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

PROPOSED STUDY & EVALUATION SCHEME

FOR

B. TECH.

(TEXTILE TECHNOLOGY)

3RD YEAR

On

Choice Based Credit System
### DR. APJ ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW

### STUDY AND EVALUATION SCHEME

#### B. Tech. Textile Technology

**3rd Year V-SEMESTER**

Effective from SESSION-2018-19

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#### PRACTICALS

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| TOTAL  | 620 | 120 | 260 | 1000 | 24 |

**Department Elective I:**

1. RTT051: Structure & Properties of Fibres
2. RTT052: Textile Design & Colour
### DR. APJ ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW
### STUDY AND EVALUATION SCHEME

#### B. Tech. Textile Technology

**3rd Year VI-SEMESTER**

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**Department Elective I:**

1. RTT061: Fabric Structure & Analysis
2. RTT062: Multi & Long Fibre Spinning
3. RTT063: Textured yarn Technology
5th Semester B. Tech. Textile Technology

1. Managerial Economics

2. Cyber Security/ Sociology

3. Textile Testing-I (L T P 3-1-0 = 4)

   **Unit (1):** Introduction of textile testing (1), sampling, random sampling, biased sampling (1), sampling techniques, square, cut square, zoning technique (1), selection of sample for testing, grading of cotton fibre with respect to staple length (1), laboratory measurement of fibre length, span length, Baer sorter (1), Shirley photo electric staple, servo fibro graph (1), salient features of HVI (1).

   **Total Lectures Required = 7**

   **Unit (2):** Atmospheric conditions for testing, absolute & relative humidity, moisture regain & moisture contest (1), importance of moisture in textiles, measurement of moisture regain & content (1), effect of moisture on properties (physical & mechanical) of textile material, factors affecting the regain (2), correct numerical weight, oven dry weight (1), shrilly moisture meter (1).

   **Total Lectures Required = 6**

   **Unit (3):** Dry and wet bulb hygrometer, sling assmann, hair hygrometers (2), control of testing room atmosphere (1), AFIS (1), Napping potential (1), Nep count (1), rating of nep, maturity coefficient measurement by NaOH method, fibre fineness by airflow meter & Sheffield micronaire (2).

   **Total Lectures Required = 9**

   **Unit (4):** Fibre bundle strength by Pressley, stelometer (2), fibre quality index, linear density of man made fibres and strength (1), spin finish, crimp analysis (1), Trash, Shirley trash analyzer (1). Yarn numbering system (1), wrapping test for lap, sliver, roving (1).

   **Total Lectures Required = 7**

   **Unit (5):** determination of yarn count, diameter (1), average & resultant count of folded yarn, relation between Ne, D, T, Nm (1). Instruments used for determination of count, quadrant balance, Knowles balance, beeslay balance and physical balance (2), Twist, classification of twist, twist measurement, direct counting method, continuous twist tester, twist-untwist method, (2), Twist tester; (2), R.B. twist tester, level of twist (1).

   **Total Lectures Required = 9**

   **Grand total of lectures required = 36**

   **Reference Books:**
   1. Quality control and testing management by Dr. V.K. Kothari
   2. Principle of textile testing by J.E. Booth
   3. Physical testing of textiles by B.P. Savile.

4. Yarn Manufacture-III (L T P 3-0-0 = 3)

   **Unit (1):** Objects of Ring Frame, drafting, twisting & winding on ring frame, Traveller twisting, yarn twist by traveler, propagation of twist, spinning triangle
Total Lecturers Required = 8
Unit (2): Builder motion, types of rings and travelers and their common uses, lappet movement, balloon control rings, apron drafting system mechanical and actual draft
Total Lecturers Required = 8
Unit (3): ring frame wastes (2), limitation in ring spinning and factors responsible for loss in efficiency (1), yarn faults and their remedies, Traveller forces
Total Lecturers Required = 8
Unit 4: Compact spinning, spinning machine manufacturers. Objects of doubling, ring doublers, fancy yarns manufacturing
Total Lecturers Required = 8
Unit 5: sewing thread and tyre Cord yarns. Reeling, yarn bundling, calculation of draft, TPI and production of ring frame & doubling frame, brief idea of classmate test report
Total Lecturers Required = 8
Grand Total of lectures required =40
Reference Books: -
1. Elements of ring frame & doubling – Dr. A.R. Khare
2. The technology of short-shape staple spinning – W. Klein
3. Cotton spinning – Taggart
4. Spun yarn technology – Oxtoby
5. Fundamentals of Spun yarn technology by C. A. Lawrence

Laboratory work: As per the lab Syllabus

5. Fabric manufacture-III (L T P 3-0-0 = 3)

Unit (1): Jacquards shedding, types of jacquards and their principle of working, cross border jacquards (2). Single lift single cylinder Jacquard, Double lift single cylinder, double lift double cylinder
Total Lecturers Required = 9
Unit 2: Different system of harness tie-up, terry mechanism, Recent developments in jacquard weaving, split harness
Total Lecturers Required = 7
Unit 3: Automatic loom: pirn change, shuttle change loom, detailed study of various motions of automatic looms, mechanical warp stop motions, electro-mechanical warp stop motion
Total Lecturers Required = 9
Unit (4): Multiple box motion, their types, two colours and four-colour drop box motion, brief description of pick-at will, pick and pick motion. On line process and quality control, estimation of productivity, snap study. Total Lecturers Required = 7
Unit (5): Harness mounting London and Norwich system, Card cutting, limitations of jacquards, Electronic jacquard. Total Lecturers Required = 08
Grand Total of lectures required = 40
Reference Books: -
1. Weaving mechanism by Fox.
2. Weaving mechanism by N.N. Bannery.
Weaving machine & mechanism by Talukdar
5. Handbook of weaving by Sabit Adanur
Laboratory work: As per the lab Syllabus

6. Departmental Elective 1

a) Structure & properties of Fibres (NTT-011) (L T P 3 1 0) Credits = 4

Unit (1): Basic structural features of fibre, Structure of Cotton, wool, silk, and other textile fibres, relation between fibre structure and fibre, Methods of estimating molecular weight, orientation, crystallinity & crystalline orientation of fibre forming polymer, Overall orientation by “sonic modulus tester,

Total Lectures Required = 8

Unit (2): Concept of scanning electron microscope (SEM), Concept of transmission electron microscope (TEM) Fourier Transform Infrared Spectroscopy (FTIR), Atomic force microscopy, fibre fracture.

Total Lectures Required = 8

Unit (3): Thermal behavior of textile fibres by Differential Scanning Calorimeter (DSC) (2), TGA, thermal mechanical analysis (TGA) (2), Thermomechanical Analyser (TMA) Density gradient column (2), Preparation of density gradient column (2) Crystallinity by density gradient column.

Total Lectures Required = 8

Unit (4): Optical properties of fibres (2), Birefringence behavior, dielectric properties, fibre friction, fibre friction measurement, fibre to fibre, yarn to yarn friction measurement

Total Lectures Required = 8

Unit (5): Creep behavior (2), concept of moisture absorption by fibres (2), (2). Moisture absorption, heat of absorption, differential heat of absorption, integral heat of absorption, Quantitative theory of heat moisture absorption, Rate of moisture absorption

Total Lectures Required = 10

Grand Total of lectures required = 42
Laboratory work: As per the lab Syllabus

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
7. Polymers by fibre & textiles encyclopedia
8. Advances in fibre source by S.K. Mukhopadhyaya
a) Colour & Design (L T P 3-1-0 =4)

Unit (1): Light and colour phenomena, physical basis of colour, Emission & absorption theory of light, Colour vision and light theory of colours, Complementary colours, Chromatic circle, Pigment theory of colours, Brewster circle, Attributes of the primary & secondary colours,
Total Lectures required = 11

Unit (2): Colour measurement, Primary, Secondary, Tertiary & compound colours, Biren’s triangle, Modification of colours, Coloured greys, Colours in combination, Colour contrast, contrast in hue, contrast of tone, colour harmony, Relative spaces occupied by colours, divisional colours, Application of colours, Mixed colour effect,. Total Lectures required =11

Unit (3): Composition of designs, Condition to be observed during ornamentation of fabrics, Mode shade, Harmony of succession, gradation of hue, Different stages of colouring of textile materials, Colour and weave effect and its classification. Bases of Textile design, One third and one fourth drop design, Half drop and drop reverse design, Total Lecture required = 10

Unit (4): Unit repeating design, Geometric ornamentation, Construction of symmetrical designs, Stripe and check effect designs, Sari border / vertical border design, Factor affecting the woven designs, reversing inclined figure, Diamond, Ogee, & diagonal waved line base, applications of colours. Total Lecture required = 10

Unit (5): Art sheet based question covering all above units
Grand total Lectures required = 42
Laboratory work: As per the lab Syllabus

Reference Books:
1. W. Watson- Textile design and colour
2. Traditional Textile designs B K Behera
6th Semester B. Tech. Textile Technology

1. Managerial Economics (L T P 3-0-0 = 3): As per concerned BoS AKTU

2. Cyber Security/ Sociology (L T P 3-0-0 = 3) As per BoS AKTU Syllabus

3. Textile Testing-II (L T P 3-1-0= 4)

   **Unit (1):** Tensile properties of yarn and fabric, stress-strain curve, various methods for finding of yield point, methods for finding of various modulus, destination of tenacity, and stiffness of fabric. **Total Lectures Required = 7**

   **Unit (2):** Procedure of determination of strength and elongation in the spun yarns, knowledge about the equipment used, yarn tensile strength testing machines, single yarn strength tester, lea strength tester, fabric strength tester - impact tester, Grab test, fabric B.S. Test, Scott serigraph, Instron tensile tester. **Total Lectures Required = 9**

   **Unit (3):** Measurement of evenness testing of yarns, nature and causes of irregularities, principles and methods of evenness testing, evaluation and interpretation of evenness diagram & spectrogram and their associated equipment, Classimat faults. **Total Lectures required =9**

   **Unit (4):** Measurement of physical properties of fabric and the knowledge of the equipment used, tensile strength, bursting strength, tearing strength, pilling, air permeability, crimp, thickness, EPI, PPI, weight and cover factor. **Total Lectures required =10**

   **Unit (5):** Measurement of water repellency, shrinkage, measurement of fastness to light and rubbing, thermal transmission, Brief introduction to FAST and KAWABATA. **Total Lectures required =7**

   **Grand total of lectures required = 42**

**Text Books & Reference Books:**

1. Physical testing of textiles by B.P. Saville.
2. Quality control and testing management by Dr. V.K. Kothari.
4. Quality control by V.K. Kothari

Laboratory work: As per the lab Syllabus

4. **Advance Spinning Technology (NTT-602) (L T P 3 1 0=4)**
Unit-1: Limitation of ring spinning (1), Principles of unconventional method of yarn manufacturing (1) open-end spinning process(1), Advantages and Limitations of open-end spinning process(1), Classification of new spinning yarn technology (1)

Unit-2: Rotor spinning- Objects of rotor spinning (1), Principle of operation(1), Raw material requirements(1), opening unit, yarn formation(1) Design of rotor, Navel and yarn withdrawal tube(1) Automation, yarn characteristics comparison of yarn properties with ring yarn and rotor yarn (1).

Unit-3: Friction spinning- Principle(1) DREF-2 and DREF-3, yarn formation , yarn quality, yarn structure(1) fibre specifications for optimum results, merits & limitations(1) Twist less spinning-TNO process and TWILLO process(1), Traveller-less NOVA Spinning

Unit-4: Air jet Spinning-Principle(1) DREF-2 and DREF-3, yarn formation , yarn quality, yarn structure(1) fibre specifications for optimum results, merits & limitations(1) Twist less spinning-TNO process and TWILLO process(1), Traveller-less NOVA Spinning

Reference Book-  
1. New Spinning Technology Vol. 4 & 5 –W.Klien  
2. Fundamentals of Spun yarn technology by C. A. Lawrence  
3. Spun yarn technology – Oxtoby  

Laboratory work: As per the lab Syllabus

5. **Advance Weaving Technology (NTT-041) (L T P 3 1 0=4)**

**Unit 1:** Principle of operation of shuttle less loom (2) Classification of shuttle less looms., Comparative study of various systems of weft inserting (2) advantage of shuttle less looms over shuttle looms (2)  
**Total of lectures required=7**

**Unit-2:** Basic operational principle of projectile weaving machinery, picking mechanism of Sulzer projectile loom, beating (3), Selvedge formation (2) multicolour weft feeding on projectile loom (2)  
**Total of lectures required=7**

**Unit-3:** The Rapier system of weft insertion (1) Classification of Rapier looms and its description(2) flexible and rigid rapier (2) Dewas and Gabler system of weft transfer (2) weft Control mechanism, loom timing (2,) rapier design, tip transfer mechanism of rapier loom  
**Total lectures required=8**

**Unit-4:** Working principle of Air-jet weaving (2) essential requirements of air-jet loom, weft measuring, weft tensioning devices (2) beating-up, weft gripping, weft cutting (2) weft stop motion selvedge formation (2), Tendom nozzle and relay nozzles, quality of compressed air for air jet loom, multiphase weaving  
**Total lectures required=8**
Unit-5: Weft insertions of water-jet loom (2), general description of the water-jet loom (2) weft supply system, tension measuring device, water stream for weft insertion (1) fundamental problems of hydraulic weft insertion (2), Electronic dobbby and electronic jacquard.

Total lectures required = 8
Grand total of lectures required = 38

Reference books
1. Modern development in weaving machine by ra and Duxburg,
2. Weaving mechanism, machine and Management by Talukdar.
3. Weaving Mechanism by Robinson.

Laboratory work: As per the lab Syllabus

6. Departmental Elective-2

a) Fabric Structure & Analysis (L T P 3-1-0= 4)

Unit (1): Classification of various fabrics, construction of plain weave and its derivatives (riib and mat weave), ordinary twill, right hand twill, warp faced, weft faced & balanced twills.

Total Lectures required = 8

Unit (2): Satin regular, irregular and their extension. Combined twills, end to end and pick-to-pick combination, elongated twills, steep twills, broken twill, curved twill, Fancy twills-large diagonal shaded twills, Wave/ zig-zag, herringbone twill.

Total Lectures Required = 8

Unit (3): Regular and irregular satin, sateen base diagonals and brained twills, Diamond, mock leno, ordinary honeycomb, brighten honeycomb, Huck-a-back and crepe weave.

Total Lectures Required = 9

Unit (4): derivatives of hopsack, barley corn stitched hopsack and twilled hopsack, Ripstop weave, Simple and wadded bed ford cords (1), weft and piques (1), principle of figuring with extra material extra warp figuring, extra weft, limitation of extra thread.

Total Lectures Required = 9

Grand Total Lectures Required = 34

Reference Book:
2. Z.J Grosicki Watson’s Textile design and colour Newnes Butter Worth, London.
Laboratory work: As per the lab Syllabus

b) Multi & Long Fibre Spinning (L T P 3-1-0= 4)
Unit 1: Characteristics of manmade fibres, Spinnability, blending, and its objectives, Spinnability, blending & its objectives, processing of Man- made fibres & blends on short, medium and long staple spinning systems.

**Total Lectures Required = 10**

Unit 2: Spinning of dyed fibres, estimation of blends intimacy, factors affecting the blend irregularity, structural properties of blended yarns.

**Total Lectures Required = 8**

Unit 3: Production of bulked yarn, characteristic difference in the physical & mechanical properties of various long staple fibres & their influence in the choice of preparatory & spinning machinery.

**Total Lectures Required = 8**

Unit 4: Woolen, semi-worsted & worsted systems of spinning, retting of flax, & jute, Jute & flax spinning, manufacturing of spun silk.

**Total Lectures Required = 8**

**Grand total lectures required =34**

Reference book:-
1. Wool Spinning by Vickerman, Abhishek Publication
2. Principle of woolen spinning by Priestman
3. Woolen & Worsted yarn manufacture by J. W Redcliff
4. Jute Spinning Calculation by Andrew Smith
5. Worsted Drawing & Spinning by Miles

**Textured Yarn Technology (3-1-0) 4 Credits**

Unit (1): Importance of texturizing, Methods of texturizing, Basic principles of heat setting and texturizing, False twisting, Process variables, developments of false twist texturing machines, **Total Lectures Required = 8**

Unit (2): Structural geometry of textured yarn, characterization of textured yarn, Stuffer box crimping, Edge crimping & other methods of texturing thermoplastic yarns. **Total Lectures Required = 8**

Unit (3): Textured yarn properties and fabric characteristics, principles of draw texturing, Draw texturing machines, and properties of draw textured yarn, Effect of process variables, time, temperature, twist and tension on properties of textured yarn. **Total Lectures Required = 8**

Unit (4): Principles of air bulking and properties of air bulked yarn, Texturing of non thermoplastic yarns cross linking and effect of process variables on properties of textured yarn, Texturing with the aid of solvent, Yarn characteristics, Morphological chances induces by mechano-thermal forms of texturing and their effect on properties of textured yarns. **Total Lectures Required = 10**

**Grand total lectures required =43**

Reference book:-
1. Textured yarn Technology by J.W.S.Hearle
2. Synthetic fibre by Vaidhya
PROPOSED STUDY & EVALUATION SCHEME

FOR

B. TECH.

(TEXTILE TECHNOLOGY)

4TH YEAR

On

Choice Based Credit System
### 4th Year VII-SEMESTER

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Science Based Open Electives

### 4th Year VIII-SEMESTER

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15
7th Semester B. Tech. Textile Technology

1. Open Elective-1 (L T P 3-0-0): As decided by AKTU

2. Knitting Technology (L T P 3-1-0=4)

Unit 1: Difference between knits and wovens, knitting terms and definitions (Course, wale, stitch density) different type of knitting needles: bearded needle, latch needle, sinker, jack, cam arrangement, overlap, under lap, closed lap, open lap. Total Lectures required =8

Unit 2: Comparison of warp and weft knitting, Classification of weft knitting machine, elements of knitting machine like type of needles, sinkers, etc Needle numbering system, technology of loop formation, geometry of loop structure, Elements of loop structure: needle loop, sinker loop, relation between yarn count, machine gauge and stitch density. Total Lectures required =9

Unit 3: Classification of knit-structures, loop formation on: single jersey, Rib machines and interlock machines, socks knitting technology, Loop formation on flat bed machine Total Lectures required =9


Unit 5: Basic warp knitting machines, classification of warp knitting, Modern developments in weft knitting technique, calculations regarding production, gsm, stitch density etc, Causes and remedies of faults of knitted fabrics. Total Lectures required =9

Grand total of lectures required = 42

Reference and Text Book-
1. Knitting Technology – Chamberlin
2. Knitting Technology – W.J. Spencer
3. International Textile Journal – Knitting
4. Knitting Calculation – Chamberlin
5. Wet Knitting Vol. 1 & 2 – Published by IIT New Delhi.
6. Knitting – NCUTE
   Laboratory work: As per Lab Syllabus

3. Garment Technology (L T P 3-0-0)

Unit (1): Introduction to garment manufacturing technology, Sample cutting, Fusing, Sewing, Pressing, Finishing and inspection, Line balancing concept. Total Lectures required =8

Total Lectures required = 9

Unit (3) Introduction to garment cutting, Marker planning, Efficiency of Marker planning, methods of marker planning and marker use, spreading of the fabric, to form a lay, spreading requirements, methods of spreading, fabric packages, objective of cuttings, methods of cuttings

Total Lectures required = 9

Unit (4): Introduction to seam, stitch, stitch classification, stitch structure, seam formation, joining material, surface characteristics, seam appearance, damages (thermal and mechanical), seam performance, seam degradation, seam failure, seam puckering and seam testing. Sewing needle and sewing thread, thread consuption

Total Lectures required = 9

Unit 5: Introduction of spreading machines and cutting machines- types and functions, History of sewing machines. Sewing machinery- classification according to bed types, stitch types (hook or looper) material wise (extra light to heavy weight). Major parts of sewing machinery and functions. Parts, functions and adjustments of Over Lock: Collar turning machines, folding machinery fusing and pressing machinery, Computer controlled cutting, sewing, folding machinery.

Total Lecture Required: 8

Grand total of lectures required = 42

Text Books and Reference material:
1. Introduction to Garment Manufacturing Technology By T Ramchandran
2. Garment Manufacturing Technology by By T Ramchandran
3. Practical Clothing Construction Part I & II by Mary Methews
   Laboratory work: NA

4. Department Elective-3

a) Non Woven Technology
   Unit 1: National and international scenario on non-woven fabric production, Concept about felts and non woven, Classification of non-woven fabrics, fibres for non-woven fabrics, Felt Manufacturing process
   Total Lectures Required = 9
**Total Lectures Required =9**

**Total Lectures Required =8**

**Total Lectures Required =8**

**Total Lectures Required =8**

**Grand total of Lectures required= 42**

Reference & Text Books
1. Non Woven – N.N. Banarjee
2. Non woven – NCUTE
3. Knitting technology : Spencer

b) Functional Textiles (3-0-0)

Unit 1: Definition of functional clothing, Classification of functional clothing, Functional finishes, ways to apply functional finishes on textile surfaces, Functional clothing market review

Unit 2: Functional Protective clothing: Nuclear biological Chemical protective clothing, extreme cold clothing; design, mechanism and applications, Fire retardant clothing, approaches to achieve fire retardancy in clothing, mechanism of fire retardancy, Soft and hard body armour, super thickening fluids (non-nutonean) for body armour, water proof breathable fabrics, ways to achieve waterproofness and breathability in textiles

Unit 3: Medical functional clothing: therapeutic and rehabilitative clothing, biosensing clothing, wound healing promoting dressings, antimicrobial sutures

Unit 4: Sportswear clothing: moisture management in sportwear, compression textiles, Aerodynamics, Spacesuit design and development, woven and knitted sportswear,
Unit 5: Cosmetotextiles: definition, classification, mechanism to develop various cosmetic effects in textiles, various cosmetoingradients, worldwide scene of cosmetotextiles, Smart Textiles, classification of smart textiles, Intelligent textiles, mechanism of various types of smart textiles, Wearable electronics

Reference Books
2. Functional Textiles and Clothing, G. Thilagavathi., M. Parthiban, S. Viju
3. Woodhead Publishing
5. Smart Clothes and Wearable Technology, J. McCann (Editor), David Bryson Woodhead Publishing Series in Textiles.

5. Departmental Elective 4
a) Theory of Textile Structure (L T P 3-1-0)

Unit (1): Classification of yarns, Yarn geometry- idealized yarn geometry, relationship of yarn number and twist factor, packing of fibres in a yarn, ideal packing, hexagonal close packing and radial packing, packing factor and its measurement, yarn diameter, method of measurement of twist contraction. Total Lectures required =10

Unit (2): Fibre migration: mean fibre position, amplitude of migration and frequency of migration, mechanism of migration, spinning-in coefficient and fibre extent. estimation of strength of blended yarn Total Lectures required =6

Unit 3: Mechanism of staple fibre yarns, translation of fibre properties into yarn properties, twist and strength relationship, limit of twist, spinability of textile fibres, relation with end-breakage rate. Total Lectures required =9

Unit (4): Elements of fabric geometry, cloth setting theories, flexible and rigid thread model, Pierce’s equation and later modifications. Total Lectures required =7

Unit (5): Relation of fabric properties to simple geometry, crimp interchange in woven fabric, crimp balance equation, Fabric cover, cover factor and their significance, relation between cover and weight per unit area of fabric, Theoretical treatment of fabric deformation in tension. Total Lectures required =10

Grand total of lectures required = 42

Text Books and Reference material:
1. Textile Yarn- B.C. Goswami, J.G. Martindale, F.L. Scardine
b) Clothing Science (L T P 3-1-0)

Unit 1: Definition of clothing comfort: importance of studying clothing comfort, various components and definition of clothing science, Brief introduction to the various processes related to comfort aspect: psychological, neurophysiological, physiological and physical, Psychology and Comfort: Psychological scaling, scales of measurement, wear trial technique, Aesthetic Comfort: General aspects, measurement of aesthetic properties, changes in aesthetic behavior


Unit 3: Thermal Conductivity of Fibrous Materials: Various parameters and related factors that affect the thermal conduction through fibrous materials like fibrebatts, nonwoven fabrics, pile fabrics, woven and knitted fabrics, thickness, cover factor, fibre type, yarn structure, fibre morphology and shape, effect of fabric layers etc. Transient heat transfer mechanism (the warm-cool feeling): Kawabata’s theoretical proposition of thermal diffusivity as an objective parameter for evaluation of warm-cool feeling, Hess’s proposition of thermal absorbivity as a more suitable parameter for the same purpose, Kawabata’s instrument, Alambeta

Unit 4: Liquid Moisture Transfer through Fibrous Materials (Wicking and Water absorption): Theory of surface tension, theory of capillary action, wetting and wicking, interaction between liquid and fibrous materials, liquid spreading dynamics on a solid surface, Rayleigh instability, Lucas-Washburn theory, various theories and models on vertical and horizontal wicking through yarns, nonwoven fabrics and woven fabrics, absorption of water by a fibrous mass, objective measurement of wicking and absorption: angle of contact, droplet absorption test, vertical wicking, horizontal or transverse wicking tests

Unit 5: Transfer of moisture vapour through Fibrous Materials: Diffusion of vapour through a porous medium, various modeling approaches, moisture vapour permeability of fabrics, influence of various fabric parameters such as thickness, cover factor, etc. on the moisture vapour permeability, measurement of moisture vapour permeability, International standards.

Reference Book

2. Improving Comfort in Clothing edited by Guowen Song Woodhead Publications
3. Textiles for Cold Weather Apparel, J. Williams Woodhead Publications
8th Semester B. Tech. Textile Technology

1. Open Elective-2 (L T P 3-0-0) As Decided by AKTU

2. Departmental Elective 5
   a) Technical Textiles (L T P 3-0-0)


Total Lectures required =8

Unit (2): Manufacture and properties of protective textiles- water proof/coated and water repellent, antimicrobial, flame retardant, chemical resistance, Nuclear and biological resistance, mechanical resistance such as bullet proof, cut prof, stab proof

Total Lectures required =9

Unit (3): Medical textiles, fibres used, classification of medical textiles- non-implantable material wound dressings, bandages, plasters, etc, Extra-corporal devices – Artificial kidney, liver lung, implantable material- suture, soft tissue implant, Orthopedic implants, Cardiovascular implants, Healthcare/ hygiene products, medical cost, surgical gown, face mast etc.

Total Lectures required =8

Unit (4): Smart textiles, brief introduction of smart textiles, classification of smart textiles, passive smart textiles, active smart textiles, brief discussion of smart shirt, smart suit, musical jacket, space suit etc. automotive textiles: type cord, seat belt, air bag, seat upholstery, carpets, headliners, helmets etc, Agro textile: Shade net, green house film, Mulch net, crop cover, anti hail and bird protection net, finishing net etc.

Total Lectures required =9

Unit (5): Introduction of geo textile, classification of geo textiles, functions of geo textile-soil reinforcement, drainage (fluid transmission), filtration, separation, erosion control/ absorption, objective of geo textiles, manufacturing of geo textile, essential properties of geo textiles- Mechanical determinants, Hydraulic determinants, durability determinants.

Total Lectures required =8
Grand total of lectures required = 42

Text Books and Reference material:
2. Smart fibre, fabrics and clothing Tao X

b) High Performance Fibres (L T P 3-0-0)

Unit – I; Introduction- Definition, molecular dimensionality mechanical properties, Fibre markets, Hi -Performance Gelspun Polyethylene fibres- Manufacture, fibres characteristics, properties & applications. Total lectures required=9

Unit- II: Aramids- Introduction, polymer preparation, Spinning, Structure & properties, applications, Fibres based on liquid crystalline polymer (PPTA fibre). Total lectures required=8

Unit- III: Carbon Fibres- Physical properties, PAN bases Carbon fibres, Pitch based Carbon fibres, Vapour grown Carbon fibres, Applications. Total lectures required= 8

Unit-4:Glass Fibres- Glass for Fibres, Fibre manufacture, fibre finish, fibre properties & application, optical fibres. Total lectures required=8

Unit –5: Vectran (Melt spun wholly aromatic polyester fibre), Fibre production, properties & application, PBO (Polyphenylene benzobisoxazole) fibres- Fibre production, properties & application. PEEK Fibres -Fibre production, properties & application. Total lectures required=9

Grand total of lectures required= 42

Reference Books
1. High Performance Fibres by J.W.S. Hearle
c) TEXTILE MARKETING AND MERCHANDISING (L T P 3 0 0) =3

Unit 1: Introduction to Textile Marketing function; genesis, the marketing concept. Marketing Management System: objectives, its interfaces with other functions in the organisation. Environment of Textile Marketing, Political and Economic Environment, Market segmentation Consumer buying behaviour. Socio-cultural environment


Unit 3: Implementation and Control. The marketing organization alternative organization structures; the concept of product management. Administration of the textile marketing programme: sales forecasting; marketing and sales budgeting; sales management; management of sales force. Evaluation of marketing performance; sales analysis; control of marketing effort; marketing audit

Unit 4: Jute textile sector, Silk textile sector, Man-made textile sector, Wool Textile sector, Statistics of Indian textile business (Domestic & Export) and World textile trade, Textile policy, World trade practices, norms, barriers, etc., Various pertinent prevailing issue impacting textile industry and trade, corporate social responsibility, ISO accreditation, etc., Retailing in textiles vis-a-vis consumer trends and behaviour and the challenges,

Unit 5: Textile Merchandising: Process of Planning, Purchasing, Motivating and Controlling of Materials in an optimum manner, vendor development, manufacturing, pricing, product design and development, exporting etc.

Reference Books:
1. Marketing Research A S Rao, Neha Publishers and distributors
5. Retail Merchandising Sapna Pradhan Tata McGraw Hill Education Private Limited 2009

3. Departmental Elective-6
   a) Process Control in Spinning & Weaving (L T P 3-1-0)
Unit (1): Importance of evolving a system for process control, control of mixing quality through fibre characteristics, simultaneous control of mixing cost and quality, concept of bale management. Control of waste in blow room and carding, norms for waste and cleaning efficiency in blow room & card, control of neps, assessment of performance of blow room & card, control of comber waste, concept of yarn realization, calculation pertaining to waste & yarn realization \textbf{Total Lectures required =9}

Unit (2) Measurement and analysis of productivity, means to improve productivity, maximizing machine efficiency in ring spinning, controlling end breakage rate in ring spinning, control of soft waste and hard waste, control of yarn faults and package defects-slubs, crackers, spinner’s doubles, bad piecing & slough off.

Control of yarn quality- count, strength and their variability, study of CV% (within bobbin and between bobbin), control of variability of lea strength, single yarn strength and elongation %, Control of yarn unevenness, imperfections and hairiness.

\textbf{Total Lectures required =9}

Unit (3): Scope of process control in weaving, systems of process control in weaving, setting norms and schedule of checks, machinery audit, optimizing quality of winding, control of quality of knot, producing good package, dressing of the beams for reducing incidence of cross ends.

\textbf{Total Lectures required =9}

Unit (4): Process control in warping, minimizing end breakage in warping, quality of warping beam, control of productivity, factors responsible for loss in efficiency, control of productivity, Process control in sizing, choice recipe and size pick-up, control of size pick-up, control of yarn stretch, quality of sized beams. \textbf{Total Lectures required =9}

Unit (5): Process control in loom shed, snap study and time and motion study, control of warp and weft breakage, causes and remedies of fabric defects, factors responsible for loss in efficiency, control of productivity, process control in grey inspection, and folding sections.

\textbf{Total Lectures required =9}

\textbf{Grand total of lectures required = 45}

\textbf{Reference Books}
1. Machine catalogues of various machines manufacture
2. Process Control in Spinning by ATIRA
3. Process control in weaving by ATIRA
4. Process Control in Spinning by K.R. Salhotra
5. Weaving tablets by ATIRA

6. Mill Planning & Organization (L T P 3 1 0) Credits =4
Unit-I: Preparation of project—Spinning/Weaving/Processing/Composite
A- Selection of product
B- Site Selection (site, location, land and cost)
C- Building (single, double and multiple)
D- Plant and Machinery
Total lecture required 09

Unit-II
1. Industrial hazards: i. Fire hazards, ii. Mechanical hazards, iii. Electrical etc
2. Safety rules for prevention of accidents
3. Humidification of textile mill- humidifier and humidification
4. Ventilation, floor cleaning in textile mills, lightening
5. Air conditioning and Refrigeration system
Total lecture required 08

UNIT III: Balancing of machine (plant layout for machines--balancing of machines,
layout of different machines, calculation for balancing of machines for different
processes—spinning, weaving)
Total lecture required 07

UNIT IV
Production Costing—various terms used in costing (cost volume, profit analysis, cost
allocation on waste, effect on cost direct, indirect
Various elements of costing- concept of estimation for costing, break-even analysis
Total lecture required 10

UNIT V
Economic Viability
Staff organization in textile mills—daily wages, various systems
Recruitment, allocation and skill development
Management and information system MIS
Total lecture required 08

Text Books & Reference Material
1. Industrial Engineering, Organization & management by Tarachand
2. Industrial Economics & Principle of Management by T.M. Chabra