste.
4. To discuss and describe the various printing machines and operations.
5. To understand theory of nano particle functional finishes and application to textiles.
6. To acquire knowledge of colour theory and software based instruments like spectrophotometers.
7. To know the application of computer colour matching system to textiles.

UNIT – I

Chemistry of dyes and chemicals: Classification of dyes according to chemical constitution, features and specification, dye intermediates, manufacturing principle and ecofriendly dyes.

Total lectures required = 12

UNIT II

Acid Dyes:

Generalized formula and classification of acid dyes, Procedure for application of various types of acid dyes to wool & other fibres (e.g. Nylon & Silk) Nylon; mechanism of acid dyeing & dye fibre bond, effect of different process parameters and role of additives in acid dyeing. Fastness properties of acid dyes.

Chrome Dyes: Concept of mordants; formation of chromium complexes; Method of application of chrome dyes (i) Chrome mordant process, (ii) After Chrome process, (iii) Meta Chrome process. Brief idea on fastness properties of chrome dyes.

Metal Complex Dyes: General formula and structure, classification of metal complex dyes- 1:1 Metal complex dyes & 1:2 Metal complex dyes; Procedure of application of metal complex dyes and mechanism of dyeing fastness; Properties of metal complex dyes.

Total lectures required = 12

UNIT III

Printing paste composition. Different styles of printing e.g. Direct, Resist and Discharge, Printing process for different fibres with direct dyes, acid dyes, vat dyes, azoic colours, reactive dyes, pigments, disperse dyes etc. Brief idea on function performed by the different pigment auxiliaries/assistants used in the printing paste. Different methods of printing e.g.- screen, flat bed & rotary screen printing machineries and equipments. Common printing faults their causes and remedies.

Total lectures required = 12

UNIT IV

Functional finishes

Type of Nano finishes, preparation, application to textiles, self cleaning finish, UV protection, Anti bacterial nano finish, advantages and disadvantages.

Total lectures required = 12

UNIT V

Colour Theory and Evaluation

Theory of colour, quantification of colours, CIE colour system colour difference, whiteness & yellowness in dyes, CIE lab formula, 555 sort. Application of spectrophotometer; Reflectance & Transmittance: K/S Curve, Theory of computer colour matching & recipe prediction.

Total lectures required = 12

1. Wool Dyeing by D.M. Lewis
2. Chemistry of dyes and principles of dyeing by Dr. V.A. Shenai.
3. Technology of dyeing by Dr. V.A. Shenai
4. Technology of Printing by Dr . V. A. Shenai
5. An introduction to Textile Printing by W Clarke.
6. Textile Printing by L.W.C. Miles.

Course Outcomes:

At the end of the course students will be able to:

1. Apply knowledge of the chemistry of dyes and intermediates for dye synthesis.

2. Describe and apply acid dyes, chrome dyes & metal complex dyes to various fibres.
3. Formulate printing paste and apply to textiles.
4. Describe and operate various printing machines.
5. Formulate and apply nano particle functional finishes to textiles.
6. Describe colour theory and software based instruments like spectrophotometers.
7. Apply knowledge of computer colour matching system widely to textiles.

KCT – 062

KNITTING AND NONWOVENS

(L-T-P: 3-0-0)

Credits = 3

Total contact hours: 60

Course Objectives:

1. To understand weft knitted fabric structure, process and knitting mechanism
2. To analyse and design knitted garments
3. To study warp knitting mechanism and various warp knitted fabric structures
4. To get knowledge of various nonwoven fabric application and its manufacturing techniques

UNIT I

Total lectures required = 12

Introduction to knitting:

Essential features of knitted fabric, advantages and limitations with reference to weaving knitted loop structure, terms and definitions.

Knitting needles and cycle of knitting.

Knitted garments : designing and specifications

UNIT II

Total lectures required = 12

Weft Knitting machine:

Types of weft knitting m/c: flat and circular. Essential parts of circular weft knitting machine. Flat weft knitting machine.

Weft knitting machines for plain knit, rib, interlock and purl knitting machines, variation for tuck and miss stitches.

production calculation of weft knitting machines.

Technical specification of modern weft knitting machines.

UNIT III

Total lectures required = 12

Warp knitting machine:

Basic warp knitted structures, under lap and overlap.

Essential parts of warp knitting m/c,

Brief idea of the Working principal of Tricot, Rachel & crochet Machines

calculation of Production pertaining to the warp knitting machine

Technical specifications of modern warp knitting machines

UNIT IV**Total lectures required = 12**

Non wovens – classification and brief idea of various types of nonwoven fabric, non-woven fabric manufacturing process, Fibres used, Principles of web formation, bonding techniques.
Various finishing used for non woven.

UNIT V**Total lectures required = 12**

Principles of needle punching, Process variables and their effect on properties of needle punched fabrics.
Brief idea of Stitch bonded fabrics, their manufacture and properties.
Brief idea of spun bonded fabrics production
Technical specifications of modern nonwoven machines.

Text Books & Recommended Books:-

1. Non woven by P Madhavanmoorthi
2. Knitting Technology David J Spencer Knitting Technology Ajgaonkar
3. Warp Knitting Production S Ray, Melliand
4. Manual of Nonwoven R Krcma
5. Nonwoven Fabric Technology M Mc Donald
6. Nonwoven technology by Milin patel & Dhruvkumar bramahat.

Course outcome

At the end of the course students will be able to:

1. Design and Develop weft knitted fabric for garment production on circular and flat knitting machines.
2. Design and develop non woven products for special application for domestic as well as technical application.
3. Supervise and Manage production of nonwoven fabric on modern machines.

KCT 651 Textile Testing II Lab (L-T-P 0-0-2) Credits = 1**Course Objectives**

- i) To get aware of principles involved in tensile, tear and bursting strength testing of textiles
- ii) To develop an understanding of the importance of Dimensional stability of textile materials and its measurement
- iii) To get an understanding of the measurement of functional properties, such as flame proofness & water proofness of textile materials
- iv) To get aware of measurement of serviceability and comfort aspects of textile materials

1. Determination of twist in single and folded yarn and to determine twist factor used in spinning the yarn.
2. Determination of hank of rove and hank of sliver.

3. Determination of C.S.P. of yarn.
4. Comparison of grams per square meter of a piece of fabric (both by theoretical calculations and practical measurements).
5. Determination of ends/inch; picks/inch; warp & weft count from a given piece of fabrics.
6. Determination of bending length, flexural rigidity, bending modulus & fabric stiffness by Shirley fabric stiffness tester.
7. Determination of abrasion resistance and pilling resistance using Martindale Abrasion Tester.
8. Determination of fabric tensile strength using universal tester.
9. Determination of flammability of a fabric.
10. Determination of water repellency using Bundesmann water repellency tester.
11. Determination of pilling of fabric by pill box.
12. Determination of fabric tear strength

NOTE:

Experiments shall be decided on factors like:

- Facilities installed at Institute.
- Accessibility to Industry & nearby Institutes.
- Trend of Technological Developments in National & International perspective.

Course outcome

After completion of this course, students will be able to:

1. Appreciate the importance of mechanical strength testing of Textile materials and its measurement using various instruments.
2. Understand the principles of testing of dimensional stability of textile materials.
3. Appreciate the importance of measurement of working life/ durability/surface appearance of textile articles.
4. Appreciate the importance of measurement of various functional properties of textile articles.

KCT 652 Carpet Analysis and Testing Lab (L-T-P: 0-0-2) CREDIT 1

COURSE OBJECTIVES

1. To operate and find out tuft withdrawal force of tufts of carpet
2. To determine thickness of carpet and learn operation of thickness gauge.
3. To operate and learn operation of carpet dynamic loading tester.
4. To learn testing of flammability of carpet by 16 CFR 1630/1631 method.
5. To learn testing of flammability of carpet by 4790 method.
6. To learn compressibility and thickness recovery of carpet.
7. To learn operation of hexapod tumbler tester and find out appearance retention of carpet.
8. To learn analysis of hand knotted, hand tufted and machine made carpets.

EXPERIMENTS

1. Determination of tuft withdrawal force using tuft withdrawal tensometer/UTM.
2. Determination of thickness of carpet using portable thickness gauge.

3. Determination of thickness loss under dynamic loading.
4. Determination of thickness loss under static loading.
5. Measurement of pile height of carpet using leaf gauge.
6. Determination of c.
7. Determination of Abrasion resistance of carpet and weight loss in carpet.
8. Determination of degree of appearance retention of a carpet using Hexapod Tumbler Tester.
9. Determination of flammability of carpet by 16 CFR 1630/1631 method.
10. Determination of flammability of carpet by BS 4790 method.
11. Analysis of hand knotted carpet sample
12. Analysis of hand tufted carpet.
13. Analysis of machine made carpet

NOTE : Any ten of above experiments depending on availability of instruments/raw materials.

COURSE OUTCOMES

At the end of the course students will be able to:

1. Operate Tuft Withdrawal Tensometer/UTM and determine TWF of carpet
2. Operate Thickness Gauge Tester and determine thickness of carpet.
3. Find out thickness loss under carpet dynamic loading.
4. Apply knowledge of flammability of carpet by 16 CFR 1630/1631 method and evaluate flammability of carpet.
5. Apply knowledge of flammability of carpet by 4790 method and evaluate flammability of carpet.
6. Apply knowledge and determine compressibility and thickness recovery of carpet.
7. Operate Hexapod Tumbler Tester and determine appearance retention of carpet.
8. Apply knowledge of analysis of hand knotted, hand tufted and machine made carpets.

KCT-653

Home Textile Technology Lab

L: T: P:: 0:2:0

Course objectives

1. To learn about sewing machines and practice on it.
2. To prepare various samples necessary for construction of home textiles.
3. To prepare various samples necessary for embellishment of home textiles.

Experiments

1. To study the various parts and its functions of the lock stitch Sewing Machines.
2. Practice of machine stitch on paper.
3. Practice of machine stitch on fabric.

4. Sample preparation for basic Hand Stitches.
 - i) Temporary Stitches (Even basting, Uneven Basting, Diagonal, Slip stitch)
 - ii) Permanent Stitches (Running, Hemming, Back, Run and Back, Over casting, Whipping)
5. Preparation of seam samples.
 - i) Superimposed seam.
 - ii) Lapped seam.
 - iii) Bound seam.
 - iv) Ornamental seam.
 - v) Edge finishing.
 - vi) Flat seam.
6. Sample preparation for seam finishes and self-finish seams.
 - i. Seam finishes (Clean finish, Bias binding, Bound finish, Hand overcast).
 - ii. Self finished seam (Standing fell, Drapery French, Single needle, Quick flat seam, Lap seam)
7. Preparation of samples for following fullness tools: -
 - a. Darts.
 - b. Tucks.
 - c. Pleats.
 - d. Godets.
 - e. Gathers.
 - f. Shirrs.
 - g. Frills.
 8. Preparation of samples for different types of Plackets.
9. Sample preparation for hand embroidery stitches.
(Running, Stem, Single lace, Double lace, Chain, Satin, Lock, Whip, Cross, Pipe, Loop, Flat, Knotted).

Course outcomes

At the end of the course students will be able to:

1. Demonstrate various parts of lock stitch sewing machine.
2. Operate various sewing machines.
3. Construction of various samples like basic hand stitches, seams, seam finishes and self-finish seams, which are necessary for construction of home textiles.
4. Construction of various samples like fullness tools, plackets and hand embroidery stitches, which are necessary for embellishment of home textiles.