Programme Name	Bachelor of Technology (Textile Engineering)	Semester III
Course Title	Universal Human Values II: Understanding Harmony	
Course Code	HTM-901A	
Purpose	Purpose and motivation for the course, recapitulation from Universal Human Values-I	
Course Outcomes	**CO 1.** Development of a holistic perspective based on self-exploration about themselves (human being),family, society and nature/existence. **CO 2.** Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence. **CO 3.** Strengthening of self-reflection. **CO 4.** Development of commitment and courage to act.	
Prerequisite	Knowledge of basic humanities subjects and Universal Human Values-I	

HTM-901A

UNIVERSAL HUMAN VALUES II: UNDERSTANDING HARMONY

L T P
3 0 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 Hrs

Note:
Examiner will set nine questions in all. Question no. 1 will be objective type covering all the four units. Eight more questions will be set with two questions from each unit. The students will be required to attempt five questions in total; Question no. 1 compulsorily and one question from each unit.

Module 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

1. Purpose and motivation for the course, recapitulation from Universal Human Values-I
1. Self-Exploration–what is it? – Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration
2. Continuous Happiness and Prosperity- A look at basic Human Aspirations
3. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
4. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
5. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrarinessin choice based on liking-disliking

Module 2: Understanding Harmony in the Human Being - Harmony in Myself!

6. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
7. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
8. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
9. Understanding the characteristics and activities of 'I' and harmony in 'I'

10. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
11. Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

Module 3: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

12. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as thefoundational values of relationship
13. Understanding the meaning of Trust; Difference between intention and competence
14. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
15. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
16. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- fromfamily to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

Module 4: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

17. Understanding the harmony in the Nature
18. Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature
19. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space
20. Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" canbe used), pollution, depletion of resources and role of technology etc.

Module 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics

21. Natural acceptance of human values
22. Definitiveness of Ethical Human Conduct
23. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
24. Competence in professional ethics:
    a. Ability to utilize the professional competence for augmenting universal human order
    b. Ability to identify the scope and characteristics of people- friendly and eco-friendly production systems,
    c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
25. Case studies of typical holistic technologies, management models and production systems
26. Strategy for transition from the present state to Universal Human Order:
    a. At the level of individual: as socially and ecologically responsible engineers,

technologists and managers.

b. At the level of society: as mutually enriching institutions and organizations

27. Sum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. todiscuss the conduct as an engineer or scientist etc.

READINGS:

Text Book

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books,New Delhi, 2010

Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J CKumarappa
8. Bharat Mein Angreji Raj - PanditSunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

MODE OF CONDUCT

Lecture hours are to be used for lecture/practice sessions.

Lectures hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.

Practice hours are to be used for practice sessions.

While analysing and discussing the topic, the faculty mentor's role is in pointing to essential elementsto help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.

In the discussions, particularly during practice sessions, the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-exploration. Scenariosmay be used to initiate discussion. The student is encouraged to take up" ordinary" situations rather than" extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

Practice experiments are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based onbasic human values.

It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses.

This course is to be taught by faculty from every teaching department, including HSS faculty. Teacherpreparation with a minimum exposure to at least one 8-day FDP on Universal Human Values is deemedessential.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester III
Course Title	Textile Fibers	
Course Code	PCC-TEX-217A	
Purpose	To make students understand textile terms, natural fibers and their properties To make students understand production of man-made fibres and their properties.	
Course Outcomes	After completing this course student will be able to: **CO1**. define textile terms **CO2**. explain classification of textile fibres **CO3**. enumerate essential and desirable properties (physical and chemical) of textile fibres **CO4**. familiar with natural and man-made fibres used in textile field **CO5**. use the relevant fibres for suitable applications in textile industry	
Prerequisite	Knowledge of basic Physics, Chemistry and Mathematics	

PCC-TEX-217A

TEXTILE FIBRES

L T P
3 0 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 Hrs

Note:
Examiner will set nine questions in all. Question no. 1 will be objective type covering all the four units. Eight more questions will be set with two questions from each unit. The students will be required to attempt five questions in total; Question no. 1 compulsorily and one question from each unit.

UNIT-I
General definitions and important terminologies related to textiles; Classification of fibres; Essential and desirable properties of textile fibres and their role in final end-products; Comparison of natural and manmade fibres;
Cotton: Geographical distribution; structure and properties (physical and chemical) of cotton fibres; Different varieties including organic as well as Bt cotton and their properties and applications.

UNIT-II
Geographical distribution, extraction, properties and uses of Bast and leaf fibres such as Jute, Hemp, Sisal and Ramie etc.
Varieties of natural silk, rearing of silk worm, properties and uses of various types of silk; silk degumming, reeling, throwing and weighing.

UNIT-III
Varieties, sorting and grading of wool, physical and chemical properties of wool, processes involved in the removal of impurities from raw wool, numbering systems of woollen and worsted yarns.
Basic concept of polymer, essential properties of fibre forming polymers, General principles of manufacturing of man-made fibres.

UNIT-IV

Brief outline of the manufacturing processes of important man-made fibres, viz. rayons (Viscose and Acetate), polynosic, tencel, nylons, polyester, acrylics, polypropylene, polyolefins, polyacrylonitrile and some technical speciality fibres like aramid, spandex/lycra etc (only flow charts); their Important physical and chemical properties and applications

Suggested Text Books & References

1) Kozłowski, R.M., "Handbook of Natural Fibre", 1st Edition, Woodhead Publication, 2012.
2) Jindal R., Jindal A.,"Textile Raw Material",1st Edition, Abhishek Publications, Chandigarh, 2007.
3) Lewin M., "Handbook of Fiber Science and Technology (International Fiber Science and Technology)", CRC Press.
4) Gupta V. B. and Kothari V. K., "Manufactured Fiber Technology", Chapman & Hall, London,1997.
5) Kothari V.K., "Textile Fibers: Developments and Innovations", IAFL Publication, 2000.
6) Simpson W S., Crawshaw G., "Wool: Science and Technology", Woodhead Textile Series, 2002.
7) Mishra S.P., "A text Book of Fiber Science and Technology", New Age International (P) Ltd.
8) Moorthy H.V.S, "Introduction to Textile Fibers", Woodhead Textile Series, 2015.
9) Ghoel E.P.G., Valensky. "Textile Science", CBS Publishers & Distributors, 2ndEdn Reprint-(2005).
10) Bernard P C., "Textile Fiber to Fabric", McGraw Hill Book Co.
11) Morton W.E &Hearle J.W.S., "Physical Properties of Textile Fibers", Textile Institute, U.K.
12) Kothari V.K., "Progress in Textiles: Science & Technology" Vol-2, IAFL Publication New Delhi.
13) Cook G., "Hand Book of Textile Fibers", Vol-1&2, Woodhead Publication.
14) Eichhorn S., Hearle J.W.S., Jaffe M. and Kikutani T., "Handbook of Textile Fibre Structure", Vol.I., Wood Head Publication, 2009.
15) https://nptel.ac.in/courses/116102026/24 (21st May, 2019).

Programme Name	Bachelor of Technology (Textile Engineering)	Semester III
Course Title	YARN MANUFACTURING-I	
Course Code	PCC-TEX-203A	
Purpose	- To study the working principle of preparatory machines used in yarn manufacturing process. - To introduce the objectives and importance of blow-room, card and draw-frame.	
Course Outcomes	After completing this course, students will be able to: **CO1**. Illustrate the various operations involved in preparatory process of yarn manufacturing i.e. mixing-blending, opening, cleaning, drawing etc. **CO2**. Solve the numerical problems associated with blow-room, carding and draw-frame. **CO3**. Understand the various operation involved in carding machine **CO4**. Understand the basic geometry of card clothing. **CO5**. Analyse the suitability of different drafting systems.	
Prerequisite	Brief knowledge of basic machine drawing, basic mathematics and mechanics.	

PCC-TEX-203A

YARN MANUFACTURING – I

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 Hrs

Note:
Question no. 1 is objective type fifteen sub parts covering all the four units. Eight more questions will be set in the question paper i.e. two from each unit. The students will be required to attempt Question no. 1 compulsorily and one question from each unit.

UNIT-I

Mixing and Blending

Objectives of mixing and blending, Formulation of cotton mixing – scientific bale management, Different Blending methods with their advantages and disadvantages. Tinting & Application of additional spin finish for manmade fibres.

UNIT-II

Opening and Cleaning

Need for opening and cleaning, Objective of blowroom, Various types of opener and cleaner – construction and working, Lap forming mechanism, Blow room accessories, Selection of blow room line for different cotton and man-made fibres, Production and cleaning efficiency level attainable in blowroom, Causes of lap defects and their remedies, Modern developments in blowroom.

UNIT-III

Carding

Objective, Comparison of lap feed and flock feed system. Principle of carding, stripping and brushing action, Design and construction of carding machine, Flexible and metallic card clothing, Processing of man-made fibres on carding, Optimization of process and machine parameters of carding, Autolevelling in card. Modern developments in carding, Calculations pertaining to draft and production.

UNIT-IV

Drafting

Objective, Fundamental concept of Ideal drafting, Actual drafting, Working principles of draw frame including constructional details, Weighting in draw frame, Draft distribution, Different types of drafting roller arrangements, Relation between drafting & doubling, Drafting irregularities, Autolevelling, modern developments in draw-frame, Calculations pertaining to draft and production.

Suggested Text Books & References:

1. Klein, W., "Manual of Textile Technology: Vol. I. Technology of Short Staple Spinning", – Textile Institute, Manchester, 1998.
2. Klein, W., "Manual of Textile Technology: Vol. II. A practical Guide to Blowroom & Carding", – Textile Institute, Manchester, 2000.
3. Klein, W., "Manual of Textile Technology: Vol. III. A practical Guide to Combing & Drawing", – Textile Institute, Manchester, 1995.
4. Klein, W., "Manual of Textile Technology: Vol. VI. Manmade Fibres and their Processing", – Textile Institute, Manchester, 1994.
5. Oxtoby E, "Spun Yarn Technology", Butterworths, London, 1987.
6. Salhotra, K.R.and Chattopadhyay (Eds.), R., "Course Material of Pilot Programme on Spinning: Blow room and Card", NCUTE Publication, 1998.
7. Salhotra K R, "Spinning of Man-Made Fibres and Blends on Cotton Spinning System", TheTextile Association, Mumbai, 1989.
8. Foster G A R, "Manual of Cotton Spinning", Vol. I –IV, The Textile Institute, Manchester, 1958.
9. Khare A R, "Elements of Blowroom, Carding and Drawframe", Sai book Centre, Mumbai, 1999.
10. Lawrence C A, "Fundamental of Spun Yarn Technology" CRC Press, USA, 2003.
11. Booth J E, "Textile Mathematics", Part II, Textile Institute, Manchester, 1978.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester III
Course Title	FABRIC MANUFACTURING – I	
Course Code	PCC-TEX-205A	
Purpose	- To study the weaving preparation processes - To introduce the various loom motions - To study the primary motions of weaving machine.	
Course Outcomes	After completing this course, students will be able to: **CO1**. Explain the various operation involved in weaving preparation i.e. winding, warping, sizing and looming-in **CO2**. Solve the numerical problems associated with the weavingpreparation operation and production calculation. **CO3**. Interpret various loom mechanisms. **CO4**. Explain the primary motion of looms **CO5**. Analyse the principles involve in shedding, picking and beating motion.	
Prerequisite	Brief knowledge of basic machine drawing, basic mathematics. Knowledge of Yarn properties	

PCC-TEX-205A

FABRIC MANUFACTURING – I

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 Hrs

Note:
Question no. 1 is objective type fifteen sub parts covering all the four units. Eight more questions willbe set in the question paper i.e. two from each unit. The students will be required to attempt Questionno. 1 compulsorily and one question from each unit.

UNIT-I

Winding: Objectives, types of packages, types of winding machines, Basic features of a winding machine, uniform buildup of cones, Mechanical and electronic type yarn clearer. Yarn tensioners: Additive, multiplicative, combined and compensating type. Patterning: Reasons and remedies. Yarn fault classifying systems. Basic features of auto winders like Autoconer, Barbar column, Murata etc. Basic features of automatic winding machines, stop motions in winding machine, types of warp packages.

Pirn winding: Objectives, types of pirns, basic feature of pirn winding, yarn path on pirn winding machine, yarn traversing system, different automation and standard winding parameters.

UNIT-II

Warping: Objectives, classification of warping, beam warping, sectional warping, conditions for warping, comparison of beam warping with sectional warping, basic features of warping machine, beaming, head stock, relation between section height and cone angle, drum storage capacity, different types of creels, leasing systems.

Sizing: Objectives, Classification and features of sizing methods and sizing machines, stresses on warp yarn during weaving, sizing parameters-size concentration, size percentage, size add-on, features of conventional slasher sizing machine, sizing ingredients, size preparation. Starch, modification of starch, polyvinyl alcohol, carboxyl methyl cellulose, acrylics, binders, lubricants and other additives, sizing of spun yarns, sizing of filament yarn, principle of different non-conventional sizing techniques.

UNIT-III

Drawing in: Object of drawing in, importance, different types of heald wires, different types of dropwires, reed, reed count, drawing in order of plain weave, drawing in order of twill weave, drawing inorder of satin weave, automation in drawing in, knotting and gaiting.

Weaving: General loom elements, Classification of looms, Different motions of looms: Primary, secondary and auxiliary motions.

Shedding: Different types of shedding with advantage and disadvantages, geometry of shedding, heald reversing motion, shedding motion principles-open shed, closed shed, semi open shed, Loom timing diagram, early shedding, late shedding, split shedding or staggering of shed, asymmetric shedding, lease rods, back rest, effect of shed timing and back rest settings on properties of fabrics.

UNIT-IV

Picking: Types of conventional picking: over picking, under picking and parallel picking. Differenttype of picking accessories and their functions. Picking timing such as late picking and early picking,reasons of false picking and shuttle fly.

Beating: Function of beating. Kinematics of sley, sley eccentricity ratio, effects of sley eccentricityon beat up force and timing available for shuttle passage, accelerating force on sley, mechanics of beat up, bumping of loom, effect of yarn irregularity on pick spacing.

Calculations: Production, efficiency, Calculations related to winding, warping and sizing.

Suggested Text Books & References:

1. Talukdar, M.K., "An Introduction to Winding and Warping", Textile Trade Press, Mumbai.
2. Ajgaonkar, D.B., "Sizing, Materials, Methods and Machines", Textile Trade Press, Mumbai, 1982.
3. Banerjee, P.K., "Industrial Practices in Yarn Winding", NCUTE Publication, 1999.
4. Ramsbottom, "Warp Sizing Mechanisms", Columbia Press, Manchester, 1965.
5. Ormerod, A., "Modern Preparation and Weaving Machinery", Butterworths, 1983.
6. Aitken, Automatic Weaving, Columbia Press, Manchester, 1969.
7. Bennet, G.A., "An Introduction to Automatic Weaving", Columbia Press, Manchester, 1958.
8. Gorder, V and Volkov, P., "Cotton Weaving", Mir Publications, Moscow, 1987.
9. Sengupta, R., "Yarn Preparation Vol.-I & II", Mahajan Publishers, Ahmedabad, 1970.
10. Singh, R.B., "Modern Weaving Calculation", Vol-I Preparatory, Mahajan Book Distributor, Ahmedabad, 1994.
11. SITRA Report on Work Methods of Cone winder Tenters.
12. BTRA Report on Winding.
13. BTRA Report on Warping and sizing.
14. Lord and Mohamad, "Conversion of Yarn to Fabric".
15. Hougton, "Hand Book of Cotton Warp Sizing".

Programme Name	Bachelor of Technology (Textile Engineering)	Semester III
Course Title	Textile Chemical Processing– I	
Course Code	PCC-TEX-207A	
Purpose	To understand the principles of wet processing and dyeing of textile materials	
Course Outcomes	After completing this course students will able to: **CO1**. Explain the principles and mechanisms of singeing, desizing and scouring. **CO2**. Describe the various methods involved in bleaching, mercerisation and heat setting of textile materials **CO3**. Distinguish the various dye class and their application to different fibres types. **CO4**. Explain the working principles of various types of dyeing machineries. **CO5**. Understand the wet processing of protein fibers	
Prerequisite	Students should have knowledge of Applied Chemistry-I and Applied Chemistry II	

PCC-TEX-207A

TEXTILE CHEMICAL PROCESSING – I

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 Hrs

Note:
Question no. 1 is objective type fifteen sub parts covering all the four units. Eight more questions will be set in the question paper i.e. two from each unit. The students will be required to attempt Question no. 1 compulsorily and one question from each unit.

UNIT-I

Introduction: Sequence of chemical processing of textiles. Natural and added impurities in textiles.

Preparatory Processes:

Singeing: Objective, types of singeing, details of various singeing methods with advantages and disadvantages. Evaluation method. Singeing machines.

Desizing: Objective, types, method details and mechanism of removal of starch in various methods. Efficiency of desizing.

Scouring: Objectives, mechanism of removal of impurities, recipe and controlling parameters involved. Scouring of natural, manmade and blended textiles. Evaluation of scouring efficiency. J-Box and kier machines.

UNIT-II

Bleaching: Objectives of bleaching. Hypochlorite and Hydrogen peroxide bleaching methods and their mechanism of action. Controlling parameter involved. Efficiency of bleaching.

Mercerization: Objectives, mechanism related to various physical and chemical changes in cotton during mercerisation. Process parameters involved in each method. Assessment of efficiency of mercerization: Barium activity number, its determination and interpretation. Different types of mercerising machines.

Heat setting: Objectives and mechanism of heat setting. Different methods of heat setting and their effectiveness. Heat setting conditions and controls. Heat setting of polyester, nylon, acetate and their blends. Evaluation of degree of heat setting.

UNIT-III

Dyeing technology of natural and manmade textiles with Direct, Reactive, Vat, Insoluble Azoic, Sulphur, Solubilised vat, Acid, Metal-complex, Basic and Disperse dyes.

Dyeing machineries: Loose fibre, yarn and package dyeing machines. Jigger, winch, jet and HTHP beam dyeing m/cs. padding mangles.

UNIT-IV

Wool Processing: Brief idea about wool setting and milling.

Silk Processing: Brief idea about Degumming.

Suggested Text Books & References:

1. Shenai, V.A. "Technology of Textile Processing, Technology of Bleaching and Mercerising", Vol. 3, Sevak Publisher, Bombay, 1996.
2. Shenai, V.A., "Technology of Textile Processing, Chemistry of Textile Auxiliaries", Vol. 5, Sevak Publisher, Bombay, 1976.
3. Shenai, V.A., "Technology of Textile Processing, Chemistry of Dyes and Principles of dyeing", Vol. 2, Sevak Publisher, Bombay, 1977.
4. Koushik C.V and Jasico A. J., "Chemical Processing of Textile, Preparatory Process and Dyeing", NCUTE.
5. Marsh, J.T., "Mercerising", Chapman Publication, London, 1951.
6. Trotman, E.R., "Textile Technology and Dyeing of Textile Fibres", Griffin Publication, London, 1970.
7. Shenai, V. A., "Principle and practice of Dyeing", Sevak Publisher, Bombay.
8. Shenai, V.A., "Fundamentals of Principles of Textile Wet processing", Sevak Publisher, Bombay.
9. Datye, K.V. and Vaidya, A.A., "Chemical processing of Synthetic Fibres and Blends", Wiley Publication, New York, 1984.
10. Prayag. C.R. "Dyeing of silk and Manmade Fibre".
11. Prayag, C.R., "Bleaching, Mercerising and Dyeing of Cotton"
12. Chakraborty J. N, "Fundamentals and Practices in Colouration of Textiles", Woodhead Publishing India, 2009.
13. https://nptel.ac.in/courses/116102016/ (31 May, 2019)

Programme Name	Bachelor of Technology (Textile Engineering)	Semester III
Course Title	TEXTILE FIBRE – I LAB	
Course Code	PCC-TEX-209LA	
Purpose	Identification of textile fibres and their blends	
Course Outcomes	After completing this course student will be able to: **CO1**. Identify natural and synthetic fibres using physical and chemical test. **CO2**. Examine physical structure of natural and synthetic fibres. **CO3**. Analyse the fiber type and blend ratio of blended fabric.	
Prerequisite	Knowledge of basic fibre chemistry and morphological structure.	

PCC-TEX-209LA

TEXTILE FIBRE – I LAB

L T P
0 0 2

Practical/Viva 60 Marks
Sessional: 40 Marks
Total 100 Marks
Time: 2 Hrs.

At least 7 experiments are to be performed by each student.
List of Experiments:

Physical and Chemical identification of following textile fibre(s)

1. Identification of cotton
2. Identification of wool
3. Identification of silk
4. Identification of viscose
5. Identification of bast fibers
6. Identification of polyester
7. Identification of nylon
8. Identification of acrylic
9. Identification of polypropylene
10. Identification of physical structure of fiber by XRD, SEM, NMR
11. Identification of chemical structure of fiber by

Identification of fibers in blend and % of fiber content in blend

1. Analysis of P/C blended fabric
2. Analysis of P/V blended fabric
3. Analysis of P/W blended fabric
4. Analysis of W/C blended fabric
5. Analysis of N/W blended fabric
6. Analysis of L/C blended fabric
7. Analysis of L/S blended fabric
8. Analysis of P/W blended fabric
9. Analysis of W/A blended fabric
10. Analysis of S/W blended fabric
11. Analysis of C/V blended fabric

Note: The above experiment should be conducted and shall be decided on factors like:

1. Facilities installed at Institute
2. Accessibility to industry & nearby institute like IIT Delhi, NITRA Ghaziabad, Textile Committee and NITRA Panipat.

3. Trend of technological developments in National & International perspective

Programme Name	Bachelor of Technology (Textile Engineering)	Semester III
Course Title	YARN MANUFACTURING – I LAB	
Course Code	PCC-TEX-211LA	
Purpose	- To provide practical knowledge on the mechanical processes involved in preparation of raw materials before twisting for short staple spinning.	
Course Outcomes	After completing this course, students will be able to: **CO1**. Understand practical aspects of mixing and blending of fibres. **CO2.** Demonstrate the construction and function of different components of blow-room. **CO3**. Understand the working, settings and draft distribution in different zone of carding. **CO4**. Get hands-on experience of the construction and settings of draw-frame machine.	
Prerequisite	Students should be convergent with basic operations of spinning industry.	

PCC-TEX-211LA

YARN MANUFACTURING – I LAB

L T P
0 0 2

Practical/Viva: 60 Marks
Sessional: 40 Marks
Total: 100 Marks
Time: 2 Hrs.

At least 7 experiments are to be performed by each student.

List of Experiments:

Mixing

1. To study the different techniques of Mixing and Blending.
2. To study the application of spin finish and antistatic agents during mixing.

Opening & Cleaning

3. Study of general outline of opener and clearer machine employed in a modern Blowroom line.
4. Calculation of speeds of different machine parts for Cotton and Synthetic fibres, Blow/inch of Kirschner beater, Production calculation of blow room. Carding
5. To illustrate the working principle of carding machine.
6. To study the change places and speed of different parts of a carding machine for Cotton and Synthetic fibres.
7. Calculation of the speed, individual draft & total draft and production of carding machine.

Draw frame

8. To study the working principle and important settings of draw frame machine.
9. Calculation of the total draft and its distribution in draw frame machine.
10. Study of drafting arrangement and top roller weighting system of draw frame machine.

Note: The above experiment should be conducted and shall be decided on factors like:

1. Facilities installed at Institute
2. Accessibility to industry & nearby institute like IIT Delhi, NITRA Ghaziabad, Textile Committee and NITRA Panipat.
3. Trend of technological developments in National & International perspective.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester III
Course Title	FABRIC MANUFACTURING – I Lab	
Course Code	PCC-TEX-213LA	
Course Purpose	- To provide practical knowledge on the mechanical processes involved in weaving preparatory. - To study various mechanism associated with weaving machine.	
Course Outcomes	After completing this course, students will be able to: **CO1**. Demonstrate the working principle of winding and warping machines **CO2**. Explain the passage and working of sizing machines **CO3**. Outline the basic loom mechanism especially primary motions	
Prerequisite	Knowledge of fundamentals of yarn preparation for weaving.	

PCC-TEX-213LA

FABRIC MANUFACTURING-I LAB

L T P
0 0 2

Practical/Viva: 60 Marks
Sessional: 40 Marks
Total: 100 Marks
Time: 2 Hrs.

At least 7 experiments are to be performed by each student.

List of Experiments:

1. To study the motion transmission system in winding machine.
2. To study the package stop motion in cone winding machine.
3. Study of precision winding machine.
4. Study of the direct warping machine.
5. Study of the sectional warping machine.
6. To study the passage of yarn on a sizing machine and the features of various parts/ mechanism of the sizing machine.
7. To Study the basic loom mechanism.
8. Study of shedding mechanism.
9. Study of picking mechanism.
10. Study of Beating up mechanism.

Note: The above experiment should be conducted and shall be decided on factors like:

1. Facilities installed at Institute
2. Accessibility to industry & nearby institute like IIT Delhi, NITRA Gaziabad, Textile Committee and NITRA Panipat.
3. Trend of technological developments in National & International perspective.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester III
Course Title	Textile Chemical Processing –I Lab	
Course Code	PCC-TEX-215LA	
Purpose	To make the students understand about practical methods followed inpretreatment and dyeing of textile substrates.	
Course Outcomes	After completing this course, the students will be to: **CO1**. Perform the pretreatment of grey fabric. **CO2**. Get hands on experience in dyeing of natural fibres with reactive, direct and acid dyes.	
Prerequisite	Basic knowledge of Textile Chemical Processing I and Textile Fibre	

PCC-TEX-215LA

TEXTILE CHEMICAL PROCESSING-I LAB

L T P
0 0 2

Practical/Viva: 60 Marks
Sessional: 40 Marks
Total: 100 Marks
Time: 2 Hrs.

At least 7 experiments are to be performed by each student.

List of Experiments:

1. Desizing of cotton fabric using various types of desizing agents.
2. Scouring of Natural fibre in the form of yarn and fabric and find the scouring loss.
3. Scouring of Polyester/ Cotton /Blends and Wool.
4. Degumming of Silk and calculation of weight loss percentage.
5. Bleaching of Natural fibre namely Cotton, jute with
   (a) Hypo-chloride Bleaching
   (b) Peroxide Bleaching
6. Bleaching of Polyester /Cotton Blend.
7. Determination of transmittance, absorbance, and concentration of given dye liquor by visible spectrophotometer.
8. Dyeing of cotton yarn with direct dyes, reactive dyes and basic dyes
9. Dyeing of wool with direct dyes, basic dyes, and acid dyes.
10. Understand the color difference in AATCC grey scale (1-5) between standard and batches
    (I) Manually with the comparison of grey scale, and
    (II) By computer color matching machine and interpretation of color spectrograph
11. To conduct practical as per latest technology/material.

Note: The above experiment should be conducted and shall be decided on factors like:

1. Facilities installed at Institute
2. Accessibility to industry & nearby institute like IIT Delhi, NITRA Ghaziabad, Textile Committee and NITRA Panipat.
3. Trend of technological developments in National & International perspective.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester III
Course Title	Environmental Sciences	
Course Code	MC-901A	
Purpose	To learn the multidisciplinary nature, scope and importance of Environmental sciences.	
Course Outcomes	After completing this course, the students will be able to: **CO1**. learn the importance of natural resources. **CO2**. learn the theoretical and practical aspects of eco system. **CO3**. learn the basic concepts of conservation of biodiversity. **CO4**. understand the basic concept of sustainable development.	
Prerequisite	Basic knowledge of History and Environment	

MC-901A

ENVIRONMENTAL SCIENCES

L T P
3 0 0

Sessional: 00 Marks
Exam: 100 Marks
Total: 100 Marks
Time: 3 Hrs

UNIT I

The multidisciplinary nature of environmental studies, Definition, Scope and Importance, Need for public awareness, Natural Resources: Renewable and Non-Renewable Resources: Natural resources and associated problems.

(a) Forest Resources: Use and over-exploitation, deforestation, case studies. Timber eztraction, mining, dams and their effects on forests and tribal people.
(b) Water Resources: Use & over-utilization of surface & ground water, floods, drought, conflicts over water, dams-benefits and problems.
(c) Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
(d) Food Resources: World Food Problems, changes caused by agriculture and overgazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
(e) Energy Resources: Growing energy needs, renewable & non-renewable energy sources, use of alternate energy sources. Case studies.
(f) Land Resources: Land as a resource, land, degradation, man induced landslides, soil erosion and desertification.

Role of an individual in conservation of natural resources, Equitable use of resources for sustainable lifestyle.

UNIT II

Ecosystem-Concept of an ecosystem. Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological Succession, Food Chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: (a) Forest Ecosystem, (b) Grassland Ecosystem, (c) Desert Ecosystem and (d) Aquatic Ecosystems (ponds, streams, lakes, rivers, oceans, estuaries

Field Work: Visit to a local area to document Environment assets-river/forest/grassland/hill/mountain, Visit to a local polluted site-Urban /Rural Industrial/Agricultural, Study of common plants, insects and birds, Study of simple ecosystems-pond, river, hill, slopes etc. (Field work equal to 5 lecture hours).

UNIT III

Biodiversity and its conservation: Introduction, Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity of global, National and local levels. India as a mega-diversity nation Hot spot of Biodiversity, Threats to biodiversity: Habitat loss, poaching of wild life, man-wildlife conflicts, Endangered and endemic species of India, Conservation of Biodiversity- In situ and Ex-Situ conservation of biodiversity.

Environmental Pollution Definition: Cause, effects and control measures of (a) Air Pollution (b) Water Pollution (c) Soil Pollution (d) Marine Pollution (e) Noise Pollution (f) Thermal Pollution (g) Nuclear Hazards
Solid waste management- cause, effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution, Pollution case studies, Disaster management: floods, earthquake, cyclone and landslides

UNIT IV

Social Issues and the Environment. From unsustainable to sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people: Its problems and concerns, Case Studies: Environmental ethics-issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies: Wasteland Reclamation, Consumerism and waste products, Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public Awareness, Human population and the Environment, Population growth, variation among nations, Population Explosion-Family Welfare Programme, Environment and human health. Human rights, Value Education, HIV/AIDS, Women and Child Welfare, Role of Information Technology in Environment and Human Health, Case Studies, Drugs and their effects; Useful and harmful drugs, Use and abuse of drugs, Stimulant and depression drugs, Concept of drug de-addiction, Legal position on drugs and laws related to drugs.

Suggested Books

- Environmental Studies- Deswal and Deswal. Dhanpat Rai and Co.
- Environmental Science and Engineering Anandan, P. and Kumaravelan, R. 2009. SciTech Publications (India) Pvt. Ltd., India.
- Environmental Studies. Daniels Ranjit R. J. and Krishnaswamy. 2013. Wiley India.
- Environmental Science- Botkin and Keller. 2012. Wiley, India

Note: The Examiner will be given the question paper template to set the question paper.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester IV
Course Title	**Entrepreneurial and Industrial Engineering**	
Course code	**HSMC–TEX–216A**	
Purpose	1. To acquaint the students with principles of management, Entrepreneurship and Entrepreneurial Skills; 2. To make the students understand the concepts of Industrial Engineering	
Course Outcomes	After completing this course, the students will be able to: **CO1**. take the right decision to optimize resource utilization by improving productivity of Materials, Machines, Money, Methods, Manpower and Management effectively; **CO2**. find alternative best productive methods reducing time, improving human efficiency and minimizing waste; **CO3**. understand the functions and applications of Industrial Engineering	
Prerequisite	Basic concepts of Social Sciences	

HSMC–TEX–216A

Entrepreneurial and Industrial Engineering

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 Hrs

Note: *Examiner will set nine questions in total. Question one having objective type questions will be compulsory covering all the units. The remaining eight questions of 15 marks each will be set by taking two questions from each unit. The students will have to attempt five questions in total, first being compulsory and selecting one from each Unit.*

UNIT-I

Entrepreneurship: Meaning and concept, role of entrepreneurship in economic development & new economic reforms, Entrepreneurial Skills, decision process, Factors influencing entrepreneurship; Business Opportunity Identification; Preparing a Business Plan and project reports, Significance, components and feasibility studies of business plans/project reports, Importance of new venture financing, sources of financing

UNIT-II

Industrial Parks (Meaning, features with examples); Special Economic Zone (Meaning, features with examples); Financial institutions and agencies, MSME, Small Scale Industries, Introduction to SIDBI, IDBI, IFCI and various Government agencies like NABARD etc, Carry on Business (COB) license, Environmental Clearance, Introduction to various industrial hazards like fire, mechanical and electrical etc, Introduction to safety rules for prevention of accidents, National Small Industries Corporation Rules and regulations for exemption from income tax, excise clearance etc., Claiming of draw back in export business.

UNIT-III

Productivity – importance, concepts and measurements, Work study, Method study, micro -motion study, Production planning and control- Importance of planning - job, batch and mass production- Introduction and need for a new product, Functions of production control at macro and micro levels - Routing, Scheduling, dispatching and follow up etc. Ergonomics and its importance

UNIT-IV

Introduction to Industrial Engineering - Evolution of modern Concepts in Industrial Engineering - Functions of Industrial Engineering, application of Industrial Engineering. Facility location factors and evaluation of alternate locations, Types of plant layout and their evaluation, Assembly line balancing, Materials handling systems, Inventory Control, inventory control techniques. Job evaluation, merit rating, incentive schemes, and wage administration, Quality control and Inspection.

Suggested Text Books & References

1) Cliffon, Davis S & Fyfie, David E, “Project Feasibility Analysis” Wiley, 1977
2) A N Desai, “Environment & Entrepreneur” APH Publishing Corporation, 2009
3) P F Drucker, “Planning a Small-Scale Industry: A Guide to Entrepreneurs” HarperCollins, 2006
4) R Jain, “Developing Entrepreneurship-A Handbook Learning System”, Learning Systems, 1978
5) Pareek, Udai and Venkateswara Rao, “Motion and Time study,” Oxford and IBH Publishing, 2015
6) Ralph M Barnes, “Engineered work Measurement” Wiley India Pvt. Limited, 2009
7) Weldon, ELBS, Marvin E Mundel, Work Study and Ergonomics
8) ILO Ralph & Barnes, Work Study
9) S Dalela and Sourabh, Introduction to Work Study

Programme Name	Bachelor of Technology (Textile Engineering)	Semester IV
Course Title	YARN MANUFACTURING-II	
Course Code	PCC-TEX-204A	
Purpose	- To study the principle involved in combing, speed frame and ring frame operation. - To study the function, working, construction and passage of materials through doubling machines.	
Course Outcomes	After completing this course, students will be able to: **CO1**. Understand the combing process and comber settings **CO2**. Illustrate the function of different components and working principle of speed frame, ring frame and doubling machines. **CO3**. Interpret the mechanism of package formation and building motion in speed frame and ring frame. **CO4**. Solve the numerical problems associated with comber, speed frame, ring frame and doubling machines.	
Prerequisite	Fundamentals of yarn manufacturing process sequence.	

PCC-TEX-204A

YARN MANUFACTURING-II

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total 100 Marks
Time: 3 Hrs.

Note:
Question no. 1 is objective type fifteen subparts covering all the four units. Eight more questions willbe set in the question paper i.e. two from each unit. The students will be required to attempt Question no. 1 compulsorily and one question from each unit.

UNIT-I

Combing

Objective, Different combing preparatory process for lap preparation – Sliver lap, Ribbon lap and Unilap machine, Different types of combers, Combing cycle of rectilinear cotton comber, Timing diagram for combing operation, Configuration of fibre feed and its effect on quality of product, noil percentage and fractionation efficiency of comber, Influence of type of feed on noil extraction and cleanliness of sliver, Calculation pertaining to draft, production and noil percentage.

UNIT-II

Speed frame

Objective, Working principle of speed frame, Construction and working of important parts, Mechanism of drafting, twisting and winding, Basic principle of designing of cone drum, Differential motions & Building motions, Common defects in roving packages, their causes and remedies, Processing of man-made fibres on speed frame, Recent development in speed frame. Calculations pertaining to draft, TPI and production, twist multiplier and roving twist.

UNIT-III

Ring frame

Objective, Principle and mechanism involved in drafting, twisting and winding, Ordinary and high draft systems, Rising and falling lappets, balloon control rings, Design and types of spindle, ring and traveler, Concept of twist multiplier and yarn contraction due to twisting, types of builds, Mechanism of package formation, Causes and remedies to control end breaks, Recent developments in ring frame, Concept of average mill count and 20's conversion.

UNIT-IV

Doubling

Objective and terminology, Requirement of feed package for yarn plying, Systems of doubling (dry &wet) study of ring doublers, Two for one twister (TFO)- objective & working principle, Calculation of draft, TPI and production of ring frame & doubling frame.

Suggested Text Books and References:

1. Klein, W., "Manual of Textile Technology: Vol. I. Technology of Short Staple Spinning", – Textile Institute, Manchester, 1998.
2. Klein, W., "Manual of Textile Technology: Vol. III. A practical Guide to Combing & Drawing", – Textile Institute, Manchester, 1995.
3. Klein, W., "Manual of Textile Technology: Vol. IV. A practical Guide to Ring Spinning", – Textile Institute, Manchester, 1995.
4. Klein, W., "Manual of Textile Technology: Vol. VI. Manmade Fibres and their Processing", – Textile Institute, Manchester, 1994.
5. Salhotra K R, "Spinning of Man-Made Fibres and Blends on Cotton Spinning System", The Textile Association, Mumbai, 1989.
6. Salhotra, K.R., Alagirusamy, R. and Chattopadhyay R. (Eds.), "Course Material of Pilot Programme on Spinning: Ring Spinning, Doubling and Twisting", NCUTE Publication, 2000.
7. Chattopadhyay, R., and Rengasamy (Eds.), "Course Pilot Programme on Spinning: Drawing Combing and Roving", NCUTE Publication, 1999.
8. Oxtoby, E. "Spun Yarn Technology". Butterworths, London.
9. Khare A R, "Elements of Combing", Sai book center, Mumbai, 1999.
10. Khare A R "Elements of Ring Frame and Doubling", Sai book Centre, Mumbai, 1999.
11. Lawrence C A, "Fundamental of Spun Yarn Technology" CRC Press, USA, 2003.
12. Booth J E, "Textile Mathematics", Part II, Textile Institute, Manchester, 1978.
13. https://nptel.ac.in/courses/116102038/ (31st May, 2019)

Programme Name	Bachelor of Technology (Textile Engineering)	Semester IV
Course Title	FABRIC MANUFACTURING – II	
Course Code	PCC-TEX-206A	
Purpose	- To study the secondary and auxiliary motions of weaving machines - To study various shedding devices in weaving operation	
Course Outcomes	After completing this course, students will be able to: **CO1**. Explain secondary and auxiliary motions of weaving machine **CO2**. Elaborate the principle involved in shedding (dobby and jacquard) **CO3**. Construct weave designs on dobby and jacquard looms. **CO4**. Calculate production and efficiency of weaving machinery.	
Prerequisite	Students must have completed course Fabric Manufacturing – I Brief knowledge of machine drawing and basic mathematics.	

PCC-TEX-206A

FABRIC MANUFACTURING-II

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 Hrs.

Note:
Question no. 1 is objective type fifteen subparts covering all the four units. Eight more questions will be set in the question paper i.e. two from each unit. The students will be required to attempt Question no. 1 compulsorily and one question from each unit.

UNIT-I

Secondary motion

Take up motion: Negative take up, positive take up, five wheel take up motion, seven wheel take up motion, electronic take up.
Let Off Motion: Objective, negative let off motion, positive let off motion- basic requirements, tension control mechanism, electrical let off motion, warp tension variation.

UNIT-II

Auxiliary motion: Objective, classification.

Weft Stop motion: objective, side weft fork motion, center weft fork motion.

Warp Stop motion: objective, mechanical warp stop motion, electrical warp stop motion.

Warp Protecting motion: objective, loose reed warp protecting motion, fast reed warp protecting motion, electromagnetic warp protecting motion.

Weft mixing motion, Multiple box motion, 4×1 drop box motion, preparation of pattern cards, pick at will motion.

UNIT-III

Automatic looms: basic features, advantages over plain looms, classification of automatic looms, weft feeling mechanism, mechanical weft feeler, electronic weft feeler, optical weft feeler, pirn changing mechanism, shuttle changing mechanism, bobbin loader mechanism.

Dobby Shedding: Main parts of dobby loom, types of Dobby, negative dobby, single, double lift single jack dobby, double lift double jack dobby, design and peg plan for dobbies, positive dobby, electronic dobby, types of shed formed in dobby

UNIT-IV

Jacquard Shedding: Principle parts of jacquard machine, types of jacquard, types of shed formed in jacquard, single lift single cylinder jacquard, double lift single cylinder jacquard, double lift double cylinder jacquard, harness building, harness ties, design ties, card cutting, card lacing

Calculations: Production, efficiency, Calculations related to weaving.

Suggested Text Books & References

1. Marks and Robinson, "Principles of Weaving". Textile Institute, Manchester, 1986.
2. Thomas fox, "Mechanism of Weaving", Bombay Universal Publishing Co, 1993.
3. Lord and Mohamad, "Conversion of Yarn to Fabric", Merrow Publishing Co. Ltd, England, 1988.
4. Aswani, K. T., "Plain Weaving Mechanism", Mahajan Publishers, Ahmedabad, 1996.
5. Aswani, K.T., "Fancy Weaving Mechanism", Mahajan Publisher, Ahmedabad, 1990.
6. Sengupta, R., "Weaving Calculations", Taraporwala Sons, Bombay 1990.
7. Banerjee, N. N., "Weaving Mechanism Vol,-I & Vol .II", West Bengal, 1994.
8. Rai, Hasmukh, "Fabric Forming", S.S.M. Institute, Kuomarapalyam Tamil Nadu, 1996.
9. Talukdar, M. K., "Modern Weaving Technology", NICTAS, Ahmedabad, 1998.
10. Rapier Looms, WIRA Research & Technical Service Manual for industry.
11. Khatwani, P.A., "Weaving I Shuttle looms", NCUTE Publication, 1999.
12. Khatwani, P. A., "Weaving II Shuttleless Looms" NCUTE Publication, 1999.
13. Khatwani, P. A. "Filament Weaving", NCUTE Publication, 2000.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester IV
Course Title	Textile Chemical Processing– II	
Course Code	PCC-TEX-208A	
Purpose	-To understand about the principles of dyeing, printing and finishing -Ecofriendly wet processing of textile materials.	
Course Outcomes	After completing this course students will able to: **CO1.** Understand various styles and methods of printing for textile materials. **CO2**. Explain the working principles of textile printing machines. **CO3**. Interpret the mechanisms of various chemical and mechanical finishes of textile materials. **CO4**. Understand latest developments in textile wet processing. **CO5**. Summarise pollution control measures in wet processing of textile materials. **CO6**. Identify of testing methods for colour fastness of textile materials	
Prerequisite	Students must have completed course Textile Chemical Processing-I	

PCC-TEX-208A

TEXTILE CHEMICAL PROCESSING - II

L T P
3 1 0

Sessional: 25 marks
Exam: 75 marks
Total: 100 marks
Time: 3Hrs

Note:
Question no. 1 is objective type fifteen subparts covering all the four units. Eight more questions will be set in the question paper i.e. two from each unit. The students will be required to attempt Question no. 1 compulsorily and one question from each unit.

UNIT-1

Printing: Introduction to printing methods block, screen and roller printing. Advantages and disadvantages of each method. Various styles of printing like Direct, Discharge and Resist styles on natural, man-made and blended textiles. Ingredients of print paste with their details. Classification and mechanism of working of thickeners.

Transfer Printing: Types, mechanism of transfer printing and machineries.
Pigment Printing: Mechanism and recipe details of pigment printing.

UNIT-II

Finishing:

Mechanical Finishes: Calendaring – its types, construction and function of various calendaring m/cs. Sanforizing – method, mechanism and machineries involved. Sueding /raising, Napping and Shearing finishes, Foam finishing technology.

Chemical Finishes: Problem of creasing, anti-crease finish on cotton. Drawback and advantages associated with use of various anti-crease chemicals. Water repellency and water repellent finishes on cotton. Evaluation of water repellency. Flame proofing and its evaluation. Softeners and their application. Silk Finishing: Weighting of silk and Scroop finish.

UNIT-III

Developments in preparatory and dyeing: Continuous pre-treatment and Continuous dyeing. Mass coloration principle, technology and different methods, Tie and dye, Batik printing.

UNIT-IV

Ecofriendly processing and Effluent generated from textile processing and its treatment.

Fastness properties: Light fastness, rubbing fastness, Sublimation fastness, Perspiration fastness, washing fastness properties evaluation.

Suggested Text Books and References

1. Shenai, V.A., "Technology of Textile Processing Vol. 2,3,4,6, and 10", Sevak Publisher, Bombay.
2. Koushik C.V and Jasico A. J., Chemical Processing of Textile, Preparatory Process and Dyeing, NCUTE.
3. R.S. Prayag, "Technology of Textile Printing", Shree J. Printers, 1999.
4. Marsh, J.T., "An Introduction to Textile Finishing", Chapman Publication, London, 1948.
5. Trotman, E.R. "Textile Technology and Dyeing of Textile Fibres". Griffin Publication, London, 1970.
6. Shenai, V.A. "Principle and Practice of Dyeing", Sevak Publisher, Bombay.
7. Datye, K.V. and Vaidya, A.A., "Chemical Processing of Synthetic Fibres and Blends", Wiley Publication, New York
8. Prayag, C.R., "Bleaching, Mercerising and Dyeing of Cotton", Dharwar, Karnataka, India, 1990.
9. Vankar, Padma, "Textile Effluents", NCUTE Publication, 2001.
10. Prayag R.S, "Textile Finishing'', 1994.
11. V.A. Shenai, "Technology of Finishing", Sevak Publication, 1996.
12. V. A Shenai, "Technology of Printing", Sevak Publications, Mumbai, 1990.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester IV
Course Title	YARN MANUFACTURING-II LAB	
Course Code	PCC-TEX-210LA	
Purpose	- To provide hands-on experience in working of comber, speed frame, ring frame and doubling machine.	
Course Outcomes	After completing this course, students will be able to: **CO1**. Demonstrate working of the lap preparation machines. **CO2**. Describe the passage of material through comber. **CO3**. Illustrate flow of material, building mechanism and differential motion in speed frame. **CO4**. Explain the passage of material in ring frame and doubling machines.	
Prerequisite	Student must have knowledge of Yarn Manufacturing-I	

PCC-TEX-210LA

YARN MANUFACTURING-II LAB

L T P
0 0 2

Practical/Viva 60 Marks
Sessional: 40 Marks
Total 100 Marks
Time: 2 Hrs.

At least 7 experiments are to be performed by each student.

List of Experiments:

Combing

1. To the study the different methods of lap formation in combing preparatory.
2. To study the combing cycle of a rectilinear cotton comber.

Speed frame

3. To study the drafting, twisting and winding zone of speed frame.
4. To study the building motion in speed frame.
5. Calculation of break draft constant, draft constant and twist constant and production of speed frame.

Ring frame

6. To demonstrate the working principle of a ring-frame.
7. To study the different components of drafting system and twisting system.
8. Calculation pertaining to gearing, speed, constant, draft and production.

Doubling

9. To show the passage of yarn in doubling machine and demonstrate the working principle.

Note: The above experiment should be conducted and shall be decided on factors like:

1 Facilities installed at Institute
2 Accessibility to industry & nearby institute like IIT Delhi, NITRA Gaziabad, Textile Committee and NITRA Panipat.
3 Trend of technological developments in National & International perspective.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester IV
Course Title	FABRIC MANUFACTURING – II Lab	
Course Code	PCC-TEX-212LA	
Course Purpose	- To provide practical knowledge on secondary and auxiliary motions of weaving machines - To get practical information about shedding devices i.e. dobby and Jacquards	
Course Outcomes	After completing this course, students will be able to: **CO1**. Explain the working of take up and let off motions **CO2**. Demonstrate the functioning of stop motions, protecting motions and pirn changing motions. **CO3**. Demonstrate the working of dobby and jacquards and construct designs on the same.	
Prerequisite	Knowledge of fundamentals of weaving.	

PCC-TEX-212LA
FABRIC MANUFACTURING-II LAB

L T P
0 0 2

Practical/Viva 60 Marks
Sessional: 40 Marks
Total: 100 Marks
Time: 3 Hrs.

At least 7 experiments are to be performed by each student.

List of Experiments:

1. Study of take up motion.
2. Study of negative let-off system
3. Study of positive let-off system.
4. Study of Warp protection motion (both loose reed and fast reed).
5. Study of warp stop motion.
6. Study of weft stop motion.
7. Study of pirn changing mechanism.
8. Study of multiple box motion.
9. Study of dobby mechanism.
10. Study of jacquard mechanism.

Note: The above experiment should be conducted and shall be decided on factors like:

a) Facilities installed at Institute

b) Accessibility to industry & nearby institute like IIT Delhi, NITRA Gaziabad, Textile Committee and NITRA Panipat.

c) Trend of technological developments in National & International perspective.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester IV
Course Title	FABRIC MANUFACTURING – II Lab	
Course Code	PCC-TEX-212LA	
Course Purpose	- To provide practical knowledge on secondary and auxiliary motions of weaving machines - To get practical information about shedding devices i.e. dobby and Jacquards	
Course Outcomes	After completing this course, students will be able to: **CO1** – Explain the working of take up and let off motions **CO2**–Demonstrate the functioning of stop motions, protecting motions and pirn changing motions. **CO3**–Demonstrate the working of dobby and jacquards and construct designs on the same.	
Prerequisite	Knowledge of fundamentals of weaving.	

PCC-TEX-212LA

FABRIC MANUFACTURING-II LAB

L T P
0 0 2

Practical/Viva: 60 Marks
Sessional: 40 Marks
Total: 100 Marks
Time: 3 Hrs.

At least 7 experiments are to be performed by each student.

List of Experiments:

1. Study of take up motion.
2. Study of negative let-off system
3. Study of positive let-off system.
4. Study of Warp protection motion (both loose reed and fast reed).
5. Study of warp stop motion.
6. Study of weft stop motion.
7. Study of pirn changing mechanism.
8. Study of multiple box motion.
9. Study of dobby mechanism.
10. Study of jacquard mechanism.

Note: The above experiment should be conducted and shall be decided on factors like:

d) Facilities installed at Institute

e) Accessibility to industry & nearby institute like IIT Delhi, NITRA Gaziabad, Textile Committee and NITRA Panipat.

f) Trend of technological developments in National & International perspective.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester IV
Course Title	Textile Chemical Processing II Lab	
Course Code	PCC-TEX-214LA	
Purpose	To make the students understand about practical methods involved in dyeing and printing.	
Course Outcomes	After completing this course students will able to: **CO1**. Get hands on experience in dye affinity of vat and sulphur dyes for cotton fabric. **CO2**. Experiment with affinity of disperse dye for polyester fabric using HTHP machine. **CO3**. Demonstrate different styles and methods of printing. **CO4**. Analyse fastness tests on dyed and printed substrates.	
Prerequisite	Students should have knowledge of Textile Chemical Processing-I, Textile Chemical Processing-II and Textile Fibres	

PCC-TEX-214LA

TEXTILE CHEMICAL PROCESSING-II LAB

L T P
0 0 2

Practical/Viva: 60 Marks
Sessional: 40 Marks
Total: 100 Marks
Time: 3 Hrs.

At least 7 experiments are to be performed by each student.

List of Experiments:

1. Conduct practical on Conventional and latest machines (Preparatory / dyeing / Finishing).
2. Conduct practical on Recent developed methods of dyeing using different type of dyes
    (a) Natural
    (b) Synthetic
    (c) Blends
3. Dyeing of cotton yarn with vat, reactive and sulphur in a sample pot dyeing machine.
4. Dyeing of cotton fabric with vat, reactive and sulphur dyes in laboratory jigger machine.
5. Calibration of dyeing and recipe prediction with the help of CCM.
6. Study of fastness to washing and rubbing with the help of CCM.
7. Reproduction of shade with the aid of computer as well as visual methods.
8. Printing with kerosene and synthetic based thickeners. Evaluate the printing with qualitative and quantitative methods on different materials.
9. Conduct practical with transfer printing technique on different materials.
10. Quantitative analysis of different textile blends in fibre, yarn and fabric form.

Note: The above experiment should be conducted and shall be decided on factors like:

1. Facilities installed at Institute
2. Accessibility to industry & nearby institute like IIT Delhi, NITRA Ghaziabad, Textile Committee and NITRA Panipat.
3. Trend of technological developments in National & International perspective.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester IV
Course Title	Constitution of India	
Course Code	MC-902A	
Purpose	To know the basic features of Constitution of India.	
Course Outcomes	After completing this course students will able to know about: **CO1**: salient features of the Constitution of India. **CO2**: fundamental duties and federal structure of Constitution of India. **CO3**: emergency provisions in Constitution of India. **CO4**: fundamental rights under constitution of India.	
Prerequisite	Students should have knowledge of Basic history	

MC-902A

CONSTITUTION OF INDIA

L T P
3 0 0

Sessional: 00 Marks
Exam: 100 Marks
Total: 100 Marks
Time: 3 Hrs.

UNIT-I

Meaning of the constitution law and constitutionalism, Historical perspective of the Constitution of India. Salient features and characteristics of the Constitution of India.

Scheme of the fundamental rights

UNIT -II

The scheme of the Fundamental Duties and its legal status. The Directive Principles of State Policy – Its importance and implementation. Federal structure and distribution of legislative and financial powers between the Union and the States.

Parliamentary Form of Government in India – The constitution powers and status of the President of India

UNIT - III

Amendment of the Constitutional Powers and Procedure. The historical perspectives of the constitutional amendments in India.

Emergency Provisions: National Emergency, President Rule, Financial Emergency. Local Self Government – Constitutional Scheme in India.

UNIT-IV

Scheme of the Fundamental Right to Equality. Scheme of the Fundamental Right to certain Freedom under Article19.

Scope of the Right to Life and Personal Liberty under Article 21.

Text Books

1. Constitution of India. Prof. Narender Kumar (2008) 8th edition. Allahabad Law Agency**.**

Reference Books:

1. The constitution of India. P.M. Bakshi (2016) 15th Edition. Universal law Publishing.

Note: The paper setter will set the paper as per the question paper templates provided.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester V
Course Title	TEXTILE TESTING - I	
Course Code	PCC-TEX-301A	
Purpose	To study the principles of physical and mechanical testing of fiber and yarn	
Course Outcomes	After completing this course student will be able to: **CO1**. Classify different sampling methods used for textile testing. **CO2**. Define moisture and its impacts on textile material. **CO3**. Illustrate various methods used for testing of physical properties of fibres. **CO4**. Describe various methods used for testing of properties of yarns. **CO5**. Identify different methods used for testing of yarn tensile properties.	
Prerequisite	Knowledge of Fabric Physical and mechanical properties.	

PCC-TEX-301A

TEXTILE TESTING - I

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs.

Note: *Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question no. 1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.*

Unit-I

Sampling Methods and Moisture Calculation

Introduction of textile testing, Reason for Testing, standardization of testing, sampling, sampling techniques, square, cut square, zoning technique, Routine sampling techniques used in the textile industry

Moisture: - effect of moisture or physical properties regain and content, correct invoice weight, Atmospheric conditions for testing, Control of testing room atmosphere, moisture regain & moisture content, importance of moisture in textiles, measurement of moisture regain & content, effect of moisture on properties (physical & mechanical) of textile material, factors affecting the regain, Shirley moisture meter.

Unit-II

Cotton Fibre Testing

Fibre Dimension: fibre fineness, fineness measurement, fibre length, method of measurement: direct method high volume instrument, advance fibre information system Grading of cotton fibre with respect to staple length, laboratory measurement of fibre length, span length, Baer sorter, servo fibro graph, maturity coefficient measurement by NaOH method, fibre fineness by airflow meter. Fibre bundle strength by Pressley, Stelometer, determination of trash content: Shirley trash analyzer.

Fibre quality index, salient features of HVI, AFIS, Nep count. Wrapping test for lap, sliver and roving.

Unit-III

Yarn Evenness Testing

Yarn testing, linear density, yarn numbering systems, conversion methods, and measurement of yarn numb-r.

Twist, classification of twist, twist measurement, Twist, Measurement of twist in continuous filament spun and plied yarns.

Evenness testing of yarns. Nature and causes of irregularities, principles and methods of evenness testing: evaluation and interpretation of evenness measurements. Measurement of sliver and yarn unevenness, Capacitive and optical principle of measuring unevenness, salient features of Uster evenness tester, yarn imperfections and classimat yarn faults.

Unit-IV

Yarn Tensile Testing

Strength and elongation test, Definition, force-elongation curve, Factor affecting tensile testing, Fibre strength and Yarn strength.

Various terms related to tensile testing, stress-strain curve, various methods for finding the yield point, Application of tensile force by CRL, CRE and CRT method, various principles (pendulum lever, balance principle, inclined plane, strain gauge principle, etc.) to apply tensile load on textile specimen.

Yarn testing machines- Single yarn strength tester, Uster, Instron testing machine, lea strength testing.

Hairiness: Determination of yarn hairiness.

Suggested Text Books & References:

1. Booth, J.E., "Principles of Textile Testing", Butterworths, London
2. Kothari, V. K., "Quality Control and Testing Management", IAFL Publishers, New Delhi
3. Slater,"Textile Progress–Physical Testing and Quality Control", Textile Institute, Manchester
4. "Handbook of Methods of Tests for Cotton Fibres, Yarns and Fabrics", CTRL, Bombay
5. "Cotton Assessment and Appreciation", SITRA Report, Coimbatore.
6. Savile, B.P.," Physical testing of textiles"
7. Grover, E. and Hamby, D.S., "Handbook of Textile Testing and Quality Control", Wiley Eastern, New Delhi, 1969

Programme Name	Bachelor of Technology (Textile Engineering)	Semester V
Course Title	YARN MANUFACTURING-III	
Course Code	PCC-TEX-303A	
Purpose	-To study the unconventional spinning techniques	
Course Outcomes	After completing this course, students will be able to: **CO1**. Interpret mechanism of yarn formation in open end spinning systems. **CO2**. Understand the false twist principle in air-jet spinning system. **CO3**. Compare the structure and properties of rotor, air-jet, friction and compact yarn with ring yarn. **CO4**. Understand the electrostatic, self-twist, wrap and adhesive spinning methods. **CO5**. Illustrate the production of compact, fancy yarns and sewing yarns.	
Prerequisite	Fundamentals of yarn manufacturing process.	

PCC-TEX-303A

YARN MANUFACTURING-III

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note:

Nine questions will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT-I

Forces acting on yarn and traveler during spinning, spinning tension in ring frame, Theory of yarn balloon, Limitations of ring spinning systems, modern developments in ring frame, Introduction to new spinning systems, Advantages and comparison of new spinning system over ring spinning system, Introduction to open-end spinning.

UNIT-II

Rotor Spinning: Principle and raw material preparation. Design and working of rotor spinning machine and effect of each on the process and product quality. Production calculation, Effect of fibre properties on the rotor yarn property, Structure of rotor spun yarns, End uses of rotor yarns, new developments

Air-jet Spinning: false-twist process: generation of false twist, forming a yarn with the aid of false twist spinning elements. Murata Jet spinner: operating principle, Raw material requirements, Yarn Characteristics and end uses.

UNIT-III

Friction Spinning: Operating principle, Classifications, Dref-2 process & DREF-3 process: Working principle, Technological interrelationship, Advantages & disadvantages, use of friction spun yarn.

Working principle and Specifications: Electrostatic spinning, Self-twist spinning (Repco spinning), Wrap spinning (Parafil process), Adhesive spinning, Twilo process (TNO), Bobtex process -.

UNIT-IV

Compact Spinning: principle, different methods of fibre compacting, properties of yarn.
Comparative analysis of yarn structure, properties and their end use application produced from rotor, air-jet, friction techniques and compact spun yarn viz a viz ring spun yarn.

Production of fancy yarn & their applications.

Production of Industrial yarn- Sewing thread.

Suggested Text books and References

1. Klein. W., "Manual of Textile Technology", 'Short Staple Spinning Series', Vol. 1 to 6. - Textile Institute. Manchester.
2. Salhotra K R, "Spinning of Man-Made Fibres and Blends on Cotton Spinning System", The Textile Association, Mumbai, 1989.
3. Oxtoby, E., Spun Yarn technology.
4. Lawrence C A, "Fundamental of Spun Yarn Technology" CRC Press, USA, 2003.
5. Fancy Yarns, "Their Manufacture and Application," 1st Edition, R H Gong R M Wright, Woodhead Publishing Limited, UK, 2002.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester V
Course Title	FABRIC MANUFACTURING – III	
Course Code	PCC-TEX-305A	
Course Purpose	- To study the modern methods of fabric production - To understand the nonwoven production processes	
Course Outcomes	After completing this course, students will be able to: **CO1**. Contrast between shuttle and shuttle-less weaving **CO2**. Explain principles of projectile looms, rapier looms and jet looms. **CO3**. Describe multiphase weaving machines. **CO4**. Discuss the positive let-off and positive take-up motions of weaving machines. **CO5**. Summarise nonwoven production techniques.	
Prerequisite	Completion of course Fabric Manufacturing- II	

PCC-TEX-305A

FABRIC MANUFACTURING-III

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note:
Nine questions each of 15 marks will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT-I

Introduction to Shuttle-less Weaving. Advantages of Shuttle-less weaving, comparison with shuttle weaving. Features of unconventional weaving. Different Selvedge: Tucked-in, Leno, fused, Stitched. Their mechanism of formation, their characteristics and uses. Weft Accumulator.
Projectile Weaving Machine: Basic principle of projectile weaving. Feeding of yarn to projectile. Sequence of weft insertion. Cam driven shedding, Dwelling Sley beat-up, Torsion bar picking. Energy utilization during picking.

UNIT-II

***Rapier Weaving Machine*:** Classification based on type of rapier, system of weft insertion and number of rapiers. Sequence of weft insertion for Gabler and Dewas system, their comparison. Driving of flexible and rigid rapiers. Asynchronized rapier timing. Rapier buckling.
Air Jet Weaving Machine: Principle of weft insertion. Air requirements. Path of the yarn on loom. Sequence of weft insertion. Control of air stream by relay nozzle, confuser profile reed and suction. Design of air jet nozzle. Air drag force, factors affecting drag force.

UNIT-III

Water Jet Weaving Machine: Principle of weft insertion. Path of the yarn on loom. Quality of water required. Sequence of weft insertion. Water jet nozzle. Merits and demerits of water jet weaving. Fabric drying on loom.
Multiphase Weaving: Principle of multiphase weaving. Warp way and weft way multiphase looms. Circular loom.
Positive Let-off: Hunt's let-off, electronic let-off.
Positive Continuous Take-up: Sulzer take-up and Shirley take-up.

UNIT-IV

Nonwoven: Definition and classification. Fiber properties requirements. Parallel laid, Cross laid, aerodynamic, Wet laid and Spunbonded technique of web formation. Web bonding techniques: Needle punching, Spunlace, Spunbond, Meltblown Thermal bond and Chemical bonding. Application of various non-woven fabrics.

Suggested Text Books and References

1. Talukdar, M., "Weaving Mechanism, Management", Mahajan Publisher, Ahmedabad.

2. Adanur, S. "Weaving Technology"

Programme Name	Bachelor of Technology (Textile Engineering)	Semester V
Course Title	FABRIC STRUCTURE & DESIGN	
Course Code	PCC-TEX-307A	
Course Purpose	-To understand and apply the concept of designing of woven fabrics	
Course Outcomes	After completing this course, students will be able to: **CO1**. Explain the fundamentals of woven design production **CO2**. Understand and apply elements of colour in textile designing **CO3**. Construct different types of weave designs and their derivatives along with draft and peg plan. **CO4**. Determine fabric parameters for a particular weave.	
Prerequisite	Basic knowledge of fabric manufacturing	

PCC-TEX-307A

FABRIC STRUCTURE & DESIGN

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note- Total eight questions will be set in the question paper taking two questions from each unit by the paper setter for the examination. The student will be required to attempt any five questions taking at least one question from each unit.

UNIT–I

Elements of colour -physical basis of color, light and color phenomenon, complementary colors and color measurements, attributes of primary and secondary color, color contrast and color harmony, application of color.
General passage of material through loom, Classification of woven structures, basic elements of woven design, Method of notation of structure or design, weave repeat, types of draft plans. Selection of reed and its importance in fabric design.

UNIT–II

Plain weave and derivatives- warp rib, weft rib, matt, hopsack, fancy matt, stitched hopsack Classification of plain cloth.
Twill weave and derivatives- zig-zag, herringbone, broken, transpose, and rearrange twills on sateen base, combined, steep and flat twill, diamond, effect of twist on prominence of twill lines, characteristics of twill weave.
Fabric set calculation
Yarn and cloth relationships-GSM Calculation

UNIT–III

Sateen & Satins, Crepe weaves, Mock-leno, Cork screw, Honey-comb, Huck-a-back, Bed ford cord, Welt and pique fabrics.

UNIT–IV

Extra warp and weft figuring, Velvet and Velveteen, Backed fabric, Double cloth classification Stitched double cloth, Wadded double cloth, belting structures, label weaving-narrow

Suggested Text Books and References

1. Watson's Textile Design and Colour: Elementary weaves and Figured fabrics, edited by Z. J. Grosicki., Woodhead Publication, Seventh edition.

2. Watson's Advance Textile Design: Compound Woven Structure edited by Z Grosicki, Woodhead Publication, Series No.-2

3. Fabric Structure and Design, by N. Gokarneshan, New Age International, 2nd Edition

4. Woven Fabric Structure Design and Product Planning by J. Hayavadana, Woodhead Publishing India Pvt. Ltd.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester V
Course Title	TEXTILE TESTING LAB - I	
Course Code	PCC-TEX-309LA	
Purpose	To provide hands-on experience on testing of physical and mechanical properties of fibers and yarns.	
Course Outcomes	After completing this course student will be able to: **CO1**. Perform and evaluate physical properties of textile fibres. **CO2**. Perform and evaluate physical properties of yarns. **CO3**. Test and evaluate the tensile properties of textile fibres and yarns.	
Prerequisite	Knowledge of fibre & yarns, physical and mechanical properties.	

PCC-TEX-309LA

TEXTILE TESTING LAB - I

L T P
0 0 2

Practical/viva: 60 Marks
Sessional: 40 Marks
Total: 100 Marks
Time: 2 hrs

1. To determine moisture parameters of the fibers.
2. To determine the staple length of natural fibers.
3. To determine the fineness of natural fibers.
4. To determine the maturity of the fibers.
5. To find the strength and elongation of natural, manmade & synthetic fiber.
6. To determine the linear density of fibers.
7. To determine the spin finish percentage in manmade fibers.
8. To determine blend percent of the material.
9. To determine the linear density of a given yarn.
10. To determine the twist per inch of the yarn.
11. To determine the hairiness of the yarn.
12. To determine the strength & elongation of a given yarn.
13. To determine the count strength product of the yarn.

Note: The above experiment should be conducted and shall be decided on factors like:

1. Facilities installed at institute
2. Accessibility to industry & nearby institute like IIT Delhi, NITRA Ghaziabad, Textile Committee and NITRA Panipat.
3. Trend of technological developments in National & International perspective.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester V
Course Title	FABRIC MANUFACTURING – III Lab	
Course Code	PCC-TEX-311LA	
Course Purpose	-To provide practical knowledge on modern methods of fabric production.	
Course Outcomes	After completing this course, students will be able to: **CO1**. Recognise various selvedges and understand their manufacturing. **CO2**. Demonstrate the weft insertion and various mechanisms in projectile, rapier and air-jet looms. **CO3**. Compare the shuttle looms and shuttle-less looms.	
Prerequisite	Knowledge of fundamentals of weaving.	

PCC-TEX-311LA

FABRIC MANUFACTURING –III LAB

L T P
0 0 2

Practical/viva: 60 Marks
Sessional: 40 Marks
Total: 100 Marks
Time: 2 hrs

LIST OF EXPERIMENTS

1. To study the different selvedge formation: Tuck-in, Leno, Fused and Knitted selvedge.
2. To study the working of positive let-off and electronic let-off and their advantages.
3. To study the working of Matched cam beat-up.
4. To study the working of Electronic Dobby and development of designs in electronic dobby.
5. To study the working of Flexible Rapier loom system and sequence of weft insertion.
6. To study the working of Rigid Rapier loom system and sequence of weft insertion.
7. Studies of different mechanism on Somet flexible rapier drive.
8. To study the working of torsion bar picking and sequence of weft insertion in projectile loom.
9. To study the working of Air jet nozzle and sequence of weft insertion in air jet weaving.
10. To study the advantages and disadvantages of various shuttle less looms.

Note: Any 8 experiments from the above list of experiments are to be performed by each student.

Note: The above experiments should be conducted and shall be decided on factors like:

1. Facilities installed at Institute
2. Accessibility to industry & nearby institute like IIT Delhi, NITRA Gaziabad, Textile Committee and NITRA Panipat.
3. Trend of technological developments in National & International perspective.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester V
Course Title	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	
Course Code	MC-903A	
Purpose	To understand the values of Indian tradition.	
Course Outcomes	After completing this course students will be able to: **CO1**. understand the concept of Traditional knowledge and its importance **CO2**. know the need and importance of protecting traditional knowledge. **CO3**. know the various enactments related to the protection of traditional knowledge. **CO4**. understand the concepts of Intellectual property to protect the traditional knowledge.	
Prerequisite	Knowledge of Basic history	

MC-903A

ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

L T P
3 0 0

Sessional: 00 Marks
Exam: 100 Marks
Total: 100 Marks
Time: 3 hrs.

Note:

Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question no. 1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT-I

INTRODUCTION TO TRADITIONAL KNOWLEDGE:

Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge.

UNIT-II

PROTECTION OF TRADITIONAL KNOWLEDGE:

Protection of traditional knowledge: The need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

LEGAL FRAMEWORK AND TK

A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act);

B: The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indicators act 2003

UNIT-III

TRADITIONAL KNOWLEDGE AND INTELLECTUAL PROPERTY:

Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

UNIT-IV

TRADITIONAL KNOWLEDGE IN DIFFERENT SECTORS:

Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK. 139

Text Books:

1. Environmental Studies- Deswal and Deswal. Dhanpat Rai and Co.
2. Environmental Science and Engineering Anandan, P. and Kumaravelan, R. 2009. Scitech Publications (India) Pvt. Ltd., India.
3. Environmental Studies. Daniels Ranjit R. J. and Krishnaswamy. 2013. Wiley India.
4. Environmental Science- Botkin and Keller. 2012. Wiley, India

Reference Books:

1. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002.
2. "Knowledge Traditions and Practices of India" Kapil Kapoor1, Michel Danino

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VI
Course Title	TEXTILE TESTING - II	
Course Code	PCC-TEX-302A	
Purpose	To study the principles of physical and mechanical testing of fabric.	
Course Outcomes	After completing this course student will be able to: **CO1**. Test and evaluate the fabric dimensional and aesthetic properties. **CO2**. Perform and evaluate fabric tensile properties. **CO3**. Understand the testing methods of fabric comfort and handle properties. **CO4.** Understand the testing methods of technical textiles **CO5**. Explain various statistical quality control charts used in textiles.	
Prerequisite	Knowledge of Fabric Physical and mechanical properties.	

PCC-TEX-302A

TEXTILE TESTING - II

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note:

Nine questions will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT-I

Fabric Testing

Importance of fabric testing, scope of fabric testing.

Structural Properties of Fabric:-

Thickness, crimp, weight and shrinkage test - Definition, significance, effect on fabric properties and measurement methods. Cover factor - Definition, significance, derivation of cover factor.

Serviceability testing parameters of fabrics:-

Abrasion resistance of fabric- Definition, factors affecting abrasion resistance, assessment of abrasion damage, methods of measuring abrasion resistance & evaluation of results.

Fabric Pilling, Creasing and crease recovery- Concept, mechanism, factors affecting and methods of assessment.

UNIT-II

Mechanical Properties of fabric: -

Fabric Strength Testing: Tensile, tearing and bursting strength tests; principles and operation of equipment, Factors affecting test results, Evaluation and interpretation of tensile test results

Low stress mechanical properties of fabric: -

Fabric bending, stiffness, compression, softness, shearing and drape Test: - Principle, terminology, quantities and units, experimental method.

UNIT-III

Fabric Comfort: - Introduction, importance and classification of comfort.

Transport Properties of Fabric:-Fabric Porosity and Air Permeability: -Concept, Importance, Factors affecting, methods of testing, relationship between fabric porosity and air permeability.

Water-Fabric Relation: - Concept, Importance, water vapour permeability, moisture transport, Fabric Wettability, Water proofing and water repellency testing.

Fabric Handle:-Introduction, factors affecting fabric handle, subjective & objective evaluation of fabric handle by KES and FAST system.

UNIT-IV

Testing of Garment and Garment Accessories: -
Tests related to garment performance and appearance such as measurement of seam pucker, seam slippage and seam strength etc.
Testing of fusible Interlinings, zippers, elastic waistband, sewing threads, buttons, snap fasteners.
Statistical Quality control in Textiles: Concept of quality, quality assurance, concept of reproducibility and repeatability, methods pertaining to fibre, yarn and fabric testing.
International quality parameters & standards like USTER standards, AATCC, JIS and ASTM.

Suggested Text /References Books

1. Booth, J.E., "Principles of Textile Testing", Butterworts, London
2. Kothari, V.K., "Physical Testing of Textiles"
3. Fabric testing, ED. Jinlian HU, Woodhead publication CRC Press, 2008.
4. Saville, BP, Physical testing of textiles, Woodhead publication CRC Press 1999.
5. Slater, "Textile Progress – Physical Testing and Quality Control", Textile Institute, Manchester.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VI
Course Title	Garment Technology	
Course Code	PCC-TEX-304A	
Purpose	To explain the process of conversion of fabric into garment.	
Purpose	After completing this course students will able to: **CO1**. Explain the overview and sequence of garment manufacturing. **CO2**. Discuss the concept of pattern making and marker planning process. **CO3**. Illustrate the spreading and cutting techniques **CO4**. Select different types of stitches, seams and sewing machines for garment manufacturing. **CO5**. Explain different types of finishing methods used for garment making.	
Prerequisite	Students should have knowledge of Fabric manufacturing and Yarn manufacturing	

PCC-TEX-304A

GARMENT TECHNOLOGY

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note:
Nine questions will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT-I

Overview of clothing manufacturing and related fabric quality requirements
Introduction to clothing manufacturing, the structure of clothing industry, Organization chart of clothing factory, Relationship between fabric properties and making up process. Fabric quality requirement for garment industry, Evaluation of sewability.

UNIT-II

Pattern making, Spreading and Marker Planning
Pattern Making: Introduction to pattern making and garment construction. Different terminologies, Drafting, Basic bodies blocks. CAD for pattern making.
Spreading and Marker Planning: Planning, drawing and reproduction of marker, Methods of marker planning and marker used-normal marker planning and computerized marker planning, Introduction to symmetrical and asymmetrical fabrics, Criteria for spreading, methods of spreading, spreading machines, Principles of lay plan, types of lay plan.

UNIT-III

Cutting and Sewing
Cutting: Criteria for cutting, cutting methods and cutting machines- straight knife, band knife, notches and drills, computer-controlled knives, die cutting, laser cutting, plasma cutting and ultrasonic cutting.
Sewing: Properties of seams, seam types, stitch types, sewing feed mechanisms, sewing machine needles, sewing threads and sewing problems.
Introduction to Sewing Machinery: Basic sewing machines and associated work aids.

UNIT-IV

Pressing, Fusing and Trimming and Garment Accessories

Pressing: Purpose of pressing, equipment used and various pressing methods.

Fusing: Requirements of Fusing, fusing process and equipment used.

Trimming and Garment Accessories: definition, types, trimming methodologies, Care labeling in garment manufacturing.

Suggested Text /References Books

1. Cooklin Gerry, Steve G. H., and John M, "Garment Technology for Fashion Designers", Wiley-Blackwell, 2012 Edition.
2. Gini S. F, "Fashion from Concept to Consumer", Pearson Education, 2009.
3. Harold Carr & Barbara Latham, "The Technology of Clothing manufacture,4th Edition Wiley-Blackwell, 2008.
4. Aldrich W, "Metric Pattern Cutting for Women's Wear, Wiley-Blackwell, 2008.
5. Mehta P V and Bhardwaj S K, "Managing Quality in Apparel Industry", New Age International Pvt Ltd, 1998.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VI
Course Title	Knitting Technology	
Course Code	PCC-TEX-306A	
Purpose	To understand the technologies of knitting	
Course Outcomes	After completing this course students will able to: **CO1**. Understand the basic concept of knitting and its elements **CO2**: Relate and contrast different weft knitted methods and weft knitted structures **CO3**: Compare different warp knitted methods and warp knitted structures **CO4**: Solve numerical problems associated with knitting **CO5**: Compare woven and knitted structure	
Prerequisite	Yarn and fabric manufacturing process and their properties	

PCC-TEX-306A

KNITTING TECHNOLOGY

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 Hrs.

Note:
Nine questions will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT-I

Concept of knitting, weft knitting, warp knitting, comparison between woven and knitted fabric, comparison of warp and weft knitting; **Knitting needles**: spring beard, latch, compound needles, knitting cycle of latch, spring bearded and compound needle, classification of knitting machines, yarn quality requirements for weft knitting; **Knitting elements**: cylinder, knitting cam, sinker, feeder, stop motions.

UNIT-II

Working of plain, rib and interlock knitting machine, pattern wheel, pattern drum, punched steel tape needle selection mechanism, basic principles and elements of flat knitting machines- different types of flat knitting machines; mechanical and computerized knitting machines, weft knit structures, technical terms and symbolic representation of weft knit structures, Characteristics of plain, rib, Interlock, purl knit structures

UNIT-III

Fundamentals of formation of knit, tuck and float stitches, Derivatives of weft knit structures, Faults in knitted fabrics and their causes and remedies - dimensional parameters such as stitch length, WPI, CPI, stitch density, GSM, Tightness factor-spirality, Production calculations of weft knitting.

Warp knitting machines: needle bar, sinker bar, guide bar, pattern wheel, chain link, Warp knitting fundamentals, knitting cycle for warp knitting- closed lap and open lap stitches, Raschel, compound needle and Tricot knitting machines, Comparison of raschel and tricot knitting machines

UNIT-IV

Materials for warp knitting: direct warping and indirect warping for warp knitting, production calculations of warp knitting. Representation of warp knit structures, chain link notation, basic warp knitted structures, Chain or pillar stitch and atlas lap, Two bar structures; Full tricot, Locknit, Reverse locknit, Satin. Application of weft and warp knit fabric in Technical Textiles. Seamless knitting: working and advantages.

Suggested Text /References Books:

1. Spencer D. J, "Knitting Technology" Woodhead Publishing Ltd. Cambridge, England.
2. Ajgaonkar, D. B. "Knitting Technology".
3. "Knitting Technology" NCUTE Publication.
4. Booth J. E., "Textile Mathematics Vol-3" The Textile Institute Manchester Publication.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VI
Course Title	THEORY OF TEXTILE STRUCTURE	
Course Code	PCC-TEX-308A	
Course Purpose	- To study the structural models of fibre assemblies.	
Course Outcomes	After completing this course, students will be able to: **CO1**. Analyse the ideal yarn geometry. **CO2.** Analyse and evaluate the fibre migration in yarn. **CO3** – Analyse the mechanical properties of yarn. **CO4** –Analyse the fabric geometry **CO5**–Solve the numerical problems associated with yarn and fabric structure.	
Prerequisite	Knowledge of yarn manufacturing and fabric manufacturing. Basic mathematics and physics	

PCC-TEX-308A

THEORY OF TEXTILE STRUCTURE

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note:
Nine questions will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units

UNIT-I

Yarn Geometry: Idealized yarn geometry, relationship of yarn number and twist factor, Twist contraction and retraction, limits of twist.
Packing of fibre in yarn: Ideal packing, hexagonal close packing and other forms. Packing factor and its measurement, measurement of packing density and radial packing density, specific volume of yarns, relation between twist, diameter and twist angle.

UNIT-II

Fibre migration: Ideal migration, tracer fiber technique, characterization of migration behavior, migration in spun yarns, mechanisms of migration, effect of various parameters on migration behavior

Mechanics of staple fibre yarns: Translation of fiber properties into yarn properties; Extension of continuous, filament yarn for small strains and large strains; Prediction of breakage, Nature of rupture for continuous filament yarn, Extension and breakage of spun yarn

UNIT-III

Elements of fabric geometry. Cloth setting theories, Fabric cover, fractional and total cover, Fabric cover and fabric weight relationship, Pierce's fabric geometry, flexible and elastic thread model, jammed structure, square fabric, crimp interchange, Relationship between h, p, c, Kemp's Race Track Model.

UNIT-IV

Geometry of weft and warp knitted structures, influence of friction on knit geometry, Fabric, deformation under tensile stress, prediction of modulus; tensile properties in bias direction. Other fabric deformation – compression, shear, bending and buckling; fabric handle; Spirality and skewness formation and its control

Suggested Text/ References Books

1. Hearle, J. W. S., Grosberg, P., and Backer, S., "Structural mechanics of fibre, yarn and fabrics", Wiley Inter-science Publication.
2. "Textile Yarn, Technology, Structure & Application" – Goswami B.C., Martindale, J.G., Scardino F.L., Wiley Inter-science publication, 1977, U.S.A.
3. Zurek, W., "Structure of Yarn", Foreign Scientific Publications.
4. Cloth Geometry, F.T Pierce.
5. Woven Textile Structure: Theory & Application, B. K. Behera & P. K. Hari, Woodhead Textiles Series No. 115.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VI
Course Title	TEXTILE TESTING LAB - II	
Course Code	PCC-TEX-310LA	
Purpose	To provide hands-on experience on testing of physical and mechanical properties of fabrics.	
Course Outcomes	After completing this course student will be able to: **CO1**. Perform and evaluate fabric tensile strength tests. **CO2**. Test and evaluate the fabric dimensional and aesthetic properties. **CO3**. Test and evaluate the fabric comfort properties.	
Prerequisite	Knowledge of fabric physical and mechanical properties.	

PCC-TEX-310LA

TEXTILE TESTING LAB - II

L T P
0 0 2

Practical/Viva: 60 Marks
Sessional: 40 Marks
Total: 100 Marks
Time: 2 hrs

1. To determine the stiffness property of the fabric.
2. To determine the tensile strength of the fabric.
3. To determine the tearing strength of the fabric.
4. To determine the bursting strength of the fabric.
5. To determine air permeability of fabrics.
6. To determine the shower proof property of a fabric.
7. To determine the drape property of fabrics.
8. To determine the crimp and areal density of fabrics.
9. To determine crease resistance property of the fabric.
10. To determine the pilling property of the fabric.
11. To determine water vapor permeability of the fabric.
12. To determine the thermal comfort property of the fabric.
13. Determine and compare the seam strength, seam slippage and seam puckering of a fabric sewn with different types of sewing threads.

Note: The above experiment should be conducted and shall be decided on factors like:

1. Facilities installed at Institute
2. Accessibility to industry & nearby institute like IIT Delhi, NITRA Ghaziabad, Textile Committee and NITRA Panipat.
3. Trend of technological developments in National & International perspective

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VI
Course Title	Garment Technology Lab	
Course Code	PCC-TEX-312LA	
Purpose	To develop drafting and pattern making skills To impart hands on experience in various sewing machines.	
Purpose	After completing this course students will able to: **CO1**: Design and develop drafts for basic patterns. **CO2**: Make use of different types of sewing machines. **CO3**: Construct samples of various seam classes. **CO4**: Create different stitch classes	
Prerequisite	Students should have knowledge of Garment manufacturing.	

PCC-TEX-312LA

GARMENT TECHNOLOGY LAB

L T P
0 0 2

Practical/Viva: 60 Marks
Sessional: 40 Marks
Total: 100 Marks
Time: 2 hrs

1. Developments of patterns based on anthropometric data
2. Working on sewing machines
3. Production of different types of stitches (Chain stitch, Lock stitch and Overlock stitch)
4. Production of different seam types (Superimposed seam, Lapped Seam, Bound Seam, Flat Seam, Decorative seam, Edge neatening seam, Belt loop Seam etc.)
5. Determination of seam strength
6. Determination of seam pucker

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VI
Course Title	Knitting Technology Lab	
Course Code	PCC-TEX-314LA	
Purpose	To impart practical knowledge of knitting machines To construct and analyse various knit structures	
Purpose	After completing this course students will able to: **CO1**: Identify various components of flat and circular knitting machines. **CO2**: Explain different process parameters in designing of weft knitted structure. **CO3**: Analyse weft knitted fabric structures.	
Prerequisite	Students should have knowledge of weaving and knitting technology	

PCC-TEX-314LA

KNITTING TECHNOLOGY LAB

L T P
0 0 2

Practical/viva: 60 marks
Sessional: 40 marks
Total: 100 marks
Duration of Exam: 3 hours

List of Experiments:

1. Study on single jersey circular knitting machine-yarn supply arrangements, loop forming mechanism, take down motion and production calculations.
2. Study on Flat knitting machine-yarn supply arrangements, loop forming mechanism, take down motion.
3. Study on double jersey circular knitting machine-yarn supply arrangements, loop forming mechanism, take down motion and production calculations
4. Development of Plain, Rib, and Interlock fabric samples.
5. Setting of knitting Cam.
6. Development of derivative knitted structures on flat bed knitting machine.
7. Analysis of knitted structures.
8. Determination of K_S, K_C and K_W values.
9. Effect of stitch length, stitch density, course count, wale count on fabric aerial density.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VI
Course Title	MULTI FIBRE SPINNING	
Course Code	PEC-TEX-316A	
Purpose	- To study the various aspects multi fibre spinning.	
Course Outcomes	After completing this course, students will be able to: **CO1**. Select the right method of blending based on constituent fibres characteristics. **CO2**. Interpret the effect of blend composition and fibre characteristics on the properties of blended yarn. **CO3**. Explain the construction and working of woolen and worsted spinning systems. **CO4**. Illustrate the spinning of jute and silk. **CO5**. Classify and explain the methods of recycled fibre spinning.	
Prerequisite	Knowledge of short staple spinning.	

PEC-TEX-316A

MULTI FIBRE SPINNING

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note:
Nine questions will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT-I

Characteristics of man-made fibres, objectives of blending, selection of fibre specification for blending, processing of short, medium and long staple manmade fibres on cotton system, measures of blend intimacy, factors influencing blend intimacy, structure and properties of blend yarns, Effect of blend composition & fibre characteristics on properties of blended yarn. Blend mechanics. Advantages & disadvantages of different blending techniques.

UNIT-II

Wool Spinning: Impurities in wool fibre. Wool blending, wool sorting, wool, wool scouring, drying, back washing. Woollen and worsted carding, intermediate gilling, auto leveler in gillbox, rectilinear combing, rubbing frame, and spinning.

UNIT-III

Jute Spinning: Basic concepts of the spinning process and the machinery. Jute retting, stripping, jute grading, jute batching, fibre defects. Jute carding; breaker and finisher card. Drawing and Spinning.

UNIT-IV

Silk Spinning: Introduction to Silk filament processing. Flow chart for spun silk processing – Cocoon beater, Filling operation, Circular dressing, Spreader, Sett Frame, Drawbox, Rover**.**

Waste Spinning: Cotton waste and its varieties, classification and possible end uses, machines and processes to produce waste yarns e.g. condenser system, coiled system.

Suggested Text/ References Books

1. Salhotra K R, “Spinning of Man-Made Fibres and Blends on Cotton Spinning System”, The Textile Association, Mumbai, 1989.
2. Oxtoby, E. “Spun Yarn Technology”. Butterworths, London, 1987.
3. Simpson W S and Crashaw G, Wool: Science and Technology, Woodhead Publishing Series in Textiles, 2002.
4. Goswami, B.G. “Textile Yarns; Technology, Structure & Applications”. Textile Institute, Manchester.
5. Atkinson, R. R., Jute- Fibre to yarn, B. I. Publications, Bombay,1965.
6. Basu A. (Ed.), Advances in Silk Science and Technology, Woodhead Publishing Series in Textiles, 2015.
7. Lawrence, C.A., Fundamentals of Spun Yarn Technology, 1st Ed., CRC Press, LLC, Florida, USA, 2003.
8. Thornley T, Cotton waste: its production, manipulation and uses, University of California, London, Scott, Greenwood & Son 8 Broadway, Ludgate, B.C., 1912.
9. Horrocks A. R. (Ed.), Recycling Textile and Plastic Waste, Woodhead Publishing Limited, Cambridge, England, 1996.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VI
Course Title	STRUCTURE AND PROPERTIES OF FIBRES	
Course Code	PEC-TEX-318A	
Course Purpose	- To study the structure and properties of textile fibres	
Course Outcomes	After completing this course, students will be able to: **CO1**. Understand the fine structure and their physical and chemical properties of textile fibres **CO2**. Interpret the mechanical and frictional properties of textile fibres. **CO3**. Describe the moisture and optical properties of textile fibres **CO4**. Understand the thermal behaviour and electrical properties of textile fibres	
Prerequisite	Knowledge of textile fibers.	

PEC-TEX-318A

STRUCTURE AND PROPERTIES OF FIBRES

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 Hrs.

Note:
Nine questions will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT-I

Structure of fibres
Morphology and order in fibre structure, concept and theories of orientation, crystallization and its measurement technique such as X-ray.
Chemical and physical structure of fibres such as wool, silk, cotton and bast fibre and man- made fibre such as Nylon, PET, Acrylic and Viscose.

UNIT-II

Mechanical properties
Theory of load-elongation curve, stress-strain curve, modulus, elasticity and visco-elasticity, work of rupture/toughness, yield point, creep and stress relaxation behavior of fibres and simple spring and dash pot models simulating textile fibers.
Frictional properties of fibers
Nature and measurements.

UNIT-III

Moisture properties
Relation between moisture regain and relative humidity, hysteresis, absorption in fibers, diffusion theories of moisture absorption-general view, diffusion of moisture, quantitative analysis of moisture absorption, swelling.
Optical properties of fibers
Refractive index and polarization of light, birefringence and its measurement.

UNIT-IV

Thermal properties

Molecular motion and transition phenomenon, thermal expansion behaviour, first order and second order transition phenomenon.

Electrical properties

Introduction to electrical properties such as dielectric properties such as electric properties and static charge generation

Suggested Text Books and References

1. Morton W E and Hearle J W S, "Physical Properties of Textile Fibres", The Textile Institute, Manchester (1993)

2. Meredith R, "The mechanical properties of Textile Fibres", North Holland co; Amsterdam (1959)

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VI
Course Title	MANUFACTRING OF SPECILITY FABRICS	
Course Code	PEC-TEX-320A	
Purpose	- To study the various aspects manufacturing of specialty fabrics	
Course Outcomes	After completing this course, students will be able to: CO1-Select the right method of production of technical fabrics bases on their requirement. CO2-Interpret the effect of manufacturing technology on the properties of fabrics. CO3-Understand the various 3D structure produced using weaving and knitting CO4-Illustrate the fabric manufacturing process used for terry, carpet and home furnishing.	
Prerequisite	Knowledge of basic fabric manufacturing	

PEC-TEX-320A

MANUFACTRING OF SPECILITY FABRICS

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total:100 Marks
Time: 3 Hrs.

Note:
Nine questions will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT-I

Introduction and method of production of some common fabrics like Lappets, Swivels, Ondule fabrics, Tuck fabrics, woven, Gauge and leno structure with their mechanism, Madras muslin structures
Industrial fabrics especially kind of canvases, Belts, Parachute Fabrics, Umbrella cloth and Lycra Fabric

UNIT-II

3D Weaving Structure: introduction, changes required in preparatory process, process parameters, study of the manufacturing setup of 3D weaving, quality aspects and end uses.

3D Knitting Structure: introduction, changes required in preparatory process, process parameters, study of the manufacturing setup of 3D Knitting, quality aspects and end uses.

UNIT-III

Woven Terry Fabrics: introduction, classification, raw material, different types of preparatory process used for terry weaving, weaving of terry fabrics, quality control in terry weaving, end uses of terry structure

Carpet Manufacturing: introduction, classification, raw material, different types of preparatory process modifications used for carpet weaving, carpet manufacturing process parameters and machine parameters, quality aspects and end uses.

UNIT-IV

Fabrics Used in Home Furnishing Applications: introduction, classification, raw material, different types of preparatory process used for home furnishing manufacturing. Fabric manufacturing process parameters and machine parameters for home furnishing, quality aspects and end uses.

Suggested Text/References Books

1. Singh Jitendra Pratap and Verma Swadesh, Woven Terry Fabrics: Manufacturing and Quality Management by Woodhead Publishing House
2. Goswami K. K., Advance Carpet Manufacturing by Woodhead Publishing House

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VII
Course Title	TECHNICAL TEXTILES – I	
Course Code	PCC-TEX-401A	
Course Purpose	- To make student aware of non-apparel functions performed by textile Substrates	
Course Outcomes	After completing this course, students will be able to: **CO1**. Define and classify the technical textile. **CO2**. Explain the properties of technical textile materials. **CO3**. Explain the functioning and applications of textile material in filtration, geotextile and transportation. **CO4**. Design the fabric for technical textile application	
Prerequisite	Knowledge of textile materials and their production methods.	

PCC-TEX-401A

TECHNICAL TEXTILES-I

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note- *Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question no. 1 is compulsory. It is objective type 10 questions of multiple choices covering the entire four units.*

UNIT-I

Introduction, definition and growth of technical textiles, Classification of Technical Textiles. Brief idea about technical fibres. Role of yarn construction, fabric construction and composite materials. Differentiate technical textile from traditional textile. Present market and future market trends of technical textile.

UNIT-II

Filtration:
Textile and other filter media for dry and wet filtration. Filtration parameters. Theory of dust collection and solid liquid separation. Filtration requirements. Role of fibre, fabric construction and finishing treatments. Concept of pore size and particle size. Nano filters. Fabric test equipments. Types of nonwoven filter media available in market and their usages and efficiencies.

UNIT-III

Geotextiles:
Scope, definition, Types of geo textiles and their uses. Functions and application areas of Geotextiles. Essential properties. Fibre and fabric selection criteria for geotextile applications. Advantages and disadvantages of woven, non-woven geotextiles, Mechanics of reinforcement, filtration and drainage by Geotextiles.

Natural fibre Geotextiles.
Methods of long-term prediction of geotextile life and survivability in soil. Geotextile testing and evaluation.

UNIT-IV

Textiles in Transportation:

Introduction to automotive textile. Application of textiles in automobiles. Fibre requirements. Textile in passenger cars, tyres, airbags, seat belts, hoses and filters. Requirement and design options Textiles in other road vehicles. Railway application. Application in aircraft and marine. Textile as structural elements in transport vehicles.

Suggested Text Books & References

1. Horrocks, A. R. and Anand, S. C., "Handbook of Technical Textiles", Woodhead Publication Ltd, Cambridge, 2000
2. Adanur, S, "Handbook of Industrial Textiles", Technomic Publishing Co. Inc., USA 1995.
3. Kothari, V. K., "Progress in Textiles : Science & Technology, Technical Textiles: Technology, Developments and Applications" IAFL Publication New Delhi, 2008.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VII
Course Title	ADVANCED CHEMICAL PROCESSING	
Course Code	PCC-TEX-403A	
Purpose	-To study the advance chemical processes and computer colour matching (CCM) system for textile materials	
Course Outcomes	After completing this course student will be able to: **CO1**. Adapt the advance and ecofriendly methods of pretreatment and dyeing processes for superior processing quality. **CO2**. Explain the novel printing techniques and functional finishes. **CO3**. Understand the various light sources and colour matching functionsused in CCM. **CO4**. Understand the working principle and use of spectrophotometer in colour matching and recipe prediction for textile materials.	
Prerequisite	Basic knowledge of textile chemical processing	

PCC-TEX-403A
ADVANCED CHEMICAL PROCESSING

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note-*Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question no. 1 is compulsory. It is objective type 10 questions of multiple choices covering the entire four units.*

UNIT-I

Continuous open width processing, use of eco-friendly enzymes in wet processing, Super critical CO_2 dyeing, New reactive and disperse dyes, Grading and methods to determine fastness relating to washing, light, perspiration, sublimation and hot-pressing treatment.

UNIT-II

Novel printing techniques like Ink Jet printing or digital printing, zero formaldehyde easy-care finishes, polysiloxanes based softener, Breathable water-proof fabrics, Antimicrobial finishing of textiles, Self-cleaning and Low wet pick-up techniques.

UNIT-III

Fundamentals of colour science, Sources of natural and artificial light, CIE illuminants, absorption and scattering of light, Beer-Lambert law, Additive and subtractive mixing, Standard observer color matching function, Tristimulus values, Chromaticity coordinates, Kubelka-Munk equation, Metameres.

UNIT-IV

Principle of spectrophotometer, Colorimeter, Munsell system of color specification, Whiteness and yellowness indices, Computer aided color matching and recipe prediction.

Suggested Text Books & References

1 "Instrumental Colour Measurements and Computer Aided Colour Matching for Textiles", Shah H.S. & Gandhi R.S., Mahajan Book Distributors.
2 "Computer Colour Analysis: Textile Applications" by Sule A.D.
3 "Computer Aided Colour Matching", by Shore J, SDC U.K 1998, ISBN.
4 "Textile Finishing", Heywood D.,
5 "Chemical Finishing of Textiles", by Schindler W.D & and Hauser P.J.
6 Colourage Journal.
7 Asian Dyer
8 Asian Textile Journal
9 Man-made Textiles in India
10 AATCC Technical Manual.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VII
Course Title	PROCESS CONTROL IN SPINNING & WEAVING	
Course Code	PEC-TEX-409A	
Purpose	To study the process controls in spinning and weaving for achieving desired quality and efficiency	
Course Outcomes	After completing this course, students will be able to: **CO1**. Understand the approach and methodology of process control. **CO2**. Identify various performance parameters to control spinning process. **CO3**. Identify various performance parameters for controlling weaving process. **CO4**. Calculate the machine productivity index, efficiency, labour and machine allocation in spinning and weaving.	
Prerequisite	Knowledge of textile manufacturing and process	

PEC-TEX-409A

PROCESS CONTROL IN SPINNING & WEAVING

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note- *Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question no. 1 is compulsory. It is objective type questions of multiple choices covering the entire four units.*

UNIT-I

Introduction, importance of process control in spinning, key variables, establishing norms, collection & interpretation of data for process control, maximizing quality & cost evaluation of fibre quality, linear programming for cotton mixing, yarn realization, estimation & control of yarn realization, waste & their norms.

UNIT-II

Process control in preparatory: Control of cotton contamination, control of cleaning efficiency and waste in blow room and card, comber, control of neps in sliver at card draw-frame and comber stage. **Process control at yarn stage**: Control of yarn imperfections and faults in yarns, control of yarn count and count CV%., control of strength, and strength CV%., control of periodic mass variations, package faults, calculations pertaining to production, productivity indices and evaluation of indices in spinning efficiency and machine allocation in preparatory and ring spinning

UNIT-III

Weaving:
Approach, methodology and scope for process control in weaving.
Process control in winding: Knot quality, efficient removal of yarn faults and the control of productivity.
Process control in warping: Control of end breaks, tension levels, quality and the productivity in warping.
Process control in sizing: Choice and the control of size pick-up, yarn stretch and moisture in sized yarns. Improving weavability of the sized yarn and the control of productivity and size losses.
Process control in pirn winding: Minimizing end breaks and stoppages. Improving the build of the pirn and the productivity. Process control in Loomshed

UNIT-IV

Productivity

Definition, idea of productivity calculations of weaving mill and factors affecting productivity, productivity indices used in weaving, relation between machine allocation and machine efficiency, calculations pertaining to production, efficiency and machine allocation in winding, warping, pirn winding, sizing and loom shed.

Material handling in spinning / weaving department, humidification and air-conditioning provisions, ventilation & air changes

Suggested Text Books & References

1. Garde A R and Subramanian T A, "Process Control in Cotton Spinning," ATIRA, Ahmedabad, 2nd Ed., 1978.
2. Paliwal M C and Kimothi P D," Process Control in weaving", ATIRA, Ahmedabad 2ndEd, 1978.
3. Gokhale S V and Modi J R, "Process and Quality Control in Chemical Processing of Textiles", ATIRA, Ahmedabad, 1992
4. Ratanam T V, "Quality control in spinning", SITRA, Coimbatore, 1994.
5. Salhotra K R, Chattopadhyay R and Ishtiaque S M, "Process control in spinning", IIT, Delhi, CD cell, 2001
6. Thilagvathy G. and Kartik T., "Process control and yarn quality in spinning

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VII
Course Title	Process Control in Garment	
Course Code	PEC-TEX-411A	
Purpose	-To understand the concept of automation-based garment manufacturing. -To study quality control aspects in garment manufacturing.	
Course Outcomes	After completing this course students will be able to: **CO1**. Understand latest garment manufacturing technologies. **CO2**. Discuss the concept of production, planning and control. **CO3**. Select the sewing thread, stitch and seam for various applications. **CO4**. Describe quality control aspects of needle, sewing thread, stitch and seam. **CO5**. Understand the quality management in garment industry.	
Prerequisite	Students should have basic knowledge of Garment Technology.	

PEC-TEX-411A

PROCESS CONTROL IN GARMENT

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note- *Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question no. 1 is compulsory. It is objective type 10 questions of multiple choices covering the entire four units.*

UNIT-I

Automation in Garment Industry- Latest machinery in design, pattern making, marker making, cutting, sewing, embroidery and programmable machines.
Production planning in garment manufacturing-Apparel production systems and their comparative assessment, Quantitative Production Analysis viz. check list, Ergonomics in apparel industry.

UNIT-II

Stitch application for woven and knitted garment, Proper stitch formation.
Common seam quality defect: Seam rupture on stretch knits, Seam grinning, Skipped stitches, Stitch Cracking and Seam slippage.
Seam puckering: Types, major causes and solution to puckering.

UNIT-III

Sewing Thread selection: Right thread to optimize seam quality, fibre type, thread construction, thread size. Advantages of core-spun sewing thread, Quality aspect of industrial sewing thread, Needle size, needle numbering system, Needle cutting, Causes and remedies
Quality parameters for assessing sewability.

UNIT-IV

Define Quality, Quality Control and Quality Assurance, Different quality control methods used in garment industry, Quality tools viz. Control charts, Pareto charts, Fish bone diagram, Scatter plots, Histogram and Six Sigma
Inspection systems–raw material inspection, in process inspection, final inspection, Inspection standards

Suggested Text Books & References

1. Mehta, P. V., “An Introduction to Quality Control for Apparel Industry”, J.S.N International, 1985
2. Mehta, P. V., and Bhardwaj, S. K., “Managing Quality for Apparel Industry”, New Age International 1998
3. Kothari, V. K., “Progress in Textiles: Science & Technology, Testing and Quality Management” IAFL Publication New Delhi, 1999.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VII
Course Title	Process Control in Chemical Processing	
Course Code	PEC-TEX-413A	
Purpose	To understand the various aspects of process and quality control in wet processing of textiles.	
Course Outcome	After completing this course students will be able to: **CO1**. Understand process control parameters in grey fabric. **CO2**. Discuss the process control parameters in pretreatment process. **CO3**. Explain quality control parameters for dyeing, printing and finishing. **CO4**. Summarise evaluation test methods for dyes, chemicals, auxiliaries and pretreated fabrics.	
Prerequisite	Students should have knowledge of Textile Chemical Processing I and Textile Chemical Processing II	

PEC-TEX-413A

PROCESS CONTROL IN CHEMICAL PROCESSING

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note- *Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question no. 1 is compulsory. It is objective type 10 questions of multiple choices covering the entire four units.*

UNIT-I

Importance of process and quality control in chemical processing. Quality of grey fabrics, selvedge quality, stains in grey fabric, overall assessment of quality of grey fabrics.
Stitching of grey pieces, common stitching defects and method for assessing stitching quality.
Process control in shearing and cropping.

UNIT-II

Singeing - Process control in singeing, parameters to control the singeing process

Desizing - Enzyme desizing, parameters to control the enzyme desizing process

Scouring - Parameters to control the pressure boil scouring
Mercerizing – Parameters to control the mercerization process,
Bleaching – Sodium hypochlorite & Hydrogen peroxide, treatment on J-Box, pad roll bleaching, washing and drying.
Process control in Heat Setting process.

UNIT-III

Process control in Dyeing - Fiber and yarn package dyeing.
Fabric dyeing - Satisfying basic needs, selection of dyes, process control in jigger dyeing, high temperature beam or jet dyeing, continuous dyeing.
Process control in Printing: Selection of thickening agent and preparation of printing paste, printing recipe, printing, fixation, after treatments.
Process control in Finishing: Stenter or felt calendar for temporary finishes. durable finishes: resin finishing, calendaring, weight reduction and carbonization.

UNIT-IV

Evaluation of dyes, textile chemicals and auxiliaries - Dyestuff performance test, Wetting agents, Levelling Agents, Cross linking Agents, Thickeners & Binders for printing, OBA, Softeners etc. **Evaluation of processed fabric at different stages**: desizing, scouring, bleaching mercerization, heat setting, dyed printed and finished fabric.

References

1. ATIRA / BTRA Books and Journals.
2. Gokhle, S. V. and Modi J. R., "Process and Quality Control in Chemical Processing", ATIRA, Ahmedabad.
3. Kothari, V. K., "Progress in Textiles: Science & Technology, Testing and Quality Management" IAFL Publication New Delhi, 1999.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester – VII
Course Code	OEC-TEX-415A	
Course Title	Fundamentals of Management	
Purpose	To study the principles and practices of management.	
Course Outcomes	After completing this course, students will be able to: **CO1**. Understand the concept of Financial management. **CO2**. Enumerate the various functions performed by personnel management. **CO3**. Get idea of production management. **CO4**. Describe nature, scope and importance of marketing management.	
Prerequisites	Basic idea of management	

OEC-TEX-415A

FUNDAMENTALS OF MANAGEMENT

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note:
Nine questions will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT-I

Financial Management: Introduction of Financial Management, Objectives of Financial Decisions, Status and duties of Financial Executives. Financial Planning – Tools of financial planning. Management of working capital, Factors affecting requirements of working capital. Capital structure decisions. Features of appropriate capital structure. Sources of finance.

UNIT-II

Personnel Management: Personnel Management – Meaning, Nature and Importance; Functions of Personnel Management – (a) Managerial Functions and (b) Operative functions. Job Analysis: Meaning and Importance; Process of Job Analysis; Job Description and Job specification. Human Resource Development- Meaning and concept.

UNIT-III

Production Management: Production Management: Definition and Objectives, Plant location: Ideal plant location. Factors affecting plant location. Plant Layout: Ideal plant layout, factors affecting plant layout. Work Measurement: Meaning, Objectives and Essentials of work measurement. Production Control: Meaning and importance of production control and steps involved in production control.

UNIT-IV

Marketing Management: Modern Nature, scope and importance of marketing management. Marketing concepts. Role of marketing in economic development. Marketing Mix. Marketing Information System. Meaning, nature and scope of International Marketing.

Suggested Text Books and References

1. Gupta, R.S., Sharma, B. D., and Bhalla, N.S., "Principles and Practice of Management", Kalyani Publishers
2. Aggarwal, R. D, "Organization and Management", Tata Mc Graw Hill, 2007.
3. Prasad, L.M., "Principles & Practices of Management", Sultan Chand & Sons, 2007.
4. Koontz, H., "Essentials of Management", McGraw Hill, 2012.
5. Pandey, I.M., "Financial Management", Vikas Publishing House, New Delhi, 2015.
6. James, A.F., Stoner, R., and Freeman, E., "Management", Pearson Prentice Hall, 1995.
7. Kotler, P., Keller, K. L., and Brady, M., "Marketing Management", Pearson Prentice Hall, 2009.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VII
Course Code	OEC-TEX-417A	
Course Title	Statistical Analysis	
Purpose	To study different statistical tools useful for solving engineering problems.	
Course Outcomes	After completing this course, students will be able to: **CO1**. Apply fundamentals of statistics in solving engineering problems. **CO2**. Understand concepts of probability theory and probability distributions **CO3**. Test for statistical hypothesis and its significance **CO4**. Make use of control chart and ANOVA to solve the statistical problems. **CO5**. Analyse correlation and regression of given data.	
Prerequisites	Knowledge of Mathematics	

OEC-TEX-417A

STATISTICAL ANALYSIS

L	T	P
3	1	0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note:
Nine questions will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type questions of multiple choice covering all the four units.

UNIT-I

Foundations of statistics:
Basic concepts of statistics, collection sampling, classification and graphical representationof data, Measures of central tendency. Numerical problems.
Sampling Theory:
Population and sample, types of sampling, sampling classification and graphical representation of data, measures of central tendency, control charts.

UNIT-II

Measurement of Deviations and Probability

Measures of Dispersion Range, Quartile deviation, standard deviation, moments, skewness and kurtosis (Definition, properties and associated numerical only). Theory of Probability Different approaches to probability, Additive and Multiplicative, Laws of probability, Baye's theorem.

UNIT-III

Tests of hypothesis and significance:
Definition of Statistical hypothesis, Null hypothesis. Type me and II errors and Levels of significance, Standard error and sampling distribution, Tests of significance for Large and small Samples (discussion). Problems based on $\chi 2$-test for goodness of fit, Student's t-Test and Analysis of variance (one way and two-way classifications.

UNIT-IV

Regression & correlation:
Karl Pearson's coefficient of correlation, Rank correlation coefficient and lines of regression, Numerical problems, factorial design and analysis.

Suggested Text Books and References

1. Ray., M. and Sharma, H. S., "Mathematical Statistics", Ram Prasad & Sons, 1966.
2. Bowker, A.H., and Lieberman, G.J., "Engineering statistics", Prentice Hall,N.J.1972
3. Spiegel, M. P., "Theory & Problems of Probability & Statistics", McGraw Hill, 1982
4. Bhattacharya, G.K., and Johnson, R.A.," Statistical concepts and methods", John Wiley, New Delhi, 2002.
5. Hogg, R.V., and Elliot, A.T., "Probability and Statistical Inference", Pearson Education, 6th Edition

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VII
Course Code	OEC-TEX-419A	
Course Title	Theory and Design of Textile Machinery	
Purpose	To study the different elements of machine design for understanding of basic mechanics of textile machinery	
Course Outcomes	**CO1**. To know about various machine parts, its mechanisms, **CO2**. Illustrate benefits of different cams and follower motions scheme **CO3**. To impart Knowledge on kinematic properties of gears **CO4**. To understand the design of several types of belt and chain drives	
Prerequisites	Basic knowledge of machine design	

OEC-TEX-419A

THEORY AND DESIGN OF TEXTILE MACHINERY

L	T	P
3	1	0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note:
Nine questions will be set in the question paper i.e. two from each unit. The student will be required to attempt one question from each unit. Question No.1 is compulsory. It is objective type questions of multiple choice covering all the four units.

UNIT-I

Basic concepts: Kinematics of machine, kinematics link and their different type, types of kinematics pair, degree of freedom, kinematics chain, mechanism and inversion of four bar chain, single slider and double slider crank mechanism.

Velocity Analysis: Motion of a link, velocity of a point on a link by relative velocity method, velocities of four bar mechanism, single slider crank mechanisms, rubbing velocity at a pin joint. Velocity of a point on a link by instantaneous centre method, properties and types of I-centre, Kennedy theorem and methods of locating I-centres in a mechanism.

UNIT-II

Belt, rope and chain drive: Types of belt drives, velocity ratio, law of belting, concept of slip and creep, length of belt, ratio of driving tensions for flat belt and vbelt, power transmitted, effect of centrifugal tension on power transmission, condition for maximum power transmission, initial tension in the belt. Use of V-belt, rope, chain, chain length and angular speed ratio, relative advantageand disadvantage of chain and belt drives.

Gears: Classification of gears, terminology used in gear, law of gearing, velocity of sliding, forms of teeth, construction, properties and comparison of an involute and cycloidal teeth, effect of centre distance variation on the velocity ratio, length of path of contact, arc of contact, number of pairs of teeth in contact, interference, minimum number of teeth on the pinion and wheel to avoid interference, minimum number of teeth on the pinion for involute rack to avoid interference, undercutting, terminology of helical and worm gears.

UNIT-III

Gear trains: Definition, types: simple, compound, reverted and epicyclic gear trains, velocity ratio of epicyclic and compound epicyclic gear trains.

Cams and follower: Types of cams and followers, cam terminology, types of motion of the follower, analysis of motion of the follower, analysis of motion of the follower for cams withspecified contours.

UNIT-IV

Flywheels: Turning moment diagram for steam engine, four stroke internal combustion engines, fluctuation of energy, maximum fluctuation of energy, coefficient of fluctuation of energy, energystored in flywheel, use of flywheel.

Application in Textiles: Belts, chains and gear drives in textile machines. Different types of cam and followers used in textile machines.

Suggested Text Books and References

1. Khurmi R.S and Gupta, J. K., "Theory of Machine", S. Chand Publisher, New Delhi, 2008.
2. Brar, J. S., and Bansal R K, "A text book of Theory of Machines", Laxmi Publication Pvt. Ltd, New Delhi, 2004.
3. Rattan, S. S., "Theory of Machines", Tata McGraw Hill, New Delhi, 2001.
4. Ghosh, A., and Mallik, A. K., "Theory of Mechanism and Machines", Affiliated East West Press Pvt. Ltd, New Delhi, 1998
5. Bevan, T., "The Theory of Machines", CBS Publishers and Distributors, New Delhi, 2002

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VII
Course Title	PCC-TEX-405LA	
Course Code	ADVANCED CHEMICAL PROCESSING LAB	
Purpose	To provide hands-on experience to use Computer Colour Matching system in determination and evaluation of pretreated and dyed textile material.	
Course Outcomes	After completing this course student will be able to: **CO1**. Make use of spectrophotometer for analysing properties of pretreated and dyed fabric sample. **CO2**. Evaluate fastness properties using computer colour matching system.	
Prerequisite	Knowledge about basics of Textile Chemical Processing	

PCC-TEX-405LA

ADVANCED CHEMICAL PROCESSING LAB

L T P
0 0 2

Practical/viva: 60 marks
Sessional: 40 marks
Total: 100 marks
Duration of Exam: 3 hours

List of Experiments:

1. Calibration of a UV-visible reflectance and transmission- based spectrophotometer.
2. Identification of dye on a dyed cotton sample.
3. Assessment of color strength (K/S) of dyed samples.
4. Estimation of colour strength difference.
5. Determination L, a, b values and construction of hue and shades based on that.
6. Comparison of bleaching methods using CCM.
7. Assessment of whiteness and yellowness index of a scoured and bleached fabric.
8. Determination of wash fastness of a dyed sample.
9. Determination of rubbing fastness of a dyed sample.
10. To identify & predict the recipe formulation of dyed sample.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VIII
Course Title	TECHNICAL TEXTILES – II	
Course Code	PCC-TEX-402A	
Course Purpose	To make student aware of non-aesthetic application of textiles i.e. medical textile, protective textile, sportech and e-textile.	
Course Outcomes	After completing this course, students will be able to: **CO1**. Explain the applications of textile material in medical field. **CO2**. Understand the protective textile functions and their applications. **CO3**. Describe about sportech and agrotech. **CO4**. Illustrate the innovations in technical textiles.	
Prerequisite	Knowledge of Technical Textile- I	

PCC-TEX-402A

TECHNICAL TEXTILE - II

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note- *Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question no. 1 is compulsory. It is objective type questions of multiple choices covering the entire four units.*

UNIT-I

Medical Textiles

Introduction and classification of Medical Textiles, Fibres used for medical applications. Implantable – sutures, soft tissue implants, hard tissue implants, vascular implants. Non-implantable – surgical dressing, bandages. Extracorporeal devices, Healthcare and Hygiene products.

UNIT-II

Protective Textiles

Different types of protective clothing, Functional requirements of defense clothing including ballistic protection, parachute, temperature and flame-retardant clothing, Chemical and Biological protective clothing, Clothing for extreme climatic conditions viz. high-altitude clothing.

UNIT-III

Sportech – Sport uniforms, sporting equipments, textiles in sport surfaces

Agrotech – General applications and fibres used in agriculture, horticulture, fishing and animal husbandry

UNIT-IV

Applications and innovations in Technical Textile viz. e-textile, biomimetic, nano-technology.

References and Text books

1. Horrocks, A. R. and Anand S. C., “Handbook of Technical Textiles”, Woodhead Publication Ltd, Cambridge, 2000
2. Adanur, S., “Handbook of Industrial Textiles”, Technomic Publishing Co. Inc., USA, 1995
3. Kothari, V. K., “Progress in Textiles: Science & Technology, Technical Textiles: Technology, Developments and Applications” IAFL Publication, New Delhi, 2008.
4. Scott, R. A., “Textiles for Protection”, Woodhead Publication Ltd, Cambridge, 2013.
5. Tao, X., “Wearable Electronics and Photonics”, Woodhead Publication Ltd, Cambridge, 2004.

Programme Name	Bachelor of Technology (Textile Engineering)	Semester VIII
Course Title	POST EXTRUSION PROCESS	
Course Code	PEC-TEX-408A	
Course Purpose	To illustrate the students about various post-spinning process for synthetic fibers	
Course Outcomes	After completing this course, students will be able to: **CO1**. Objective of post spinning operation **CO2**. Understanding operations involved in post spinning **CO3**. Concept of drawing and heat-setting **CO4**. Understanding process of production of bulk yarn **CO5**. Properties and applications of bulk yarn.	
Prerequisite	Knowledge of Textile Fiber –II	

PEC-TEX-408A

POST EXTRUSION PROCESS

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note- *Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question no. 1 is compulsory. It is objective type questions of multiple choices covering the entire four units.*

UNIT–I

Introduction: Introduction and objective of post spinning operation. Operations involved in post spinning.

Drawing: Introduction of drawing filament/fibre: Theoretical considerations of drawing, Concept of neck drawing, Prediction of neck formation, Significance and stabilization of neck, drawing unit, draw behavior of thermoplastic polymers. Influence of drawing parameters on structure and properties of fibres. High speed spinning and spin draw process, drawing of pre-oriented yarns and draw-warping.

UNIT–II

Heat-setting: Introduction and concept of heat-setting, Objective of heat-setting, Different nature of set, Heat-setting behavior of fibres, Methods of heat-setting, Influence of heat setting parameters on structure and properties of fibres, Settability and measurement of set.

UNIT–III

Tow conversion: Introduction of Tow to Top conversion, Different methods for tow to top conversion.
Bulk yarn: Introduction of bulk yarn. Objectives of producing bulk yarns. Different methods of producing bulk yarns. Principles of manufacturing acrylic high bulk yarn.

UNIT–IV

Yarn Texturing: Concept and classification textured yarns. Different texturing methods and brief working principles of different texturing methods. Principles of false twist texturing. Material and Machine variables and their influence on the structure and properties of false twist textured yarn, Concept of air-jet texturing. Material and process variables in air-jet texturing and their influence on the structure and properties of air-jet textured yarns, Testing and evaluation of textured yarns, recent developments in texturing, Air entanglement process.

Suggested Text Books and References

1. Gupta V B and Kothari V K, “Manufactured Fibre Technology”, Chapman and Hall, London,1999.
2. Vaidya A A, “Production of Synthetic Fibres”2nd Ed., Prentice Hall of India, New Delhi, 1988.
3. Hearle J W S, Hollick L and Wilson D K, “Yarn Texturing Technology”, Woodhead Publishing Ltd., UK, 2002.
4. Goswami B C, Martindle J G and Scardino F L, “Textile Yarns Technology, Structure and Applications”, Wiley-Interscience Publication, New York, 1976.
5. Mark H F, Atlas S M, Cernia E, “Man Made Fibre Science and Technology”, 1st Ed., Vol. 1, 2, 3, Science Publishers, New York, 1967.

Programme Name	Bachelor of Technology (Textiles Engineering)	Semester VIII
Course Title	HIGH PERFORMANCE FIBRES	
Course Code	PEC-TEX-410A	
Purpose	To study the high-performance fibers	
Course Outcomes	After completing this course student will be able to: **CO1**. Understand polymerization, spinning properties and applications of aromatic polyamide and ordered polymeric fibers. **CO2**. Explain manufacturing process, structure and properties of carbon fibers. **CO3**. Describe manufacturing process of optical fibers, structure and properties of flexible chain high performance fibers and their application. **CO4**. Understand glass fibers, membrane technology, plasma treatment, and fibers used in medical textiles.	
Prerequisite	Knowledge of Textile Fibers and basic chemistry	

PEC-TEX-410A

HIGH PERFORMANCE FIBRES

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note- *Total nine questions will be set in the question paper i.e two questions from each unit. The student will be required to attempt one questions from each unit. Question No.1 is compulsory. There will be questions of multiple choice covering entire four units.*

UNIT-I

Fully aromatic polyamide or aramid fibers: Nomex and Kevlar - Polymerization, spinning properties and applications

Ordered Polymeric Fibers: High molecular weight polyester, rigid rod and ladder polymers such as PBL, PBZT, PBO, PBI.

UNIT-II

Carbon Fibers: Manufacturing of carbon fibres from PAN precursors, viscose and pitch fibres. Pre-oxidation, carbonization and graphitization. Chemical and structural changes in structure during these fibers. Structure and Properties of these fibers.

Liquid crystal fibres, Gel spinning

UNIT-III

Flexible Chain based high performance fibers: High and ultramolecular weight polyethylene. Structure and properties of these fibers.

Optical Fibers: Definition, working principle of optical fibers, different materials used for manufacturing of optical fibers, different types of optical fibers. Manufacturing process of optical fibers and their applications. Hollow and profile fibres, design of spinnerets for such fibres.

UNIT-IV

Glass fibres. PEEK fibers, Soyabean fibers etc. Membrane technology. Blended and bicomponent fibres. Medical textiles (fibers used in Medical textiles). Superabsorbent fibres.

Plasma modification. Radiation processing. Industrial tapes. Biaxially oriented films and film fibres. Barrier films and coatings.

Suggested Text Books and References:

1. Bajaj, P., & Sengupta, A.K., "High performance fibers"
2. Lewin, M., & Preston, J., "High Technology Fibers (Part A, B, C, D)", CRC Press, 2019
3. Lewin, M., & Pearce, J., "Handbook of Fiber Chemistry". CRC Press LLC; 2nd edition (1998)

Programme Name	Bachelor of Technology (Textiles Engineering)	Semester VIII
Course Title	NONWOVEN TECHNOLOGY	
Course Code	PEC-TEX-412A	
Purpose	- To study the manufacturing process and applications of nonwovens Structures	
Course Outcomes	After completing this course, students will be able to: **CO1**. Discover the nonwoven technology. Classify the nonwoven according to web formation techniques, bonding techniques and applications. **CO2**. State the requirements of fibre properties for web formation. **CO3**. Understand the process of needle punching, stitch bonding, adhesive bonding, hot calendaring and fusion bonding. **CO4**. Explain the finishing and applications of nonwoven in different sectors **CO5**. Identify the test methods for nonwoven products	
Prerequisite	Knowledge of fibre properties and fabric formation.	

PEC-TEX-412A

NONWOVEN TECHNOLOGY

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note- Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit**.** Question no. 1 is compulsory. It is objective type questions of multiple choices covering the entire four units.

UNIT-I

Web Formation Technique:

Introduction, need for nonwovens in present scenario. History behind its origin, Definition of nonwoven as per INDA and ADNA, major fibres which are used for manufacturing of nonwovens, classification of nonwoven. Flowchart of its manufacturing technology.

Various web laying methods viz: dry, wet laying technique, spun-bond technique and melt-blown technique and their operating variables and products formed. Concept SMS fabrics.

UNIT-II

Bonding Techniques: Stitch Bonding

Needle Punching: Needle design, needle board parameters, process involved, various factors influencing needle punching process, properties and applications.

Hydro-entanglement: Principle and process technology, properties and applications.

Thermal Bonding: Principle, technologies such as calendar bonding, thorough air bonding, ultrasonic & IR bonding.

Chemical Bonding: Chemical binders. Mechanism of chemical bonding. Factors that affect the properties of calendar bonded products.

Limitation, Application areas.

UNIT-III

Finishing

Dry finishing of nonwoven: Shrinkage, Wrenching, Creeping, and Glazing.

Wet finishing of nonwoven: Washing, Dyeing and Printing.

Chemical finishing: Antistatic, Antimicrobial, Water repellent, Flame retardant, Water absorbency. Methods of applying chemical finishes.

Developing technologies: Plasma micro-encapsulation, biomimetic finishes and electrochemical finishes.

UNIT-IV

Test Methods

Defects of nonwoven fabrics. Test methods for nonwovens: weight, thickness, pore size, porosity, tensile properties, liquid permeability, water vapour permeability, liquid absorption, thermal conductivity and insulation. Usage of non-woven in different sector of technical textiles.

Suggested Text Books and References:

1. Madhavamoorthy, P.and Shetty, G. S., "Nonwoven", Mahajan Publishers Pvt. Ltd., 2005
2. Lunenschloss, J., and Albrecht, W., "Non-woven Bonded Fabric", Ellis and Harwood Ltd., UK(1985)
3. Radco, K., "Manual of nonwovens", Textile trade Press, UK (1971)
4. Albrecht, W., Fuchs, H., and Kittelmann, W., "Nonwoven Fabrics", Wiley-VCH Wenham (2003)

Programme Name	Bachelor of Technology (Textiles Engineering)	Semester VIII
Course Title	COMPUTER AIDED DESIGN	
Course Code	PEC-TEX-414A	
Course Purpose	To explain the latest developments of CAD in apparel industry	
Course Outcomes	After completing this course, students will be able to: **CO1**. Illustrate the concepts of CAD and its usage in garment manufacturing. **CO2**. Discuss the computerized pattern making process. **CO3**. Describe the computerized production planning and 3D technology in garment manufacturing. **CO4**. Understanding concept of e-marketing in apparel industry.	
Prerequisite	Basics knowledge of computer and garment manufacturing process	

PEC-TEX-414A

COMPUTER AIDED DESIGN

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note- *Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question no. 1 is compulsory. It is objective type 10 questions of multiple choices covering the entire four units.*

UNIT-I

CAD definition, fundamentals of CAD - Introduction, general process of design, application of computers for design, benefits of CAD, CAD in today's fashion industry. Computer graphics software in apparel industry.

UNIT-II

Design software - Introduction, features and its applications, resolution set up, saving files and file formats, vector graphics object vs raster graphics object.

Pattern design software (PDS), digitizing, grading and marker making systems.

UNIT-III

3-D Modelling: Intelligent systems - 3D scanning technology.3Dbody scanners, imaging techniques for various designs. Automatic Pattern Generation Systems. 2D to 3D conversion technology. Draping 2D

UNIT-IV

Fashion trend forecasting websites - Introduction, leading online trend-analysis and research service on creative and business intelligence for the apparel. Applications of CAD in multimedia and 3D presentation.

Suggested Text Books and References:

1. Colursy, M. K., “Fashion Design on Computers”, Prentice Hall, 2004.
2. Radhakrishnan, R., Subramanyan, S., and Raju V, “CAD/CAM/CIM Computer Aided Design &Manufacturing”, New Age International Publications, 2000.
3. Chase, R. W., “CAD for Fashion Design”, Prentice Hall Publications, 1997.
4. Taylor P, “Computers in Fashion Industry”, Heinemann Publication, 1990.
5. Donald, V. D., “Computer Aided Drafting & Design-Concept & Application”, McGraw-Hill, 1987.
6. Gray, S., “CAD in Clothing & Textiles”, Hampshire, 1998.

Programme Name	Bachelor of Technology (Textiles Engineering)	Semester VIII
Course Title	APPAREL MARKETING & MERCHANDISING	
Course Code	PEC-TEX-416A	
Course Purpose	To describe the apparel marketing and merchandising process	
Course Outcomes	After completing this course, students will be able to: **CO1**. Describe the marketing and its mix **CO2**. Explain the organization of the apparel industry **CO3**. Understand the merchandising process **CO4**. Describe various documents required for exports.	
Prerequisite	Knowledge of basic garment manufacturing process	

PEC-TEX-416A

APPAREL MARKETING & MERCHANDISING

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note- *Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question no. 1 is compulsory. It is objective type 10 questions of multiple choices covering the entire four units.*

UNIT-I

Marketing:
Definition, steps involved in marketing, marketing evolution, selling vs marketing, marketing environment, marketing research, marketing objectives and strategies, marketing mix, fashion marketing planning.

UNIT-II

Introduction to apparel industry – Different types of organization structure.

Various departments of garment unit:

Marketing, designing, merchandising, patternmaking, sampling, fabric & trim store, testing, cutting, sewing, finishing, IE, maintenance, quality control, account, HR, EDP

UNIT-III

Merchandising: Introduction to fashion merchandising and its process, roles and responsibilities of merchandiser in different organizations, categories of apparel merchandising, Buying cycles and tools of merchandising–buying cycle, time and action calender, range planning, critical path, Costingtechniques and Spec Sheets. Visual Merchandising

UNIT-IV

Export Documentation: Various types of export documents, Pre-shipment post-shipment documentation, Terms of sale, payment, shipment etc. Export incentives: Duty drawback, DEPB, I/ E license - exchange control regulation – (FEMA) foreign exchange management acts - export management risk - export finance.Various INCO terms.

Suggested Text Books and References:

1. Kotler, P., “Marketing Management”, 15th edition Pearson Education. 2016.
2. Cooklin, G., Hayes, S., McLoughlin, J., and Fairclough. D., “Cooklin's Garment Technology for Fashion Designers”, 2nd Edition, Blackwell Publications, 2011.
3. Sarkar, P., “Garment Manufacturing: Processes, Practices and Technology” Online Clothing Study.
4. Stone, E., “Fashion Buying”, McGraw-Hill Publication, 2019.
5. Kumar, K., “Apparel Merchandising”, Abhishek Publications, 2012.
6. Easey, M., “Fashion Marketing”, John Wiley & Sons publication. 2009.

Programme Name	Bachelor of Technology (Textiles Engineering)	Semester VIII
Course Title	QUALITY ASSURANCE IN APPAREL INDUSTRY	
Course Code	PEC-TEX-418A	
Course Purpose	- To aware the students on about importance of quality in apparel sector	
Course Outcomes	After completing this course, students will be able to: **CO1**. Understanding the basic concept of quality **CO2**. Describe quality control and its commercial aspects **CO3**. Discuss various inspection process **CO4**. Illustrate different quality management systems **CO5**. List the various care labelling systems	
Prerequisite	Basic knowledge of textile testing and garment manufacturing process	

PEC-TEX-418A

QUALITY ASSURANCE IN APPAREL INDUSTRY

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note- *Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit**.** Question no. 1 is compulsory. It is objective type questions of multiple choices covering the entire four units.*

UNIT-I

Definition & importance of Quality, Tools of quality control,

UNIT-II

Quality Control – Principles of Quality Control, total quality control, statistical quality control, quality circle, quality and profitability.

UNIT-III

Inspection – Definition, inspection, loop, raw material inspection, in-process inspection, final inspection, comparability checks.

UNIT-IV

ISO-9000 series of standards. Quality assurance, TQM, Six Sigma. Care labeling of apparel and textiles – American care labeling system, British care labeling system, and Japanese care labeling system.

Suggested Text Books and References:

1. Mehta P. V., "An Introduction to Quality Control for the apparel", CRC PRESS, 1992
2. Bhardwaj S. and Mehta P. V., "Industry Managing Quality in the Apparel Industry", New Age International, 1998.
3. Carr, H. and Latham, B., "The Technology of Clothing Manufacture", John Wiley & Sons, 2nd Revised Edition, 1994.

Programme Name	Bachelor of Technology (Textiles Engineering)	Semester VIII
Course Title	TEXTILE COSTING	
Course Code	OEC-TEX-420A	
Course Purpose	-To aware the students on costing of textile products in industry	
Course Outcomes	After completing this course, students will be able to: **CO1**. Understand the basic concept of costing **CO2**. Explain the financial terms used in costing department. **CO3**. Describe the cost structure in textile industry. **CO4**. Explain labour allocation and rationalization of labours in textile industries.	
Prerequisite	Knowledge of textile production and management.	

OEC-TEX-420A

TEXTILE COSTING

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note- *Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question no. 1 is compulsory. It is objective type 10 questions of multiple choices covering the entire four units.*

UNIT-I

Fundamentals of Costing:

Cost concept. Classification of cost, elements of cost. Methods of costing. Unit and operating costing, preparation of cost sheet. Estimation of cost of production and component of total cost. Profit planning, job order, batch process, and conversion cost. Inventory costing.

UNIT-II

Cost Optimization: Cost-Profit-Volume analysis, break-even point, contribution margin, margin of safety, angle of incidence. Capital budgeting.

UNIT-III

Cost Structure in Textile Industry: Cost structure, cost of raw material/labour /utilities. Cost control, standard costs, determination of cost per kg of yarn, per meter of fabric, cost of dyeing/printing per meter of fabric, yarn realization, measures of cost reduction, selling price decision for yarn/fabric. Concept of depreciation.

UNIT-IV

Labour Allocation and Rationalization of Labour: Labour allocation in different department of textile mill. Work-load standards for card tenters, speedframe and ring frame tenters, doffers and winders, weavers, etc. Costing of large package spinning and optimum package size. Costing of Open end spun and Air-jet spun yarns.

Waste and its control at spinning and weaving, Costing of shuttle-less looms like Sulzer, air-jet. Economics of shuttle loom,

Suggested Text Books and References:

1. Textile Costing by SITRA.
2. Khan and Jain, “Management Accounting”, Tata McGraw-Hill Publication.
3. Owler, L. W. J., Brown, J. L., “Wheldon’s Cost Accounting and Cost Methods”, ELVS Publication.

Programme Name	Bachelor of Technology (Textiles Engineering)	Semester VIII
Course Title	MANAGEMENT OF TEXTILE PRODUCTION	
Course Code	OEC-TEX-422A	
Course Purpose	To make the students aware of textile production management	
Course Outcomes	After completing this course, students will be able to: **CO1**. Define different sectors of Indian textile industry **CO2**. Get idea about plant location and layout for textile industries. **CO3**. Describe the concept of production planning control and ERP **CO4**. Understand the concept of air conditioning, power consumption, maintenance and work management in textile industry **CO5**. Explain different measures to be taken for maintaining good working environment in industry	
Prerequisite	Basic knowledge of textile production processes	

OEC-TEX-422A

MANAGEMENT OF TEXTILE PRODUCTION

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note- *Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question no. 1 is compulsory. It is objective type 10 questions of multiple choices covering the entire four units.*

UNIT-I: Textile Industry Scenario

Textile Industry Scenario, Textile Industry growth, problems & government policy, Make in India Concept, start-up policy of government and its utilization for textile industry.

Global Industry Scenerio: WTO / GATT / MFA - Functions and objectives, successes and failures.

Location and Layout: Different types of layouts, Layout plan for spinning, weaving and process house.

UNIT-II: Production, Planning and Control

Production, Planning and Control: Supply chain and demand chain analysis, Supply chain management and its importance, JIT technology, Concept of zero defects, Inventory concepts, techniques to reduce inventory, ABC analysis, EOQ, P and Q systems. Concept and applications of ERP and (MIS) Management information system.

UNIT-III: Operation Management in Textile Industry

Air Conditioning and humidification: Humidification systems used in textile mills, Development in humidification systems.

Power Consumption: Energy consumption in textile machines, Measure to reduce power consumption.

Maintenance Management: Maintenance systems, Maintenance schedules.

UNIT-IV

Working Environment: Basics of work load and work assignment, effect of end breaks on work assignment, effect of end breaks on work assignment. Measures of good working environment, Measures to minimize noise, terms related to lighting, illumination level required for different departments, Material handling equipments, Accidents and safety engineering, Fire prevention and protection. Industry laws like labour laws, factory acts and its study.

Suggested Text Books and References:

1. Dudeja V D, "Management of textile Industry" Textile Trade Press Ahmedabad (1981)
2. Ormerod A, "Textile Project Management" The Textile Institute, ManchesterUK(1992)
3. Talukdar M K, Srirammulu P K and Ajgaokar D B, "Weaving – Machine, Mechanism and Management," Mahajan Publisher Private Ltd., Ahmedabad, India (1998)
4. Grade A R and Subramanian T A, "Process Control in Spinning," 3rd Edition., ATIRA Ahmedabad, (1987)
5. Levit J, "Handbook of Maintenance Management," Industrial Press Inc, 2009

Programme Name	Bachelor of Technology (Textiles Engineering)	Semester VIII
Course Title	PRODUCT DESIGN AND DEVELOPMENT	
Course Code	OEC-TEX-424A	
Course Purpose	To make the students aware about of product design and development Process	
Course Outcomes	After completing this course, students will be able to: **CO1**. Basic concepts and critical factors for product design **CO2**. Basic elements and tools for conceptualization of product design **CO3**. Understanding of product life cycle and its conceptualization **CO4**. Understand the various stages of sample development	
Prerequisite	Basic knowledge of textile production processes	

OEC-TEX-424A

PRODUCT DESIGN AND DEVELOPMENT

L T P
3 1 0

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note- *Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question no. 1 is compulsory. It is objective type questions of multiple choices covering the entire four units.*

UNIT-I

Introduction, Characteristics of successful product design, Product development, process tools; Understanding customer needs, establishing product function and product specification.

UNIT-II

Product life cycle, phase of product development viz. Concept generation, Concept selection, Concept testing, Product architecture. Design for manufacturing.

UNIT-III

Types of products, study apparel product lines, brand management, idea generation, screening, commercialization, product positioning, major reasons for product failure, Product design economics.

UNIT-IV

Merchandiser's role in product development, Pre-production & TNA meetings, sampling-developing samples, sample types, sample approvals, lab dip, yarn dip, bit loom, strike offs, pre-costing and order follow-up.

Suggested Text Books and References:

1. Otto Kevin, and Wood Kristin, Product Design Techniques in Reverse Engineering and New product Development Pearson Education publication, Ist Ed, 2006.

2. Ulrich K T, Product Design and Development, TMG, 3rd Ed, 2004