

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



Evaluation Scheme & Syllabus

for

B.Tech. Second Year

Textile Technology

On

AICTE B.Tech Model Curriculum

(Effective from the Session: 2019-20)

Textile Technology

SEMESTER- III

| Sl. No. | Subject | Subject | Periods | | | Evaluation Scheme | | | | End Semester | | Total | Credit |
|---------|-------------------|---|---------|---|---|-------------------|-----|-------|-----|--------------|----|------------|-----------|
| | Codes | | L | T | P | C T | T A | Total | P S | TE | PE | | |
| 1 | KOE031-38/KAS302 | Engg. Science Course/Maths IV | 3 | 1 | 0 | 30 | 20 | 50 | | 100 | | 150 | 4 |
| 2 | KAS301/ KVE301 | Technical Communication/Universal Human values | 2 | 1 | 0 | 30 | 20 | 50 | | 100 | | 150 | 3 |
| | | | 3 | 0 | 0 | | | | | | | | |
| 3 | KTT301 | Yarn Manufacturing-I | 3 | 1 | 0 | 30 | 20 | 50 | | 100 | | 150 | 4 |
| 4 | KTT302 | Fabric Manufacturing-I | 3 | 1 | 0 | 30 | 20 | 50 | | 100 | | 150 | 4 |
| 5 | KTT303 | Textile Fibre-I | 3 | 0 | 0 | 30 | 20 | 50 | | 100 | | 150 | 3 |
| 6 | KTT351 | Yarn Manufacturing-I Lab | 0 | 0 | 2 | | | | | 25 | 25 | 50 | 1 |
| 7 | KTT352 | Fabric Manufacturing-I Lab | 0 | 0 | 2 | | | | | 25 | 25 | 50 | 1 |
| 8 | KTT353 | Textile Fibre-I Lab | 0 | 0 | 2 | | | | | 25 | 25 | 50 | 1 |
| 9 | KTT 354 | Mini Project or Internship Assessment* | 0 | 0 | 2 | | | 50 | | | | 50 | 1 |
| 10 | KNC301/ KNC302 | Computer System Security/ Python Programming | 2 | 0 | 0 | 15 | 10 | 25 | | 50 | | | 0 |
| 11 | | MOOCs (Essential for Hons. Degree) | | | | | | | | | | | |
| | | Total | | | | | | | | | | 950 | 22 |

*The Mini Project or internship (3-4 weeks) conducted during summer break after II semester and will be assessed during III semester.

SEMESTER- IV

| Sl. No. | Subject | Subject | Periods | | | Evaluation Scheme | | | | End Semester | | Total | Credit |
|---------|----------------------|--|---------|---|---|-------------------|-----|-------|-----|--------------|----|------------|-----------|
| | Codes | | L | T | P | C T | T A | Total | P S | TE | PE | | |
| 1 | KAS402/ KOE041-48 | Maths IV/Engg. Science Course | 3 | 1 | 0 | 30 | 20 | 50 | | 100 | | 150 | 4 |
| 2 | KVE401/ KAS401 | Universal Human Values/ Technical Communication | 3 | 0 | 0 | 30 | 20 | 50 | | 100 | | 150 | 3 |
| | | | 2 | 1 | 0 | | | | | | | | |
| 3 | KTT401 | Yarn Manufacturing-II | 3 | 0 | 0 | 30 | 20 | 50 | | 100 | | 150 | 3 |
| 4 | KTT402 | Fabric Manufacturing-II | 3 | 1 | 0 | 30 | 20 | 50 | | 100 | | 150 | 4 |
| 5 | KTT403 | Textile Fibre-II | 3 | 1 | 0 | 30 | 20 | 50 | | 100 | | 150 | 4 |
| 6 | KTT451 | Yarn Manufacturing-II Lab | 0 | 0 | 2 | | | | | 25 | 25 | 50 | 1 |
| 7 | KTT452 | Fabric Manufacturing-II Lab | 0 | 0 | 2 | | | | | 25 | 25 | 50 | 1 |
| 8 | KTT453 | Textile Fibre-II Lab | 0 | 0 | 2 | | | | | 25 | 25 | 50 | 1 |
| 9 | KNC402/ KNC401 | Python Programming/ Computer System Security | 2 | 0 | 0 | 15 | 10 | 25 | | 50 | | | 0 |
| 10 | | MOOCs (Essential for Hons. Degree) | | | | | | | | | | | |
| | | Total | | | | | | | | | | 900 | 21 |

YARN MANUFACTURE-I

UNIT I

Process flow chart for carded & combed yarn manufacturing. **Cotton Ginning:-** Introduction of ginning process, Functions of ginning machines, Types of Ginning machines, Pre and post ginning machines used and their objects, Factors affecting ginning performance, Influence of ginning on fibre, yarn and fabric quality, Pressing and bailing of Indian and foreign cotton, dimensions. Objects of mixing, different types of mixing & blending), Difference between mixing & blending.

UNIT II

Objects of Blow room for natural and synthetic fibres, Principles of opening and cleaning , Principles of various opening and cleaning machines of blow room line, evolution of opening and cleaning principles. Various components & zones of blow room machines, Conventional blow room machines. Lap forming mechanism, Reasons of developments in blow room, machinery, Research findings and developments of modern blow room.

UNIT III

Automation and concept of modern blow room line, Latest developments in Blow room machines, Automatic bale opener, Mild openers– Maxi-flow/ Uni-clean/Vario-clean, modern Blenders, Intensive openers, cleanomat, flexiclean, Waste extracted at various openers and beaters, Cleaning efficiency of different machines, nep generation.

UNIT IV

Principle and concept of chute feed to card. Advantages and limitations, study of design details of different types of chute feeding systems, Objects of carding, detailed description of various parts of carding machine, Carding Theory – Opening of fibre mass – Carding actions –Web formation and fibre configuration – Blending – Leveling action – Fibre breakage. Calculation.

UNIT V

Stripping and grinding, Stripping action and carding action, Card Clothing, evolution and Metallic wire details — Card wire mounting, wave defects, carding related draft and production, Tandem carding, Auto leveller used in carding, Modern development in carding made by various renewed carding machine manufacturers, Blow room & card related calculations.

References:

1. The Textile Institute Publication - Manual of Textile Technology – Short Staple Spinning Series by W. Klein
2. 'The Characteristics of Raw Cotton' by P. Lord. The Textile Institute
3. Publication, Manual of Cotton Spinning Vol.II, Part-I.
4. 'Opening and Cleaning' by Shirley. The Textile Institute Publication, Manual of Cotton Spinning Vol. II, Part-II.
5. 'Opening Cleaning and Picking' by Dr.Zoltan S. Szaloki, Institute of Textile Technology, Virginia.
6. 'Cotton Ginning' Textile Progress, The Textile Institute Publication.
7. Blowroom and Carding- Training Programme conducted by NCUTE, IIT, Delhi.
8. Essential calculations of practical cotton spinning by TK Pattabhiraman.

FABRIC MANUFACTURE-I

UNIT I

Objects of winding process, classification of winding, (manual & automatic), various latest winding machines with detailed construction and working, Description of various winding accessories.

UNIT II

Geometrical aspects: - Cone angle, angle of wind, wind per double traverse, surface speed, traverse speed, winding speed, calculations, Calculations: winding speed, production/spindle & per machine, and efficiency.

UNIT III

Objectives of pirn winding, its advantage over rewound weft, Details semi-automatic and automatic pirn winding machines w. r. t drive to spindles, traverse, tensioning yarn path. Pirn build: - length of wind, chase length, diameter, bunch, tail ends etc. their importance during weaving process. Calculations: - Average pirn diameter, winding speed, production / spindle / & per machine, efficiency, number of looms fed by spindle.

UNIT IV

Objectives of warping, precautions to be considered in the process, classification of warping process- (beam warping, sectional warping, ball warping), Latest Warping machine: - construction and working, Creel: - framing (requirements, length, height, pitch, etc.) pegs, tensioning arrangements guides, blow fan, types of creels (parallel, V, V-nose etc.), Principles of operation of beam warping and sectional warping. Sectional warping machines, Waxing attachment, computerized warping machines.

UNIT V

Objectives of sizing and sizing terminology, achieving the objectives through sizing paste constituents, concepts of sizing process: hank sizing, ball warp sizing, Slasher sizing, multi-cylinder sizing, description of sizing ingredients, Latest developments in sizing process by various sizing machine manufacturers.

References:

- 1.Principles of weaving By Marks A.T.C. & Robinson.
- 2.Weaving By Prof. DB Ajgaonkar, Prof. Sriramalu & Prof. MK Talukdar.
- 3.Weaving Mechanism by K.T. Aswani.
- 4.Winding &Warping by Talukdar MK.
- 5.Yarn Preparation-Vol-I by Sengupta.
- 6.Weaving Calculation by Sengupta.
- 7.Textile Mathematics-Vol. I by JE Booth.
- 8.Fibre to Fabric by PR Lord

TEXTILE FIBRE-I

UNIT I

Introduction: various definitions related to textile fibres, classification of textile fibres, difference between staple & filament, essential & desirable properties of textile fibres, advantages & disadvantages of natural and man made fibres.

UNIT II

Cotton cultivation and harvesting, development of cotton fibres in seed, cotton varieties and grading, morphological structure, physical and chemical properties of cotton fibre and its applications.

UNIT III

Jute cultivation, retting and extraction process, structure of jute fibre, physical and chemical properties of jute fibre and its applications, Introduction to other natural bast fibres like flax, hemp, ramie, banana, bamboo fibre etc. and their applications.

UNIT IV

Types of wool and its grading, Morphological structure, chemical composition, physical & chemical properties, varieties of wool fibres and their applications, introduction to other animal fibres like angora fibres, camel hair fibre, goat fibre etc. and their applications.

UNIT V

Types of silk and its production, chemical composition and morphological structure of silk, physical & chemical properties of silk and its applications.

References:

1. WE Morton & JWS Hearle, Physical properties of textile fibres, Textile Institute, U.K.
2. Progress in textiles: Science and technology Vol.-2 by Dr. VK Kothari, IIT Delhi.
3. Hand book of textile fibres by J. Gordon Cook
4. Fibre Science and Technology, SP Mishra

YARN MANUFACTURE-I LAB

Practice in handling and operation of blow room, study of constructional details of machinery in blow room, calculating speed of different machine parts, Blows per inch of Krishnaer beater, Production calculation of blow room, various controls points and changes Places, Practice in checking the quality of laps, Study of driving mechanism and calculation of speed of different parts & production of card, Study of different setting points on card.

FABRIC MANUFACTURE-I LAB

1. Study of weaving preparatory and weaving Processes
2. Study of loom drive, loom timing, passage of material and primary motions.
3. Study of precision and drum winding machine.
4. Study of cheese winding machine.
5. Study of autoconer its functions
6. Study of pirn winding machine
7. Study of sectional warping machine
8. Study of beam warping machine

TEXTILE FIBRE-I LAB

Principle of microscopy, microscopic identification of natural fibres, preparation and mounting of specimen for longitudinal view, standard scheme of analysis of homogeneous fibre and blend by physical and chemical methods, preparation of reagents used for chemical analysis.

Semester-IV

YARN MANUFACTURE-II

UNIT I

Functions of draw-frame, principles of drafting and doubling, Study of constructional details and design of drafting systems, weighting in draw frame, draft distribution, doubling and blending, drafting force, details of drafting system, evolution of drafting systems at draw-frame (Shirley 4/4 drafting, platts, pressure bar, Whiten accu drafting, Rieter polar drafting systems etc.

UNIT II

Coiling system and stop motion, calculations relating to speeds, drafts, production etc, design, Suction at draw-frame. Automatic can handling, Auto leveling at draw-frame. On-linequality monitoring and control, Study of draw-frames available in the market. Blending at draw-frame, Study of maintenance aspects and design developments such as rollers, roller weightings, drafting systems etc. Developments in draw frame drafting, Suction at draw-frame, Automatic can handling, Auto leveling at draw-frame.

UNIT III

Objects of combing process, Requirements of good lap – importance of number of passages, importance of good lap, linear density of lap, etc., Methods of comber lap preparation – Different sequences of comber lap preparation, study of sliver lap machine, ribbon lap machine, unilap machine, Developments in lap preparation machines.

UNIT IV

Constructional details of Comber- feeding, nipper assembly, cylinder and detaching rollers, cylinder needles, web and sliver transport, drafting and coiling at comber, Study of combing cycle, Semi combing, normal combing, super combing and double combing., Forward and backward combing, Comber Settings, Norms for production, speed, Combing efficiency, Fractionating efficiency of comber. Influence of combing operation on quality, Automatic and centralized noil extraction, Automatic materials handling. Stop motions in comber, Technical specifications of modern combers available in the world market.

UNIT V

Objects of speed frame, Concepts of drafting, twisting and winding process. Constructional aspects of Speed-frame – Creel, Top arm apron drafting system, Spindle & Flyer assembly, Bobbin building, stop motions. Study of mechanisms like – differential motion, building mechanism, semi-automatic and automatic doffing, Performance assessment of Speed-frame – norms, Zero break concept, block creeling, Materials handling. Link – mechanism, Features of modern speed-frame machines.

References:

- 1.The Textile Institute Publication –Manual of Textile Technology-Short Staple Spinning Series Vol. I to V by W. Klein
- 2.The characteristics of Raw Cotton by P. Lord. The Textile Institute Publication, Manual of Cotton Spinning Vol II, Part-I.
- 3.Fundamentals of Spun Yarn Technology, By Carl Lawrence.
- 4.Blow room and carding –Training program conducted by NCUTE, IIT Delhi.
- 5.Carding by F. Charanlay. The Textile Institute publication, Manual of cotton spinning series Vol - III.
- 6.Drawing, Combing and roving and speed frame by Zoltan, S. Szaloky, The Institute of Textile Technology, Verginia.
- 7.Drawing, Combing and roving and speed frame by Zoltan, S.Szaloky, The Institute of Textile Technology, Verginia
- 8.Draw frame, combing and speed frame by J.H. Black; The Textile Institute publication, Manual of cotton spinning Vol-IV part II.

FABRIC MANUFACTURE-II

UNIT I

Drawing-in: Objectives, process description, reed count system, manual drawing-in, semi-automatic drawing-in process, Knotting process and its limitations. Various methods of fabric manufacture and automatic weaving: - Weaving, knitting, braiding, non-woven, brief description of all methods and processes involved in it, Different kinds of fabrics: Grey, mono-colour, multi-colour, warp or weft stripes, checks etc.

UNIT II

General description of plain power looms, introduction to weaving process, primary, secondary and auxiliary motion of plain power looms, Various ways of shedding, over and under pick motion, tappet shedding, Temples and its utility, idea about healds count and reed count in different system, Negative and positive take up motion, negative five wheel and seven wheel take up motion and positive let-off motions, Calculations: -Production and efficiency of machine.

UNIT III

Scope & limitation of dobby, negative and positive dobby, cross border dobby, Development in dobby, Scope and limitations dobby, brief description of Crompton and Knowles dobby cross border dobby, method of pegging for dobby, methods of pegging, heald reversing motion. Warp protective devices, side and center weft fork motion.

UNIT IV

Jacquards shedding, types of jacquards and their principle of working, size and figuring capacity of jacquard, cross border jacquards. Single lift single cylinder Jacquard, Double lift single cylinder, Double lift double cylinder, split harness, Different system of harness tie-up, terry mechanism, Recent developments in jacquard weaving.

UNIT V

Limitations of automatic loom, objectives for developing automatic loom, scope for automation, design features of automatic loom, drives- loom motions, accessories and other critical features of automatic looms, weft feelers- construction & working of side sweep, electrical & electronic weft feelers, their merits, demerits & applications.

Automatic let-off motion: Principles and requirements of automatic let-off mechanism, types of Automatic loom: pirn change, shuttle change loom, detailed study of various motions of automatic looms, warp stop motion- types, construction and working of mechanical & electrical warp stop motion, centre weft fork motion, construction and working of centre weft fork motion and its advantages.

Construction & working Multiple box motion, their types, two colours and four-colour drop box motion, brief description of pick-at will, pick and pick motion, Pick finding, heald leveling, light indicators; pick counters need, functions & use, i) Auto loom fabric defects,

causes and remedies, Calculations pertaining to dobby, jacquard and automatic looms production and efficiency.

References:

1. Yarn preparation by R. Sengupta
2. An introduction to winding & warping by M.K. Talukdar
3. Modern preparation & weaving machinery by A Ormerod, Textile Institute, U.K.
4. Sizing by Prof. D. B. Ajgaonkar, Dr. M. K. Talukdar & V. R. Wadekar.
5. The Technology of Warp Sizing by J.B. Smith.
6. Modern Preparation & Weaving by A. Ormerod

TEXTILE FIBRE-II

UNIT I

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 II

Introduction to methods of fibre formation by melt spinning, dry spinning, & wet spinning, Polyethylene terephthalate fibre (PET) – History of development, Brief manufacturing process, Polymer production by DMT & PTA route, Chips drying, , physical & chemical properties of polyester fibres, applications.

UNIT III

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

UNIT IV

Polyacrylonitrile fibres, Polyurethane fibres brief manufacturing process by wet and dry spinning, physical and chemical properties of acrylic fibres & its applications, Properties of

polyethylene fibre, Type of polypropylene (PP), Properties of polypropylene fibre.
Introduction of High Performance fibres.

UNIT V

Introduction to regenerated fibre, Raw material for viscose rayon, Manufacturing sequence of viscose fibre, Steeping and pressing, Cutting and shredding, Ageing, Xanthation of sodium cellulose, Mixing and filtration, Ripening, Wet spinning of viscose rayon, Introduction to Acetate, Triacetate fibres and Lyocell fibres.

References:

1. Textile Fibres – Vol.-I by VA 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 – RW Moncrieff, Heywood Books.

YARN MANUFACTURE-II LAB

1. Study of constructional details of draw-frame,
2. Driving arrangement and calculation of speeds, draft and production of D/F.
3. Processing of Material on Draw frame and evaluating performance.
4. Study of constructional details & Driving arrangement and calculation of Speed Frame.
5. Study of sliver lap machine and calculation of speeds of different parts and production calculations of sliver lap.
6. Study of sliver lap machine and calculation of speeds of different parts and production calculations of Ribbon lap.
7. Study of sliver lap machine and calculation of speeds of different parts and production calculations of comber.

FABRIC MANUFACTURE-II LAB

1. General study of drop box motion.
2. General study of mechanical Jacquard and method of card cutting.
3. Study of Cam dobbie and paper card cutting.
4. Study & working of weft feeler motion.
5. Study & working of auto let-off motion.
6. Study and working of pirn change motion.
7. Study and working of shuttle change motion.
8. Study of various dobbie mechanics.
9. Study the mechanism of multiple box motion.
10. Study of various jacquard looms.

TEXTILE FIBRE-II LAB

Principle of microscopy, microscopic identification of man-made fibres, preparation and mounting of specimen for longitudinal view, standard scheme of analysis of homogeneous fibre and blend by physical and chemical methods, preparation of reagents used for chemical analysis.