PROPOSED STUDY & EVALUATION SCHEME

FOR

B. TECH. THIRD YEAR

(CARPET AND TEXTILE TECHNOLOGY)

On

Choice Based Credit System
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RCT 501  Textile Testing I  (L-T-P  3-0-0)  Credits = 3

UNIT – I  [8]
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.

UNIT – II  [8]
Fibre Length: measurement of fibre length and variation. Concept of span length and determination of 2.5% and 50% span length. Concept of Baer Sorter Diagram.

UNIT – III  [8]
Fibre Fineness: various methods of determination of fibre fineness – air flow method.
Strength: definitions; stress strain diagram of different fibres. Principle & brief description of modern fibre testing equipments like-H.V.I., AFIS, OFDA, WIRA FDM, Laser Scan, etc.
F.Q.I. and its technical significance,
Fibre maturity: methods of determination of fibre maturity. Determination of medullation % of wool.

UNIT – IV  [8]
Yarn Fault Testing: Classification of Yarn Faults and yarn classifying systems .
Yarn Hairiness:Causes and its measurement.
Yarn Twist:Definition of Twist & its measurement, level of twist

UNIT – V  [8]
Evenness Testing (Sliver, Rove & Yarn)
Type of irregularity and its expression;Index of irregularity; limit irregularity; addition of irregularities, variation between & within samples; B(L) & V(L) curves;
Measurement of short term and long term variation of Sliver, Rove & Yarn. Short term variation (U%): Principles of measurement of u% of textile fibre strand, thick place, thin place &neps:
Causes and effect of yarn irregularity: nature of irregularity; periodic irregularity, random irregularity.

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
UNIT I
Wool-shearing, clipping and grading.
Impurities present in wool and their removal,
wool scouring and carbonization.

UNIT II
Various systems of wool fibre spinning- woolen and semi worsted - Flow chart,
Willow m/c, woolen cards, Gilling, Rubbing frame and ring frame.

UNIT III
Worsted spinning system- sequence of machines and operations,
Comparison of above spinning systems.

UNIT IV
Requirement of carpet yarn in regards to count, twist, bulk.
Faults in carpet yarn and their remedies.
Other properties ofcarpet yarn required in handmade and machine made carpet.

UNIT V
Principles & techniques of manufacturing braided yarn,
Spinning of Long staple Fibres like Flax, Jute, Silk etc.

References-
1. C. Vickerman, Woollen Spinning, Abhishek Publications, Chandigarh-17 (India)
3. Miles Collins, Wollen and Worsted Spinning, Abhishek Publications, Chandigarh-17 (India)
4. Wool spinning, VOLUME-I & VOLUME-II, by Ya-Lipenkov, MIR PUBLISHERS, MUSCOW.
Unit 1

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

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:

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:

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:


References:


UNIT – I

Hand Knotted Carpet:

Terms and definitions, type of knots, structure and its quality.

Manufacturing process of hand knotted carpets. Preparatory process, tools and equipments used.

UNIT – II

Hand made dhurry:

Techniques, Quality and other process parameter of Hand made flat carpet on horizontal frame, Vertical panja dhurry and Other types of hand made carpet viz. Soumak, shaggy, Chindi dhurry and other fancy products.

UNIT – III

Hand loom Woven pile Carpets:

Pile carpet : V and W tuft structures. Preparatory and hand loom weaving techniques. India knot (leno) structure, Jacquard designing and other techniques of hand loom carpet.

Flat woven Carpets on hand Loom. Designing, quality and manufacturing technique.

UNIT – IV

Tufted Carpets:

Structure of tufted carpet, backing cloth used in tufting, hand tufting - Preparatory process, tools and equipments, tufting frame, electric tufting gun concept of modern tufting frame, table tufting m/c.

Techniques of backing of hand made carpet, latex, synthetic resin and composition of backing solution for hand made carpet.


UNIT – V

Process control of hand made carpet sector.

Finishing sequence for carpet textures of various types of carpets viz. singeing, Shearing, Edge Binding, Taping, Fringing and Knotting.
Defects in hand made carpets and their remedies.

Labelling and Packing of goods.

References:
1. Advances in Carpet Manufacture by K. K. Goswami, Woodhead Publishing
3. 3 Carpet Manufacture by Crawshaw
4. Tufted Carpet by Von Moody
UNIT I
Elements of woven designs, Classification of woven fabric, Design, draft, peg plan, denting order.

UNIT II
Plain weave and its derivatives. Decorating of plain fabric

UNIT III
Classification of twill weaves. Elongated, Zig-zag, wavy, broken, herringbone, transposed & rearranged twill weaves.
Satin/Sateen weave.

UNIT IV
Mockleno, diaper, diamond, Cork-Screw & crepe weaves.
Different methods of producing crepe weaves

UNIT V
Honeycomb weave, Bedford cord and pique weaves

References:
1. Watson’s Textile Design and Colour by Z Grosicki; Universal Publishing Corporation, Bombay (India)
2. Grammar of Textile Design – Nisbet
3. Structural Fabric Design by – Kilby
4. Woven Structures and Design – Doris Goerner; British Textile Technology Group WIRA House, Leeds (UK)
5. Fibre to Fabric by Ghosh
6. Watson’s Advance Textile Design
1. Study the various parts of willow machine and their function, waste%.

2. Study the various parts and the settings, driving arrangements, waste% extracted the production/hr of a woollen cum semi worsted card.

3. Study the various parts of woollen ring frame and their function, twist constant of woolen ring frame and calculation of twist per inch in yarn. determine the production per spindle/hour in a woollen ring frame.

4. Study the waste % extracted in a semi worsted card.

5. Gilling machine and their function, the draft constant, total draft and distribution of draft in a gillingmachine., production/hour of a gilling machine.

6. Study the various parts of rubbing frame and their function, drive and production/hr of a rubbing frame.

7. Study the various parts of semi worsted R/F (with drafting) and their function, production per spindle hour of a semi worsted ring frame (with drafting), total draft, distribution of draft and draft constant of ring frame, data collection on machine parameters & process parameters from industry.

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.
1. Determination of fibre length of cotton by means of Digital Fibrograph
   a. 2.5% Span Length
   b. 50% Span Length
   c. Uniformity
2. Determination of fibre length of wool fibre by means of W.I.R.A FDA.
3. Determinations of fineness of wool fibre by laser scan, WIRA tester.
4. Determination of fineness and maturity of Cotton fibre.
5. Determination of % of medullation of wool using projection microscope.
6. Determination of trash content of cotton fibre by trash analyser.
7. Determination of wax & grease content of wool fibre by soxhlet method.
8. Determination of count of a given yarn in different counting system.

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.
RCT 553  Carpet Manufacture workshop  L:T:P::0:0:2  CREDIT 1
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

RCT 554  FABRIC TECHNOLOGY III  LAB  L:T:P::0:0:2  CREDIT 1
1. Mechanical jacquard study and jacquard card cutting
2. Study on cam dobbey and paper card preparation
3. Identification of fabric defects and its remedies
4. Fabric analysis for various weave structures and calculations. Identification of warp and weft/ Count verification/ analysis of the given fabric weave/ evaluation of crimp /calculation of warp and weft weight per given length and (GSM)
5. Practice of loom turning
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RCT061: ADVANCE CARPET MANUFACTURE

RCT062: HOME TEXTILE MANUFACTURE I

RCT063: TEXTILE DESIGN CONEPT
UNIT – I

- **Tensile testing of yarn:**
  Terms and definitions used in tensile testing:
  Elastic Recovery - instantaneous & time dependent effect (Creep).
  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 the some of the common instruments eg. a) Pendulum lever instrument b) Inclined plane tester, c) Lea Strength tester

- **Modern tensile tester:** Tensile Tester operating on Strain Gauge principle. Brief description and operating principle of Universal Tensile Tester.

UNIT – II

Fabric dimension and its measurement; Measurement of Dimensional Stability of fabric; Fabric thickness and brief description of instruments & method for fabric thickness measurement; Measurement of fabric weight per unit area; ends/inch; picks/inch; crimp of yarn in fabric; Cover factor.

UNIT III

Fabric tensile testing: Sample preparation – Strip Test & Grab Test; biaxial tensile testing.
Fabric bending properties – Stiffness and Drape
Measurement of fabric stiffness by Shirley Stiffness Tester; Determination of Bending length, Flexural Rigidity & Bending Modulus;
FAST system, KESF system.

UNIT IV

Comfort properties (Heat & Moisture).
Wicking property, MVTR, Water proofing testing:
Terms & definitions; Methods of testing: (i) Spray Test, ii) Bundesman’s Water repellency testing, iii) Shirley hydrostatic pressure head testing, fabric wetting property

UNIT V

Crease Resistance & Crease Recovery:
Serviceability, Wear and abrasion resistance testing: Principles of testing of abrasion resistance testing; factors affecting abrasion resistance: Brief description of Martindale Abrasion Tester:
Flammability testing:
Terms and definitions used relating to flammability; factors affecting; Flame Resistance; Determination of flammability of fabric.

**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
UNIT I
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.
Triaxial weaving principle.

UNIT II
Weft Knitting:
weft knit structures, terms and definitions, production calculation.
Essential parts of weft knitting machine. Types of knotting m/c flat and circular
Weft knitting machines for plain knit, rib, interlock and purl knitting machines, variation for tuck and miss stitches.

UNIT III
Basic warp knit 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 knitting machine

UNIT IV
Non wovens – brief idea of various types, advantages;
Classification of non-woven products and fibres used,
Principles of web formation, types of bonding techniques and various finishing used for non woven.

UNIT V
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

References-
1. Non woven by P Madhavanmoorthi
2. Weaving machine, mechanism, management by Talukdar, Sriramulu, Ajgaonkar
3. Knitting technology by Spancer
UNIT – I
Chemistry of dyes and chemicals: Classification of dyes, chemicals including auxiliaries according to chemical constitution, features and specification, manufacturing principle and standards in eco term.

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). 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:

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.

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.

UNIT IV
Functional finishes
Type of Nano finishes, preparation, application to textiles, lotus leaf effect, UV protection, Antibacterial nano finish, advantages and disadvantages.

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 & colour forecasting.

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.
10. Instrumental colour measurements and Computer Aided Colour matching for textiles by Dr.H.S. Shah & Dr.R.S. Gandhi.

RCT 021 ADVANCE Carpet Manufacture (L-T-P 3-1-0) Credits = 4

UNIT – I
Woven Carpets, Wilton, van-de-wiele and Axminster looms.
Carpet tiles and Speciality Carpets

UNIT II
machine made tufted carpet manufacturing process. Advancement of tufting process, CAD and robotic in tufting, tufting machines such as kibby, M-tuft etc

UNIT III
Non Woven Carpet: Brief description of process and machineries involved in manufacturing of Needle Punched, Adhesive Bonded, Electrostatically flocked carpet etc

UNIT – IV
Chemical coating and finishing
Objectives of Latexing, Merit of Latex, Application of latex, formulation of latex compound & role of auxiliaries; quality assessment of latex, problems and remedial measures of latexing, synthetic latex and its advantages.

Modern backing techniques substituting latexing.

Back Latex coating and laminating

Chemical washing of carpets: Traditional System, Mechanised System including pre and post washing sequence. Detailed idea on various type of washing like antique wash, herbal wash etc. (Chemicals used and process parameters, equipments are to be studied). Sheen and glaze characteristics of woolen and silk carpets.

Modern Processing including enzymatic finishing and various functional finishes, process control including eco control.

UNIT – V

Mechanical Finishing of carpet - inspection, mending, brushing, electro-polishing and shearing etc

Care and Maintenance of Carpets; Final Inspection, Labelling and packaging of Carpet, Installation of carpet

References:

1. Carpet Manufacture by Crawshaw
2. Tufted Carpet by Von Moody
4. Encyclopedia of Carpet by B.S. Chauhan
5. Carpet Manufacturing & Chemical Processing of Carpets – IICT Bhadohi
6. Advance in Carpet Manufacture by K. K. Goswami

9. Journals & Magazines
10. Carpet-e-World

RCT 022 Home Textile Manufacture-I (L-T-P 3-1-0) Credits = 4

UNIT I

Pattern, pattern making techniques: drafting and draping techniques.

Commercial pattern - definition, merits & demerits, 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.

UNIT II

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.

UNIT III
Stitch, stitch types, sewing machine-parts and their function, maintenance, sewing machine feed mechanisms, seam, seam types, seam finishes.

UNIT IV
Sewing machine needles: functions, parts, selection of sewing needle.
Sewing threads: fibre type, construction, thread sizing and thread packages.
Sewing machinery, associated work aids of sewing machines, button hole making, button sew, bar tack, label sewers.

UNIT V
The purpose of Pressing, categories of pressing, the means of pressing, pressing equipments and methods, pleating, permanent press, the state of pressing.
Fusing definition, advantage of using fusible interlinings, requirement of fusing, fusing process, fusing technique.
Welding and moulding techniques.

Reference:
1. Carr and Latham’s Technology of clothing manufacture revised by David J. Tyler, Blackwell publishing.
4. Introduction to clothing manufacture- Gerry Cooklin, Blackwell science, New Delhi.
5. Process control in home textiles manufacturing by K KGoswami, abhishek publishing Chandigarh, India.

RCT-023    Textile Design Concept    L:T:P::3:1:0    Credits = 4

UNIT I
Principle of Design: –
Elements of textile design, commercial aspects of design with Basic Elements, Indian Sculpture, Architecture, Jewellery & Painting, History & Origin of carpet, Drawing from outdoor sources i.e. Park, Museum, Architectural Building, Traditional Textile.

UNIT II
Design elements from Textile: –
Bagh Phulkari, Kantha, Chikenkari, Baluchari, Kashmiri Kashida, Chamba Rumal, Banarasi Brocades, Indian Motif (Indiya Collection); Design & Drawing – Historical, Aesthetical.

UNIT III
Design Concept from Motif & Printed Design: –

UNIT IV
Brief discussion on traditional carpet & floor covering: –

UNIT V
Use of Motifs in Carpet & Textile Design: –
Colour forecasting of Carpet & Textile Design, Market trends, Basic of carpet designs Material and method, 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

References:
1. Traditional Needle Arts Embroidery by Katrin Cargill, Great Britain.
2. Indian Embroidery by Kamala Devi Chartophadhya, Wiley Einstein Ltd., Delhi.
4. Hand book of textile design Jacquir Wilson, wood head publishing, UK.
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].
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 Kgoswami, wood head publisher UK.
22. Ancient Indian Textile Designs - Part – I by Mishra, Jai Shankar
23. Positive Design - I Flower by Shoin, Kyoto
24. Fine Oriental & European carpets by Sotheby's
25. Rugs & Carpets from the Collection of Dildarian by Sotheby's
26. Floral patterns by Roojen, P.V.
27. Ikat Textiles Of India by Desai, Chelna
28. Carpet and Textile Patterns by Purdon, Nicholas
29. Advance carpet manufacturing, K Kgoswami, wood head publisher UK.
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.
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.

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.
Advance Carpet Manufacture lab

1. Designing on KIBBY carpet sampling machine
2. Reproduction of carpet in kibby carpet sampling machine.
4. Development of prototype sample of a given design.
5. Study of Table tufting machine and technique
6. Audio visual presentation of latest machines made carpet manufacturing.

Home Textile Manufacture I Lab

1. To study the various tools of Pattern Making Software.
2. To study the various parts and its functions of the Straight Knife Cutting Tool.
3. To study the various parts and its functions of the various Sewing Machines.
5. 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)
6. Preparation of seam samples.
   i) Superimposed seam.
   ii) Lapped seam.
   iii) Bound seam.
   iv) Ornamental seam.
   v) Edge finishing.
   vi) Flat seam.
7. 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)

TEXTILE CAD LAB

1. Introduction to CAD Tools.
2. Geometrical structures, Exploration of forms, Shapes & line with in the natural forms or objects. Still Life drawings
3. Stripes & Checks effect on fabric,
4. Colour & Design Creations: Dhurries- 30th, 60th, 80th And Boxes & Round Compositions, Colour Wheel, Concept of shade tone,

5. Carpet designs:
   Tufted - Floral & Modern Designs,
   Tibetan – Modern geometrical & Floral, Converting Natural form of designs into Abstract, Modern & Contemporary,
   Persian/Traditional Designs,

6. Colour Forecasting.

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.

RCT 653  Advance Textile Chemistry Lab  (L-T-P 0-0-2)  Credits = 1

1. Dyeing of woolen yarn with Levelling acid dyes
2. Dyeing of woolen yarn Milling acid dyes
3. Dyeing of woolen yarn chrome dyes
4. Dyeing of woolen yarn 1:2 Metal Complex dyes
5. Dyeing of silk yarn with Levelling acid dyes and 1:2 Metal Complex dyes
6. Determination of Light fastness of Carpet
7. Determination of Washing Fastness of carpet
8. Determination of Rubbing Fastness of Carpet yarn.
9. Studies on various kinds of carpet finishes.

RCT 654  ADVANCE FABRIC MANUFACTURE LAB  L-T-P: 0-0-2  CREDIT 1

1. circular weft knitting machine : passage, various mechanisms, production calculation.
2. Practice of running circular weft knitting machine.
3. Study of flat bed weft knitting machine mechanisms and its production calculation
4. Electronic tappets shedding
5. Electronic jacquard shedding
6. Rapier loom and its mechanisms
7. Turning of rapier loom
8. Single end warping machine