DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY LUCKNOW

STUDY & EVALUATION SCHEME & SYLLABUS

FOR

B. TECH 4th YEAR
Carpet & Textile Technology

ON

CHOICE BASED CREDIT SYSTEM

(EFFECTIVE FROM THE SESSION: 2019-20)
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Specialization: ADVANCE CARPET TECHNOLOGY, HOME TEXTILE TECHNOLOGY, TEXTILE DESIGN TECHNOLOGY
MILL PLANNING & ORGANISATION  3-0-0        CREDIT 3

UNIT 1

Selection of site for Textile/Carpet mills, General location, Calculation of spatial requirements, lighting of industrial building, factors influencing site selection, Climatic considerations, Humidification its importance and use in textile/carpet industry.

Unit 2

Balancing a layout of cotton spinning/woolen spinning department, Preparation of project report, Breakeven point and evaluation of project work. Calculation for no. of machines in spinning/spin plan - Preparation of organization for ring spinning mill and preparatory, departments based on ring spindle capacity and production of ring spun yarn.

Assumptions, Machinery Organizations, Requirement of Miscellaneous Fixed Assets & Machinery Stores & Spares, Requirement & Calculations related to Electrical Power, Lighting etc.

Unit 3

Balancing of machines and layout of weaving department. Type of industry: JV, company limited, public limited companies.

Unit 4

Balancing of machine for wet processing of textiles industry, layout of processing department, Water, Steam, Compressed Air

Techno-economic Viability - Calculations of cost of project – Means of Finance –


Unit 5

Site selection of carpet industry. Balancing of machine and layout of carpet industry, piece & time wage system, incentives, export documentation of carpets.

References:

4. Plant location, Layout & Maintenance by Ruddele Reed.

UNIT–I
Yarn geometry-idealised yarn geometry, relationship of yarn number and twist factor. Twist contraction, limit of twist.
Packing of fiber in yarn. Ideal packing, hexagonal close packing and to other forms. Packing factor and its measurement. Yarn diameter.

UNIT–II
Fiber migration- mechanism of migration, condition for migration to occur, frequency of migration, migration in blended yarns.
Mechanics of staple fibre yarns, the practical and experimental studies. Mechanics of staple fibre yarns, Hambureger model and later modifications. Spinnability and torsional behavior of Fibres and yarns.

UNIT–III
Translation of fibres properties into yarn properties, extension of continuous filament yarn for small strains and large strains; prediction of breakage.

UNIT – IV
Elements of fabric geometry, cloth setting theories. Fabric cover and fractional cover, fabric cover and fabric weight relationship. Fabric firmness,

UNIT – V
Pierce concept of fabric geometry and its application, Flexible and elastic threads model, crimp interchange & crimp balance equation
Uniaxial and biaxial tensile behavior of cloth.

Reference
1. Textile yarn by Goswami
2. Textile mathematics by J.E. Booth
3. Pierce papers in Journal of textile institute 1930, 1937
4. Watson’s textile design
5. AATCC review, October , 8 (10), 30-34
UNIT I
Need for carpet testing. Different aspects of quality testing & performance assessment of carpets, Norms for various performance parameters of carpet

UNIT – II
Testing of functional properties of carpet and floor coverings- (a) Appearance retention (b) Carpet durability including Soilability, carpet abrasion resistance (c) Resilience (d) Tendency of pilling and fuzzing (e) Other properties like insulation properties, acoustic properties, electrostatic properties etc.

UNIT – III
Brief Description and principle operation of following Carpet Testing Equipments:
Dynamic Loading Machine, Tuft Withdrawal Tensometer, Pilfuz Carpet Tester, Usometer, Hexapod Tumble Tester, Courtaulds Tetrapod Walker

UNIT – IV
Brief Description and principle operation of following Carpet Testing Equipments:
Digital Thickness Gauge, Portable Carpet Thickness Gauge, Drum Testing Device, Roller Chair Testing Device, Carpet Static Loading Device, Carpet Wear and Abrasion Tester, Types of Carpet Flammability Tester

UNIT-V
Carpet analysis and reproduction for knotted, tufted pile carpets, flat woven daries, table tufted, shaggy. Cross section analysis of loom made pile carpet- v tuft, w-tuft.

Grand total lectures required=42

References:
1. IWS Test Standard 1, 2, 3
3. Carpet Manufacture by Crawshaw
UNIT I
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: An Introduction, Various materials used in embroidery, Different types of
Embroidery Stitches, Precaution during setting the fabric on frame.

UNIT-II
Components & Trims: Labels and Motifs, Linings Interlining, Wadding, Lace, Braids &
Elastics, Seam Binding & Tape, Shoulder Pad, Fasteners, performance properties of
Components and trims.
Darning: Definition and various tools used in darning.
Patch Work: Definition, Different styles of Patchwork Techniques such as Pieced Patchwork,
Shell Patchwork, Suffolk Puffs, Crazy Patchwork, Log Cabin Patchwork, Strip Patchwork,
Seminoles Patchwork, Folded Star Patchwork, Mayflower Patchwork and Pleated Patchwork.

UNIT-III
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.

UNIT-IV
Curtains: - Definition, Various Styles, Choices of Fabrics, Calculating the amount of material
needed, Manufacturing Steps of Curtains, Casings, Methods of furnishing draperies at the top
with pleats. Use of drapery rods, Hooks, tapes rings and pins.
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.

UNIT-V
Bedspreads: Estimating yardage for a spread, bedspread types and its manufacturing: throw,
flounced and tailored.
Blankets: Definition, blankets types.
Terry Towel: - Definition, The Parts of a Conventional Terry Towel, Classification of Terry
Towels, Structure of a Towel, Physical Properties of a Towel, Quality Defects, Technology of
terry towel production. Kitchen textiles – features and applications

Grand total lectures required=40
Reference:-
2. Soft furnishing by saarah Campbell and Hilary More, MacDonald books, QED publishers Limited London.
4. Home Fashion
5. Cloths line (Journal)
6. House & Garden (Journal)
7. Textiles Para El Hogar (Journal) Distribution &Subscription – Ecuador, 75, entresuelo, 08029 Barcelona, Espane, e.mail: publica@publica.es, castellon@publica.es
8. process control in home textiles manufacturing K KGoswami, Abhishek publishing , Chandigarh. (In press)
Unit-1
Introduction of Computer Aided Designing, Creation of Design direct on Computer Screen by using CAD tools (Mouse / Digitizer), Arrangement & layout of Motif to form Design, vector and raster images, x and y in designs.

Unit-2
Customizable settings, views, new designing creations, Scanned photographs editing, File Utilities, Freehand tools, Geometric tool group, selection group, zoom group, selection utilities, General group.

Unit-3
Creating motifs in computer: drawing tools, motif scanning, scanning parameters, editing the image for graph making – scaling, rotating, reversing, convert to full methods of different style and forms of design using computer i.e. resize, group, irregular scale, normal scale, covert to full, drop repeat, exchange horizontally, vertical exchange adjust repeat.

Unit-4
Importance of color application in motif, Colour utilities: - colour protection, colour separation, transparent colour, Changecolours, colour reduction, colour reduction based on similarity. Tracing a graph/Design Plate Print out, wool consumption print out. Colour Library – overview, creating new colour library, DPI calculations.

Unit-5
Preparation of computerized graph design from edited motif with suitable weaves, Weave creation, creation of weaves and saving, Various steps in transferring designs from sketch to Point paper, Pixel resolution and its relation with threads and thread per inch, Creation of Different texture with the help of CAD, Comparison of Manual graph Making and Computer Aided graph Making.

Grand total lectures required=42

Reference:
1. Manual for Autotex software (PLC consultancy)
2. User Manual for Texcells (Ned graphics)
5. The Textile Institute. Winning through Information Technology, UK.
Advance Yarn Manufacture  L:T:P::3:1:0  CREDIT 4

UNIT-I  [8]
Rotor Spinning: Principle of Operation; brief description of various components, formation of yarn; yarn withdrawal & winding;
Limitation of rotor spinning process, Numerical calculation in Rotor spinning process

UNIT – II  [8]

UNIT III  [8]
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.

UNIT-IV  [8]
Brief discussion on Plyfil spinning system. Study of Principle of operation
• Self Twist Spinning
• Twist less Spinning.
• Wrap Spinning
Properties of yarn and limitation of these spinning systems.

UNIT V  [8]
Textured yarn technology, various methods used for Texturing like Airjet and False twist process.

Grand total lectures required=42

References-
1. Eric Oxtoby, Spun Yarn Technology, Butterworths, London
3. W. Klein, New Spinning systems
4. Textured Yarn Technology, by J.W.S. Hearle
STRUCTURAL PROPERTIES OF FIBRES    (L-T-P  3-0-0)     Credits: 3

UNIT I          [8]
Identification of fibres, solvents of fibres. Microscopic view of fibres. Blend analysis of mixture fibres as per standard methods.

UNIT II         [8]
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.

UNIT III        [8]
Mechanical properties of fibres, Relation between structure and mechanical properties of fibres, Basic mechanical properties (tenacity elongation, modulus, work of rupture, Elastic recovery, time effects.

UNIT IV         [8]
Thermal behaviour of textile fibres by DSC, TGA, Thermal Mechanical Analysis, Density Gradient Column, Preparation of density gradient column.

UNIT V          [8]
Optical properties of fibres, Birefringence behaviour, dielectric properties, fibre friction, fibre friction measurement and static charge measurement.

Reference Book:
1. Manufactured fibre technology by V.B. Gupta, V.K. Kothari
2. Physical properties of fibre by J.W.S. Hearle
3. Thermal behavior of material by Turi
4. Modern yarn production by Ray
5. Textile fibres by ATIRA
6. ASTM Standard books
1. To study different parts & their functions of a TFO m/c.
2. Draw the gearing diagram of VJ-150HS TFO & determine the TPI of the yarn & twist constant of the machine.
3. Draw the gearing diagram of VJ-150HS TFO & determine the take up roller speeds in terms of m/min & productivity of the m/c.
4. Draw the gearing diagram of the transmission of drive of the take up roller of VJ-150HS TFO & determine the overfeed % & the m/c constant for overfeed %.
5. Draw the gearing diagram of Ring doubling m/c & determine grams per spindle for a given count.
6. To study different parts a DREF 2000 m/c & study their functions.
7. To calculate Production per head of DREF2000 m/c.
8. To study different parts a Rotor m/c & study their functions. To calculate Production per head of Rotor m/c.
A. Determination of tuft withdrawal force using tuft withdrawaltensometer. 
Determination of thickness of carpet and carpet backing using portable thicknessgauge. 
Determination of dimensional stability of carpet 
Measurement of pile height of carpet using leafgauge. 
Determination of compressibility and % recovery of carpet by Digital thicknessgauge. 
Determination of Abrasion resistance and weight loss in carpet. 
Determination of appearance retention of acarpet. 
Determination of Rubbing fastness of carpet as per ISmethod 
Determination of Water fastness of carpet as per ISmethod 
Determination of total pile weight of carpet as per standardmethod

B. Preparation of samples for following fullness tools:-
Preparation of samples for different types ofPlackets.
Sample preparation for hand embroiderystitches.
(Running, Stem, Single lace, Double lace, Chain, Satin, Lock, Whip, Cross, Pipe, Loop, Flat, Knotted).
Preparation of samples for different types of patchworks.
Preparation of samples for different types of appliqués.
Preparation of samples for different types of quilting.
Prototypes development of various home textileproducts.
Embroidering any one furnishing item (table cloth / Table runners /Pillowcovers /Cushion cover / others)

C. Drawing and painting Equipments&Tools.
Geometrical structures, Exploration of forms, Shapes & line with in the natural forms or objects. Still Lifedrawings
Stripes & Checks effect on fabric,
Colour&DesignCreations: Dhurries- 30ct,60ct, 80ct And Boxes & Round Compositions, Colour Wheel, Concept of shadetone,
Carpet designs:
Tufted - Floral & Modern Designs,
Tibbetan – Modern geometrical & Floral, Converting Natural form of designs into Abstract,
Modern & Contemporary,
PERSIAN/Traditional Designs,
Colour Forecasting Ideas.

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.

RCT753  Industrial Training (0—0—3)  CREDIT 2

Three month training in carpet / textile industry. Details of man, machine, material involved in the industry. Production layout, process layout, organisation chart etc. The report must be in hard bound form and a ppt presentation to be made for evaluation.

RCT754  Project-1 (0—0—6)  CREDIT 3
# EIGHTTH SEMESTER
## CARPET AND TEXTILE TECHNOLOGY

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**Specialization:** ADVANCE CARPET TECHNOLOGY (ACT), HOME TEXTILE TECHNOLOGY (HTT), TEXTILE DESIGN TECHNOLOGY (TDT)
TEXTURED YARN TECHNOLOGY (NPTEL/MOOCs)  3-1-0  CREDIT 4

- Introduction, general classification of textured yarns
- False twist texturing, principles mechanism
- False twist texturing process parameters
- Draw-texturing, need
- Draw –texturing process parameters
- Friction texturing principles
- Friction texturing NCV drives
- Air Jet Texturing
- Air jet texturing process parameters
- Interlacement; need and principles, Bulked continuous filament (BCF) yarns
- Hi-bulk yarns, principle and processes
- Solvent and chemical texturing
ADVANCE FABRIC STRUCTURE 3-1-0

UNIT –I [8]
Extra warp and extra weft designed fabric.

UNIT –II [8]
Damask and brocade fabric.

UNIT –III [8]
Warp backed and weft backed fabric. Swivel and lappet fabric design.

UNIT IV [8]
Double cloths
Introduction, classification, stitched double cloths, interchanging double cloths. Treble cloth

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

References:
1. Watson’s Textile Design and Colour by Z Grosicki; Universal Publishing Corporation, Bombay (India)
2. Grammer 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
• Recall conventional printing, colourants: dyes and pigments
• Thickeners, viscosity, rheology, discharge – resist style
• Transfer printing, transfer paper printing, dyes and inks
• Mechanism of sublimation transfer, free path length, general machinery
• Introduction to digital printing, ink-jet printing principles: continuous jetting
• Drop-on-demand principle, general machinery
• Pre-treatment, ink-types and substrate, pigment inks
• Disperse inks, acid inks, reactive inks
QUALITY CONTROL IN HOME TEXTILES 3-0-0 CREDIT 3

UNIT – I [8]
Introduction to Quality
Raw Material Inspection: Fabric Inspection, 4-point system, fabric defects, sewing threads, zippers,

UNIT – II [8]

UNIT – III [8]
Textile Testing & Production Evaluation.

UNIT – IV - Textile Testing & Production Evaluation [8]

UNIT-V: Shade Sorting & Care Labeling [8]

Grand total lectures required=40

Reference:
4. Process control in home textile manufacturing by K Koswami, Abhishek Publisher Chandigarh, India. (In press)
UNIT I
Difference between design and development, Aspects of home textiles design, Sources of design ideas / inputs, Design requirements pertaining to different countries, Characteristics of industry during various phases of product life cycle

UNIT II
Stages in Textile Design process (Design planning): – Design output, Design inputs, Selection of raw material and accessories, Customer involvement in design process, Innovation in the design process

UNIT III
Design for manufacturing (DFM), Quality function deployment (QFD), Design and development system requirements as per ISO, designing for future

UNIT IV
Validation and verification of designs, Time management in designing, Basics of network analysis (PERT & CPM), Standard costing methods professional practices of designing

UNIT V
Presentation of designs need and maintenance, Design related records and their maintenance, Design catalogue – preparation, Evaluation of performance of designs; Define Elements and their Aesthetic value and marketing prospect

References:
1. Design Management by Brigitte de Mozota
2. Design Project Management by Griff Boyle
3. Principles and Practice of Management by Prasad, L M.
4. Principle of Management by Tripathi & Reddy, P.N.
5. Production Operation Management by Heizer, Joy.
7. Textile Designing: Theory & Concept by Jain, Tanya
9. Hand book of textile design, Jacquie Wilson, wood head, publishing UK

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