

**MRSPTU B. TECH TEXTILE ENGINEERING STUDY SYLLABUS 2016 BATCH
ONWARDS**

**B.Tech. Textile Engineering
SEMESTER-3RD**

Total Contact Hours = 23

Total Marks =900

Total Credits = 21

Subject Code	Subject	Periods			Credits	Ext.	Int.	Total
		L	T	P				
BTEX1-301	Fundamentals of Textile Machines and Processes	3	0	0	3	60	40	100
BTEX1-302	Textile Fiber – I	3	1	0	4	60	40	100
BTEX1-303	Fabric Manufacturing – I	3	1	0	4	60	40	100
BTEX1-304	Yarn Manufacturing – I	3	1	0	4	60	40	100
BSOS0-F91	Soft Skills-I	0	0	2	1	40	60	100
BTEX1-305	Lab –I Textile Fiber –I	0	0	2	1	40	60	100
BTEX1-306	Lab –II Fabric Manufacturing – I	0	0	2	1	40	60	100
BTEX1-307	Lab –III Yarn Manufacturing – I	0	0	2	1	40	60	100
BTEX1-300	Workshop Training	0	0	0	2	40	60	100
Total	Theory = 4 Lab = 03	12	3	08	21	400	400	900

SEMESTER - 4TH

Total Contact Hours = 24

Total Marks =700

Total Credits = 20

Subject Code	Subject	Periods			Credits	Ext.	Int.	Total
		L	T	P				
BTEX1-408	Textile Fiber –II	3	1	0	4	60	40	100
BTEX1-409	Yarn Manufacturing – II	3	1	0	4	60	40	100
BTEX1-410	Fabric Manufacturing –II	3	1	0	4	60	40	100
BTEX1-411	Textile Chemical Processing –I	3	1	0	4	60	40	100
BSOS0-F92	Soft Skills-II	0	0	2	1	40	60	100
BTEX1-412	Lab –IV Yarn Manufacturing-II	0	0	2	1	40	60	100
BTEX1-413	Lab – V Fabric Manufacturing-II	0	0	2	1	40	60	100
BTEX1-414	Lab –VI Textile Chemical Processing – I	0	0	2	1	40	60	100
Total	Theory 04 Lab 03	12	04	08	20	400	400	800

**MRSPTU B. TECH TEXTILE ENGINEERING STUDY SYLLABUS 2016 BATCH
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SEMESTER-5th

Total Contact Hours = 27

Total Marks =1000

Total Credits = 26

Subject Code	Subject	Periods			Credits	Ext.	Int.	Total
		L	T	P				
BTEX1-515	Properties of Fiber	3	1	0	4	60	40	100
BTEX1-516	Quality management in Textile Industry	3	1	0	4	60	40	100
BTEX1-517	Fabric Structure Analysis	3	0	0	3	60	40	100
BTEX1-518	Textile Testing-I	3	1	0	4	60	40	100
BTEX1-519	Textile Chemical Processing –II	3	1	0	4	60	40	100
BSOS0-F93	Soft Skills-III	0	0	2	1	40	60	100
BTEX1-520	Lab –VII Textile Testing-I	0	0	2	1	40	60	100
BTEX1-521	Lab – VIII Textile Chemical Processing –II	0	0	2	1	40	60	100
BTEX1-522	Lab –IX Fabric Structure Analysis	0	0	2	1	40	60	100
BTEX1-523	Training-II				3	40	60	100
Total	Theory 05 Lab 03	15	4	8	26	500	500	1000

SEMESTER-6th

Total Contact Hours = 26

Total Marks =800

Total Credits = 23

Subject Code	Subject	Periods			Credits	Ext	Int	Total
		L	T	P				
BTEX1-624	Theory of Textile Structure	3	1	0	4	60	40	100
BTEX1-625	Process Control in Textiles	3	1	0	4	60	40	100
BTEX1-626	Knitting Technology	3	1	0	4	60	40	100
BTEX1-627	Textile Testing-II	3	1	0	4	60	40	100
BSOS0-F94	Soft Skills-IV	0	0	2	1	40	60	100
BTEX1-628	Lab –X Knitting Technology	0	0	2	1	40	60	100
BTEX1-629	Lab –XI Textile Testing-II	0	0	2	1	40	60	100
Departmental Elective – I (Select any one)		3	1	0	4	60	40	100
BTEX1-656	Nonconventional Yarn Manufacture							
BTEX1-657	Advanced Fabric Structure							
BTEX1-658	Process Control in Chemical Processing							
Total	Theory 05 Lab 02	15	05	06	23	420	380	800

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SEMESTER 7TH

Total Contact Hours = 23

Total Marks =600

Total Credits = 22

Subject Code	Subject	Periods			Credits	Ext	Int.	Total
		L	T	P				
BTEX1-730	Kinematics of Textile Machines	3	1	0	4	60	40	100
Departmental Elective – II (Select any one)		3	1	0	4	60	40	100
BTEX1-759	Nonwoven Technology							
BTEX1-760	Texturing Technology							
Departmental Elective – III (Select any one)		3	1	0	4	60	40	100
BTEX1-761	Garment Manufacturing Technology							
BTEX1-762	Marketing & Financial Management in Textiles							
Departmental Elective – IV (Select any one)		3	1	0	4	60	40	100
BTEX1-763	Post Spinning Operation							
BTEX1-764	Waste Management and Pollution Control in Textile Industry							
Open Elective	-----	3	0	0	3	60	40	100
BTEX1-731	Training-III	0	0	0	3	40	60	100
Total	Theory 04 Lab 0	15	04	00	22	340	260	600

SEMSETER- 8TH

Total Contact Hours = 22

Total Marks =500

Total Credits = 18

Subject Code	Subject	Periods			Credits	Ext.	Int.	Total
		L	T	P				
BTEX1-832	Mechanics of Textile Process	3	1	0	4	60	40	100
BTEX1-833	Mill Planning & Management	3	1	0	4	60	40	100
Departmental Elective – V (Select any one)		3	1	0	4	60	40	100
BTEX1-865	Technical Textiles							
BTEX1-866	High Performance & Specialty Fibers							
Departmental Elective – VI (Select any one)		3	1	0	4	60	40	100
BTEX1-867	Multi Fibre Process							
BTEX1-868	Nonconventional Fabric Manufacture							
BTEX1-834	Project	0	0	6	2	40	60	100
Total	Theory 04 Lab 0 P01	12	4	6	18	280	220	500

Total Credits = 25 + 25 + 21 + 20 + 26 + 23 + 22 + 18 = 180

**MRSPTU B. TECH TEXTILE ENGINEERING STUDY SYLLABUS 2016 BATCH
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FUNDAMENTALS OF TEXTILE MACHINE AND PROCESSES

Subject Code: BTEX1-301

**LT P C
3 1 0 4**

Duration: 40 Hours

UNIT– I (15 Hours)

Basic characteristics of textile materials; Classification of fibres. Basic requirements of fibre forming polymers. Elementary idea of polymerization. Concept of dimensional characteristics of textiles; (eg. Fiber and Yarn Numbering systems, fabric thickness etc.) Applications of textiles in diversified fields; Variations in textile structure and properties based on applications.

UNIT – II (12 Hours)

Role of different structure and material constituents for fulfillment of target requirements; Different machine sequences for processing textile materials differing in structure Introduction to the language of textile and process flow of fibers up to finished product.

UNIT – III (8 Hours)

Elementary idea about the objectives and working of each machine used in yarn manufacturing. Woven knitted and nonwoven fabric production. Basic idea of nonconventional spinning & weaving machineries.

UNIT – IV (5 Hours)

Elementary idea of desizing, scouring, bleaching, dyeing, printing & finishing processes. Different end uses of finished products.

Recommended Books:

1. V.A. Senhai, 'Textile Fibre', vol-1, Sevak Publishers, Bombay, 1995.
2. W. Klein, 'Manual of Textile Technology' Textile Institute, Manchester, 1995.
3. T.K. Pattabhiram, 'Essential Elements of Textile Calculations' 2nd Edn., Textile Trade Press, Ahmedabad.
4. E.P.G. Gohl & Vilensky L.D., 'Textile Science', 1st Indian Edn., CBS Publishers, 1987.
5. Rose Sinclair, 'Textiles and Fashion: Materials, Design and Technology', Woodhead Publishing Series in Textile, No. 126.
6. W.E. Morton and J.W.S. Hearle, 'Physical Properties of Textile Fibres', Woodhead Publishing Series in Textiles No. 68, 2008, UK.

TEXTILE FIBRE –I

Subject Code : BTEX1-302

**LT P C
3 1 0 4**

Duration : 40 Hours

UNIT -I (5 Hours)

Introduction: Fibre, Textile fibre, Staple fibre, Filament fibre, Natural fibres, Manmade fibres, regenerated and Synthetic Fibres, Classification of textile fibers.

UNIT- II (10 Hours)

Properties of fibres and polymers: Essential and desirable properties of textile fibers, Essential properties of fibre forming polymers. Correlation of structures with properties of fibres, Crystallinity and Orientation in fibres.

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UNIT-III (10 Hours)

Production properties and uses of Major natural Fibres: Production, Physical & Chemical properties and uses of Major natural Fibres (e.g. cotton, flax, jute, wool, silk).

UNIT-IV (15 Hours)

Man Made Fibres : Introduction to manmade fibres. Basic production systems for the manmade fibre i.e. melt, wet and dry spinning systems. Production, Properties and uses of regenerated fibres (e.g. viscose, Cuprammonium, polynomic, HWM & acetate rayons).

Recommended Books:

1. M. Lewin, Hand Book of Fibre Chemistry, 3rd Edn, CRC Press Tylor & Francis Group, 2007.
2. B.P. Corbman, Textile Fibre to Fabric, 6th Edn, McGraw Hill Singapore, 1983.
3. R.R., Wardman, R.H., The Chemistry of Textile Fibres, Royal Society of Chemistry (RSC) Publishing, Cambridge, U.K, 2011.
4. R.M. Kozlowsky, 'Hand Book of Natural Fibres', Volume-I, Wood Head Publishing, Cambridge, U.K, 2012.
5. E.P.G Gohl,, L.D. Vilensky, 'Textile Science', CBS Publishers, New Delhi, India, 1987.
6. V.A Shenai., 'Technology of Textile Processing: Textile Fibres', Volume-I, Sewak Publications, Mumbai, India, 1995.

FABRIC MANUFACTURE-I

Subject Code: BTEX1-303

**L T P C
3 1 0 4**

Duration: 40 Hours

UNIT-I (12 Hours)

WINDING: Objectives, basic features of slub catchers and yarn clearers like Mechanical and electronics types. Yarn tensioners: Additive, Multiplicative & Combined. Anti-patterning: Reasons and Remedies. Classification and basic features of auto winders, Yarn doubling systems, Splicing and knotting Yarn fault classifying systems.

PIRN WINDING: Objective, different types of pirms, yarn traversing system, automation, standard winding parameters.

UNIT-II (10 Hours)

WARPING: Comparison of various types of warping such as: Beam warping & Sectional warping. Basic features, Creels, Reeds, Leasing systems and drawing systems

SIZING: Objectives & classification of sizing methods, features of sizing machine, machine elements, sizing ingredients, size preparation. Principles of different modern sizing techniques and their uses.

UNIT-III (4 Hours)

WEAVING: Manual, automation, General loom classifications, and Overall concept of looms. Concepts of primary, secondary & auxiliary motions of looms

UNIT- IV (14 Hours)

BASIC MOTIONS: Different types with advantages and disadvantages, Reed and reed counting systems, Tappet shedding: Mechanisms & principles. Positive & negative shedding, Heald reversing motions Types such as: under picking, over picking and parallel picking. Calculation of Picking force & shuttle velocity, Different picking accessories and its function, Pick timing

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such as late picking & early Picking. Reasons of false picking & shuttle fly. Movement of sley, Beat-up & sley eccentricity, Calculation related to sley eccentricity & its effects.

CALCULATIONS ON: Production and efficiency related to winding, warping and sizing. Machine Balancing in winding, warping, sizing and weaving.

Recommended Books

1. J.E Booth, 'Textile Mathematics', CBS Publishers N. Delhi, 1995.
2. N.N. Bannerjee, 'Weaving Mechanism', Textile Book House, Berhampore, WB., 1993.
3. M.K. Talukdar, 'Winding', Spinnet View, 1992.
4. A. Sengupta, 'Weaving Calculations', DBT & SONS Pvt. Ltd., Mumbai., 1996.
5. R. Marks & Robinson A.T.C. 'Principles of Weaving', Textile Institute, Manchester, 1976.
6. P.R. Lord & Mohammed M.H, 'Conversion of Yarn to Fabric', 2nd Edn., Marrow Publications Manchester, 1982.

YARN MANUFACTURING - I

Subject Code: BTEX1-304

**LT P C
3 1 0 4**

Duration: 40 Hours

UNIT-I (4 Hours)

Introduction to short and long staple spinning

Ginning: Objectives of ginning, differential ginning, Roller, Saw and McCarthy ginning machines.

UNIT-II (12 Hours)

Blow Room: Objectives of mixing and blending, Different methods of mixing and blending, Study of modern blending machines, Auto mixer. Principle of opening and cleaning objects of Blow room line. Various type of opener and cleaner their construction and working, its modern development. Study of Lap forming mechanism, Calendar roller pressure, Length measuring mechanism, feed regulating system. Single line processing, Selection of machinery for different types of cotton fibre, Different types of Lap defects and their remedies, Degree of opening, Norms, Recent development in Blow room, Calculation pertaining to blow room. Selection of Blow Room line for different types of cotton fibre.

UNIT-III (12 Hours)

Carding: Objectives of carding. Introduction to roller and clearer card. Principle of carding. Detailed study of revolving flat card. Construction, feature and working details of licker-in cylinder, doffer and flats. Card clothing; metallic & flexible, Carding angle, card setting, Neps in card, Fibre hooks, Fibre transfer. Features of high production card. Defects in card web & their remedies. Auto leveller. Calculation pertaining to production, draft etc. of carding m/c. Recent development in Card.

UNIT-IV (12 Hours)

Darwframe: Objectives of drawing, principles of roller drafting. Detailed study of draw frame machine. Roller & Rollers settings, Roller weighting, Roller clearer, Mechanics of roller slip, roller eccentricity, roller vibration. Conventional drafting system, Shirley draft distribution. Drafting wave, Different drafting system, Features of Modern draw frame, auto leveller in draw frame. Calculation pertaining to draft and production of draw frame machine.

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Recommended Books:

1. W. Klein, 'Opening and Carding', Textile Institute Manchester, **1987**.
2. W. Klein, 'Short Staple Spinning Series', Textile Institute Manchester, **1987**.
3. K.R. and R. Chattopadhyay, 'Blow Room and Card NCUTE, IIT Delhi, **1998**.
4. Venkatsubramanian, 'Spun Yarn Technology', Vol.-I, & II, Mub. Sevak Pub.
5. T.K. Pattabhiram, 'Cotton Spinning', Somaiya Publication Pvt. Limited, New Delhi, 4th Edn., **1997**.
6. Gilbert R. Merill, 'Cotton Blow Room and Carding', Gilbert R Publication, Lowell, No.1955.
7. J.E. Booth, 'Textile Mathematics', Vol –I, Textile Institute Manchester, **1975**.
8. J.E. Booth, 'Textile Mathematics', Vol –II, Textile Institute Manchester, **1975**.
9. Gilbert R. Merill, 'Opening and Carding', Gilbert R. Publication, Lowell, Mass, **1960**.
10. Taggart William, 'Cotton Spinning', Universal Book Corporation, Mumbai.

LAB I : TEXTILE FIBRE

Subject Code: BTEX1-305

**L T P C
0 0 2 1**

Duration: 20 Hours

At least 10 experiments are to be performed by each student

Physical and Chemical identification of following Textile fiber (s)

1. Identification of cotton
2. Identification of wool
3. Identification of silk
4. Identification of Bast fibres
5. Identification of polyester
6. Identification of nylon
7. Identification of Acrylic
8. Identification of Polypropylene
9. Identification of fibres in blend and % fibre content in blend
10. Analysis of P/C blended fabric
11. Analysis of P/V blended fabric
12. Analysis of P/W blended fabric
13. Estimation of fibre/filament fineness using projection microscope.
14. Determination of moisture regain and content in cotton fibres.
15. Determination of fibre maturity percentage in cotton fibres.

LAB II: FABRIC MANUFACTURE-1

Subject Code: BTEX1-306

**L T P C
0 0 2 1**

Duration: 20 Hours

At least 10 experiments are to be performed by each student

1. Study of the motion transmission system in winding machine.
2. Study of the effect of slub catcher, yarn tensioner & yarn guide on package formation.
3. Study of Package stop motion in cone winding machine.

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4. Calculation of winding speed on grooved drum winding system and study of anti-patterning system incorporated to it.
5. Study of precision winding machine and mechanism of package building.
6. Study of the motion transmission system in Pirn winding machine.
7. Calculation of winding speed and traversing speed of Pirn winding machine.
8. Study of the sectional working machine & plan the width of a section according to the given striped fabric keeping in view the pattern.
9. To study the passage of yarn on a sizing machine and the features of various parts/mechanism of the sizing machine.
10. To select the proper reed and heald for a weaver's beam keeping in mind the beam, loom size and fabric construction.
11. Study of shedding mechanism of shuttle loom and cam positioning with respect to loom cycle.
12. Study of picking mechanism, Picker movement in relation with crank shaft rotation & calculation of average velocity of shuttle.
13. Study of sley movement, construction and calculation of sley eccentricity.

LAB III: YARN MANUFACTURE-1

Subject Code: BTEX1-307

**LT P C
0 0 2 1**

Duration: 20 Hours

At least 10 experiments are to be performed by each student

1. Study of general outline of opener & clearer machine employed in B/R line process.
2. Study of following in Shirley Trash Analyzer machine.
 - A) Chief organs.
 - B) Gearing arrangements.
 - C) Speed of different beater.
 - D) Teeth inclination & Teeth per inch.
3. Determination of trash content and analysis of waste by using trash analyzer machine.
4. Study of carding machine with technical details.
5. Study of gearing mechanism calculation of the speed of different organs of carding machine.
6. Calculation of draft between different zone & production of carding machine.
7. Study of card settings for different fibre lengths & types.
8. Maintenance and overhauling of carding machine.
9. Study of distribution of fibrous waste in a carding machine.
10. Study of the 'Nep -COUNT' in a card.
11. Study of drafting arrangement & top roller weighting system of Drawframe machine.
12. Calculation of the total draft and its distribution in draw frame machine
13. Effects of break draft and roller settings on sliver uniformity.
14. Measurement of nip-load pressure, roller eccentricity & shore hardness of top roller drafting rollers.
15. Maintenance and overhauling of draw frame machine.

TEXTILE FIBRE-II

Subject Code: BTEX1-408

**LT P C
3 1 0 4**

Duration: 40 Hours

Unit-I (5 Hours)

Introduction: Introduction to man-made fibres, Idea about fine structure of man-made fibres.
Crystallinity, orientation: Detailed study of crystallinity, orientation and its effects on fibre properties.

Unit-II (15 Hours)

Melt Spinning: Melt Spinning with special reference to Polyester & Nylon. Melting of polymer chips, extrusion, spinning, drawing, heat setting & cutting of melt spun filaments/fibre.

Wet and dry spinning: Wet and dry spinning with special reference to acrylic. Relative merits & demerits of the wet & dry spinning systems. Preparation of polymer solution, extrusion, spinning, filament formation drawing, heat setting, cutting of wet & dry spun filaments/fibre.

Unit-III (10 Hours)

Heat Setting: Introduction about heat setting. Important parameters of heat setting & their effect on fibre properties.

Drawing and Stretching: Introduction about drawing. Drawing condition, phenomenon of necking, Machines for stretching continuous, filament yarns, Drawing, heat setting, crimping of staple fibres.

Unit-VI (10 Hours)

Production Properties and uses of Synthetic Fibres: Detail study of the production, physical, chemical structures & Properties of polyester, nylon 6 & 66, **Polypropylene**, acrylic, elementary idea about high speed spinning.

High Performance Fibres: Introduction to high performance fibres, Elementary idea about aramid, carbon & glass fibres.

Recommended Books:

1. R.R. Matter, R.H. Wardman, 'The Chemistry of Textile Fibres', Royal Society of Chemistry (RSC) Publishing, Cambridge, U.K, 2011.
2. M. Lewin, 'Hand Book of Fibre Chemistry', 3rd Edn, CRC Press Tylor & Francis Group, 2007.
3. V.K Kothari., 'Progress in Science and Technology, Textile Fibres- Development and Innovation', Volume-2, IAFL Publication, New Delhi, India, 2000.
4. B.P. Corbman, 'Textile Fibre to Fabric', 6th Edn, McGraw Hill Singapore, 1983.
5. B.L. Deopura, B. Gupta, Manmade Fibres, NCUTE-Pilot Programme, Dept. of Textile Technology, IIT, Delhi, 1999.
6. E.P.G. Gohl, L.D. Vilensky, 'Textile Science', CBS Publishers, New Delhi, India, 1987.
7. S.P. Mishra, 'Science and Technology of Manmade fibres', Suraj Publication, 2007.
8. V.A. Shenai, Technology of Textile Processing: Textile Fibres, Volume-I, Sewak Publications, Mumbai, India, 1991.
9. A.A. Vaidya, 'Production of Synthetic fibres', Prentice Hall of India Pvt. Ltd. Publisher, 1988.

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YARN MANUFACTURE – II

Subject Code: BTEX1-409

**LT P C
3 1 0 4**

Duration: 40 Hours

UNIT-1 (3 Hours)

Brief idea about short staple spinning technology.

UNIT-II (11 Hours)

Combing process: Objectives, combing for shorter and medium varieties of cotton, cottons suitable for combing, preparation of stock for combing, combing cycle, role of machine components and settings, noil extraction at backward feed and forward feed comber, norms, assessment and production calculations. Recent developments, Process related to roving formation: Objectives, functions of different machine components and high drafting system, roving twist in speed frame, winding principles and equations related to bobbin leading and flyer leading, building motion, production calculations, norms, and performance assessment. Developments in speed frame.

UNIT-III (13 Hours)

Ring spinning Process: Function and mode of operation of ring frame, role of drafting system, yarn guiding devices, forces acting between ring and traveler, yarn tension variation, angle of yarn pull, tasks of traveler, limiting speed, classification, form of traveler, traveler mass and material, different ring-traveler combinations, fiber lubrication, running on new-ring, winding process, cop building, cylinder and conical tip, spinning geometry, causes of end breaks, production calculations, norms, performance assessment. Latest developments including compact spinning

UNIT-IV (13 Hours)

Non-conventional spinning processes: Brief idea about principle of open end spinning, rotor spinning, chief organs and their functions, yarn properties in comparison with ring-spun yarn, principle of friction spinning, function of chief organs, yarn properties, basic principle to air jet spun yarn, functions of chief organs, yarn properties.

Recommended Books:

1. W. Klein, 'Manual of Textile Technology', vol.1 to 5', The Textile Institute Manchester, **1995**.
2. A.R. Khare, 'Elements of Combing', Sai book Center, Mumbai, **1999**.
3. A.R. Khare, 'Elements of Ring Frame and Doubling', Sai book Centre, Mumbai, **1999**.
4. K.R. Salhotra, 'Spinning of Man Made and Its Blends in Cotton System', The Textile Association of India, Mumbai, **1989**.
5. R. Chattopadhyay and R. Rengasamay, 'Spinning: Drawing, Combing and Roving', NCUTE, IIT, Delhi, **1999**.
6. Merill, R Gilbert, Roving, Gilbert R Publication, Lowell, Mass, **1956**.
7. W. Klein, 'Practical Guide to Ring Spinning', Vol. -4, Textile Institute, Manchester, **1987**.
8. W. Klein, 'Short Staple Spinning Series', Textile Institute, Manchester, **1987**.
9. P.R. Lord, 'Roller Drafting', Textile Progress 23 vol. 4, Textile Institute, Manchester, **1993**.
10. Taggart William, 'Cotton Spinning', Universal Book Corporation, Mumbai.
11. K.R. Salhotra, R. Alagiruswamy, R. Chattopadhyay, 'Ring Spinning, Doubling and Twisting', NCUTE, IIT Delhi, **2000**.

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12. K.R. Salhotra and B. Dutta, 'Seminar on Rotor Spinning', IIT Delhi, **1981**.
13. J.E. Booth, 'Textile Mathematics', Vol. –II, Textile Institute Manchester, **1975**.
14. Taggart William, 'Cotton Spinning', Universal Book Corporation, Mumbai.

FABRIC MANUFACTURE - II

Subject Code: BTEX1-410

**LT PC
3 1 0 4**

Duration: 40 Hours

UNIT-I (6 Hours)

LET OFF: Different types of let-off systems, long term, short term and medium term variations. Relation between beam diameter and tension of warp. Principles of modern positive Let-off systems as such as Sulzer, Hunt, etc.

TAKE-UP: Types of take-up, examples of each.: Periodicity in Take - up, Modern continuous take up like Sulzer, Saurer etc.

UNIT-II (4 Hours)

WARP STOP:-Types of warp stop motions with examples such as Mechanical & Electrical stop motion.

WARP PROTECTOR: Study of Loose reed and fast reed warp protector motion.

WEFT STOP: Functions of Weft feelers and its different types.

UNIT-III (10 Hours)

DOBBY:-Object of dobby, scope of dobby, different types of dobby and their mechanisms such as Positive and Negative dobby. Pegging systems as per design of fabric, Functions of Paper dobby & Climax dobby.

JACQUARD:- Scope of jacquard, different types of jacquard such as single lift single cylinder, Double lift single cylinder, double lift double cylinder, Cross border jacquard, Jacquard card punching systems as per fabric design. Temple motions and its importance, Different types of temples used in loom.

UNIT-IV (20 Hours)

Study of Automatic Package Changing mechanism (Pirn changing and shuttle changing). Functions of Multiple Box motion. (2x1 and 4x1 drop box) Different types of non-conventional weaving machines.

Unconventional Loom: History behind their development Sulzer projectile weaving machines (Shedding, beat-up, torsion bar picking, let-off and Take-up mechanism). Projectile checking and return. Elitex and Sulzer airjet weaving machine. Picking System of water jet weaving machine. Projectile loom. Different types of Rapiere weaving machines. Weft feeding system to the shuttleless weaving machines. Basic principles of Multiphase weaving & Circular weaving machine.

Recommended Books:

1. R. Marks and A.T.C. Robinson, 'Principles of Weaving', Textile Institute, **1976**.
2. Prabir Kumar Banerjee, 'Principles of Fabric Formation', CRC Press, **2015**.
3. P.R. Lord & M.H. Mohamod, 'Weaving: Conversion of Yam to Fabric', Merrow Publishing Co. Ltd., **1992**.
4. V. Valeriy, Choogin, 'Mechanisms of Flat Weaving Technology', Woodhead Publishing, **2013**.
5. Sabit, Adanur, 'Handbook of Weaving', Technomic Publications, **2001**.

TEXTILE CHEMICAL PROCESSING – I

Subject Code: BTEX1-411

**LT P C
3 1 0 4**

Duration: 40 Hours

UNIT-I (10 Hours)

Introduction: Process line for pretreatment, colouration and finishing of textiles

Singeing: Object of the process, types of singeing, details of various singeing methods, drawbacks and advantages. Process and quality control aspects involved.

Desizing: Object, 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 coloured textiles. Scouring of natural, manmade and blended textiles. Evaluation of scouring efficiency.

UNIT-II (10 Hours)

Bleaching: Objectives of bleaching. Hypochlorite, peroxide, chlorite and per-acetic acid bleaching methods and their effectiveness on various textiles. Controlling parameters and mechanism involved in each method. Efficiency of bleaching.

Mercerization: Objectives, mechanism related to various physical and chemical changes in cotton during mercerization. Process parameters and operation details. Causticization. Wet and hot mercerization. Ammonia treatment of cotton. Performance of various mercerization /alkali treatment processes. Assessment of efficiency of mercerization: Barium activity number, its determination and interpretation.

Pretreatment machineries: Singeing m/c, J-box, kier, mercerizing machine,

UNIT-III (10 Hours)

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

Mechanical Finishes: Physical and chemical softening processes, selection of chemical and evaluation of softening. Calendering - its types, construction and function of various calendering m/cs. Sanforizing - method, mechanism and machineries involved. Evaluation of sanforizing.

UNIT-IV (10 Hours)

Carbonization: Objectives, selection of chemical, process details, trouble shoots, precautionary measures and efficiency of carbonization.

Functional finishes: Problem of creasing, anti-crease finish on cotton. Choice of chemical, catalyst and process parameters. Drawback and advantages associated with use of various anti-crease chemicals. Measures to reduce release of formaldehyde. Water repellency and water repellent finishes on cotton. Evaluation of water repellency.

Recommended Books:

1. A.K. Roy Choudhary, 'Textile Preparation & Dyeing', Science Publishers, USA, 2006.
2. R.H. Peters 'Textile Chemistry', Vol - II, Elsevier Publishing Company, London, 1967.
3. R.M. Mittal and S.S. Trivedi, 'Chemical Processing of Polyester / Cellulosic Blends', Ahmedabad Textile Industries Research Association, Ahmedabad, India, 1983.
4. S.R. Karmakar, 'Chemical Technology in the Pretreatment Processes of Textiles', Textile Science & Technology Series, Vol-12, 1st Edn, Elsevier, 1999.

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5. A.J. Hall, 'Textile Finishing', Haywood Books, London, 1996.
6. V.A. Shenai, 'Technology of Bleaching & Mercerization'.
7. A.A. Vaidya, 'Textiles Auxiliaries & Finishing Chemicals'.
8. V.A. Shenai and N.M. Saraf, 'Technology of Textile Finishing', Sevak Publications, Mumbai, 1990.

LAB IV: YARN MANUFACTURE-II

Subject Code: BTEX1-412

**LT P C
0 0 2 1**

Duration: 20 Hours

At least 10 experiments are to be performed by each student.

1. To study the timing diagram of a comber.
2. To study the function of top comb and its depth of penetration with reference to noil extraction and fractionating efficiency.
3. To study the nature of movement of nipper assembly.
4. To study the mechanism of detaching roller drive and the nature of its motion.
5. To study the effect of type of feed and detachment setting on noil percentage and fractionating efficiency.
6. To estimate head to head difference in noil level (mill based study).
7. To study the effect of feed per nip on percentage in Nep level during combing.
8. To study the Drafting, Twisting and Winding Zone of speed frame.
9. To study the Gearing & Driving mechanism of speed frame.
10. To study the Differential Motion of speed frame and calculation of Bobbin speed.
11. Calculation of break draft constant, draft constant and twist constant and production of speed frame.
12. To study the influence of machine and process parameters on roving unevenness.
13. To study the drafting, twisting and winding zone in ring frame.
14. To study the Gearing, Driving and Building motion in Ring frame.
15. Calculation of Draft Constants, Twist Constant, Coils per inch and production of Ring frame.
16. To ascertain the effect of break draft and total draft on yarn unevenness and strength.
17. Estimation of spinning tension as a function of traveler weight, yarn count and balloon height.
18. To perform various settings and maintenance operation on Ring frame; Such as:
19. Ring rail leveling
20. Spindle gauging
21. Spindle eccentricity
22. Lappet eccentricity
23. To study the effect of shore hardness on yarn quality.
24. To study the influence of spindle speed & traveler weight on hairiness.
25. Study the chief organs mechanism and calculations of open end and friction spinning machines.

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LAB V: FABRIC MANUFACTURE-II

Subject Code: BTEX1-413

**LT P C
0 0 2 1**

Duration: 20 Hours

At least 10 experiments are to be performed by each student

1. Study of take up motion and calculation of loom take up constant.
2. Study of positive let-off system.
3. Study of Warp protection motion (both loose reed and fast reed).
4. Study of warp stop motion.
5. Study of Beating up system in Terry towel loom.
6. Study of Jacquard machine and designing of cards for different weave designs.
7. Study of temple motions.
8. Study of pirn changing mechanism.
9. Study of side/centre weft fork mechanism.
10. Study of (4x1) multiple box motion.
11. Study of Let-off and take-up of shut-less weaving machine.
12. Study of weft insertion mechanism of Air-jet and rapier weaving machine.
13. Study of selvedge formation technique of Air-jet weaving machine.
14. Identification of fabric faults by fabric inspection machine.

LAB VI: TEXTILE CHEMICAL PROCESSING – I

Subject-BTTX 1-414

**L T P C
0 0 2 1**

Duration: 20 Hours

At least 10 experiments are to be performed by each student

1. Scouring of cotton goods
2. Scouring of polyester goods
3. Scouring of P/C blended goods
4. Scouring of wool fibre
5. Degumming of silk
6. Bleaching of cotton with H_2O_2
7. Bleaching of cotton with $NaClO_2$
8. Bleaching of cotton with $NaOCl$
9. Bleaching of Polyester
10. Bleaching of P/C blend
11. Bleaching of jute yarns / fabric
12. To finish cotton fabric with
 - Water repelling agent
 - Urea – formaldehyde

PROPERTIES OF FIBRES

Subject Code: BTEX 1-515

**LT P C
3 1 0 4**

Duration: 40 Hours

UNIT- I (12 Hours)

Traditional View of fibre structure and its later development: Study of the methods of investigation of fibre structure, e.g., X-ray diffraction, electron microscopy and absorption of infra -red radiation. Fibre density and its measurement.

Moisture relations in Textile Fibre: Measurement of moisture absorption, measurement of regain, relationship between Moisture Regain and Moisture Content, Swelling of fibres- definitions and measurement. Heat of sorption- definitions, measurement and its effect on properties of textile material. Quantitative theory of moisture absorption. **Hysteresis** of moisture absorption.

UNIT-II (10 Hours)

Tensile properties of fibre: - Factors determining the result of tensile tests. Quantities & units of different parameters. Experimental methods. Elementary study of Fibre fracture.

Effect of Variability: Effect of specimen length on strength, weak link effect.

Elastic recovery: Definition, experimental methods, change of properties as a result of straining.

Study of time dependence: creep behavior, relaxation of stresses with time & its effect on tensile testing.

UNIT – III (8 Hours)

Introduction to dynamic testing: Basic concept & definition of elastic, viscoelastic and plastic deformations. Characterization of viscoelastic behavior, Concepts of Voight & Maxwell model. Test method for dynamic testing. Bending & torsional rigidity of fibre: Elementary concepts, theories and measurements.

UNIT- IV (10 Hours)

Fibre friction and its measurement: nature of friction & equations. Fibre to fibre and fibre to metal friction. Basic concept of Thermal properties & heat setting. **Optical properties of fibre:** Definition of refractive index, concept of fibre birefringence and orientation, Dichroism.

Introduction to dielectric property & static charge generation in textile material.

Recommended Books:

1. W.E. Morton & J.W.S. Hearle, 'Physical Properties of Fibres', 4th Edn., Woodhead Publishing Limited, Cambridge, UK, 2008.
2. V.K. Kothari, 'Progress in Textile Science & Technology', Vol - II, IAFL Publishers, New Delhi, 2000.

QUALITY MANAGEMENT IN TEXTILE INDUSTRY

Subject Code: BTEX 1-516

**LT P C
3 1 0 4**

Duration: 40 Hours

UNIT-I (10 Hours)

Quality Management: Definition of quality and its importance, different approaches to quality, Description of Deming's fourteen points and Ishikawa's seven tools of quality, utility of statistical method for quality control and improvement, concept of Total Quality Management (TQM), ISO 9000 Standards, Quality Function Deployment (QFD) and Quality Costs.

UNIT-II (12 Hours)

Basic Approaches to Statistical Quality Control: Population and sample, descriptive and inductive statistics, discrete and continuous variables, subjective tests, collection and classification of data, frequency distributions, measures of central tendency, measures of dispersion, random variables and probability distribution, differences and applications of normal, binomial, Poisson's and other form of distribution.

Statistical Analysis for Continuous Function: Population and sampling distribution of mean, statistical estimation theory, points estimates, concept of single tail and double tail test, Student's t distribution, confidence limit, statistical decision theory, tests of hypotheses and significances, type I and type II errors, difference between two sample means. Test for single variance, Chi-square test, the F distribution, test for the difference between two variances, confidence limits for variance and ratio of two variances, choice of sample size.

UNIT-III (6 Hours)

Statistical Analysis for Discrete Function: Application of binomial and Poisson's distribution, normal approximation, test for a single proportion and difference between two proportions, application of χ^2 distribution, contingency table.

Subjective Tests: Rank correlation, tied rank, coefficient of concordance.

UNIT-IV (12 Hours)

Acceptance Sampling: Basic idea about acceptance sampling, OC curve, producer's risk and customer's risk.

Control Charts: Advantages using quality control charts, random and assignable causes, action and warning limits, \bar{X} , R, p , $n p$ and c chart, Process Capability Ratio (CP and CPK), concept of 6 sigma process control, brief idea about CUSUM and EWMA chart.

ANOVA and Regression: Some basic concept of Analysis of Variance, method of least squares, Curve fitting, linear regression methodology, Karl Pearson correlation and standard error.

Recommended Books:

1. G.A.V. Leaf, 'Practical Statistics for the Textile Industry', Part I & II, The Textile Institute, UK, 1987.
2. D.C. Montgomery, 'Introduction to Statistical Quality Control', John Wiley & Sons Publications, 2002.
3. B.S. Dhillon, 'Applied Reliability and Quality: Fundamentals', Methods and Procedures, Springer, London, 2007.

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FABRIC STRUCTURE & ANALYSIS

Subject Code: BTEX1-517

**LT P C
3 1 0 4**

Duration: 40 Hours

UNIT-I (10 Hours)

Formation of fabric. Fabric cover and crimp. Detection of directions of warp and weft. Weaving plan. Methods of its preparation.

UNIT-II (10 Hours)

Detailed study of various weaves for their reproduction: Plain weave & its derivatives, Twill weave & its derivatives. Satin/sateen weave & its derivatives. Diamond and diaper, Honeycomb, Huck-a-back, Mock leno.

UNIT-III (10 Hours)

Went/pique, Bedford cord, crepe weaves. Stripe & check effects. Its types. Different methods to produce these weaves. Color and weave effect.

UNIT-IV (10 Hours)

Terry weaves Backed fabric, Doubled fabric. Technical specification of important weaves. Calculation relating to raw material required to produce different weaves.

Recommended Books

1. Watsons, 'Textile Design & Color', 7th Edn., Butterworth & Co. Ltd., London, 1988.
2. Watsons, 'Advanced Textile Design', 7th Edn., Butterworth & Co. Ltd., London, 1989.
3. Nisbet, 'Grammar of Textile Design', **1994.**

TEXTILE TESTING –I

Subject Code: BTEX 1-518

**LT P C
3 1 0 4**

Duration: 40 Hours

UNIT-I (5 Hours)

Introduction: Aim and scope of testing, Sample and Population, Sampling techniques for fibre, yarn and fabrics, Sample Size and Sampling errors.

UNIT-II (8 Hours)

Moisture in Textiles: Absolute humidity, Relative Humidity, Moisture content, Moisture regain, Relation between Moisture Regain and Moisture Content, Factors affecting regain of textile materials, effect of moisture on fibre properties, standard atmospheric conditions, measurement of atmospheric conditions, Moisture measuring Instruments.

UNIT-III (10 Hours)

Testing of Fibres: Cotton fibre testing such as length, fineness, maturity, neps, strength, elongation, trash-content, grading of different cotton, fibre contamination measurement, application of HVI and AFIS. Testing of wool and manmade staple fibers, measurement of fiber friction and crimp,

UNIT-IV (17 Hours)

Testing of Yarn: Yarn numbering and conversion system, Measurement of yarn twist, relation between yarn count, twist and yarn diameter, tensile properties, various type of measuring instruments and their working principles, factors affecting tensile properties, elastic recovery, effect of impact loading and fatigue behavior, yarn friction. Evenness testing of yarns, nature and

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causes of irregularities, principles and methods of evenness testing, evaluations and interpretation of evenness results, concept of index of irregularity, variance length curves and spectrogram analysis, yarn faults, classification, utility and principle of different types of measuring instruments. Yarn hairiness, principle of measurement, measuring instruments. Test for filament and textured yarn.

Recommended Books:

1. B.P. Saville, 'Physical Testing of Textiles', Woodhead Publishing Ltd. Cambridge, 2002.
2. V.K. Kothari, "Textile Fibers: Developments and Innovations", IAFL Publications, New Delhi, 2000.
3. J.E. Booth, 'Principles of Textile Testing', CBS Publishers and Distributors, New Delhi, 1999.
4. P. Angappan and R. Gopalakrishnan, 'Textile Testing', SSM Institute of Textile Technology, Komarapalayam, 2002.
5. A. Basu, 'Textile Testing', SITRA Coimbatore, 2002.
6. V.K. Kothari, 'Progress in Textile: Science & Technology', Vol. 1, Testing & Quality control, IAFL Publications, New Delhi, 1999.

TEXTILE CHEMICAL PROCESSING-II

Subject Code: BTEX 1-519

**LT P C
3 1 0 4**

Duration: 40 Hours

UNIT-I (10 Hours)

Concept of Colour: Visible spectrum, wavelength and blindness of colour.

Metamerism/isomerism.

Theories of Colour: Additive and subtractive theories. Primary, secondary, tertiary, complementary and contrasting colours. Tristimulus values of colour. Computer colour matching, Kubelka-Munk equation, reflectance factor, colour-co-ordinates, CIELAB values. Dye uptake on textiles.

UNIT-II (10 Hours)

Theory of Dyeing: Dye-fibre interaction, free volume theory.

Dyeing of textiles: Dyeing technology of natural and manmade textiles with direct, reactive, vat, insoluble azoic, sulphur, solubilized vat, acid, metal-complex, basic and disperse dyes.

UNIT-III (10 Hours)

Colouration with Pigments. Auxiliaries used in dyeing.

Dyeing of blends: Classification of blends, shades and methods for dyeing of blends. Suitability of each method for dyeing of specific blend.

Dyeing Machineries: loose fibre, yarn and package dyeing machines. Jigger, winch, jet and HTHP beam dyeing m/cs. Padding mangles.

Identification of Dyes: Identification of dye on dyed natural and manmade textiles.

UNIT-IV (10 Hours)

Printing Methods: Hand block, roller and screen printing processes. Construction and working of roller printing machine, photoelectric method of screen preparation. Drawback and advantage of each method.

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Print Paste: Constituent and characteristics of print paste, classification and mechanism of working of thickeners.

Printing after treatments: Importance of steaming, curing, ageing of prints. Mechanism of each process.

Printing Styles: Direct, discharge and resist styles of printing on natural, man-made and blended textiles.

Transfer Printing: Types, mechanism of transfer in each type and machineries. Transfer printing of natural, man-made and blended textiles.

Recommended Books:

1. L.W.C. Miles, 'Textile Printing', Dyers Company Publication Trust, Bradford, England, 1981.
2. V.A. Shenai, 'Technology of Printing', Sevak Publications, Mumbai, 1990.
3. D.M. Nunn, 'The Dyeing of Synthetic Polymer and Acetate Fibres', Dyers Company Publication Trust, London, 1979.
4. J. Shore, 'Cellulosic Dyeing', Society of Dyers & Colourists, Bradford, UK, 1979.
5. A.K. Roy Choudhary, 'Textile Preparation & Dyeing', Science Publishers, USA, 2006.
6. 'Cotton Piece Dyeing', ATIRA.
7. 'Dyeing of Polyester & Cellulose Blends', ATIRA.
8. V.A. Shenai, 'Technology of Dyeing', Sevak Publications, Mumbai.
9. Jose Cegarra, 'The Dyeing of Textile Materials'.
10. E.R. Trotman, 'Dyeing and Chemical Technology of Textile Fibre'.
11. J.N. Chakraborty, 'Fundamentals and Practices in Colouration of Textiles', Woodhead Publishing India Pvt. Ltd.

Lab VII: (TEXTILE TESTING)

Subject Code: BTEX 1-520

**L T P C
0 0 2 1**

Duration: 20 Hours

At least 10 experiments are to be performed by each student

1. To prepare a Bear Sorter diagram and determine the following:
 - ◆ Mean Length
 - ◆ Effective length
 - ◆ Short fibres Percentage
 - ◆ Dispersion Percentage
2. Determine 2.5 % S.L., 50 % S.L., and uniformity ratio of a given cotton using fibro graph. Construct a fibro gram by re-setting the counters for various S.L. between 5 % to 90 %. Compare the fibro gram of manmade fibre with cotton.
3. Determine the micronaire value of a given cotton sample by Air-Flow method. Convert the result into SI units and give a suitable rating to the fibre sample.
4. Determine maturity coefficient and maturity ratio of a given sample by caustic soda method. Give appropriate rating to the fibre sample.
5. Determine Pressley Index of a cotton sample by Pressley Tester at zero and 3mm gauge length and convert result into tenacity. Compare and comment on the results at different gauge lengths.

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6. Determine the bundle strength and elongation of a given manmade fibre using Stelometer. Study the effect of rate of loading on tensile properties of the fibre.
 7. Study the imperfections at different sensitivity level for different yarn samples.
 8. Prepare yarns Appearance Boards and compare with ASTM standards.
 9. Study the hairiness of a given yarns using Hairiness Tester. Compare the results of Evenness Tester and Hairiness Tester with ASTM grade.
 10. Determine bending rigidity by (HEART) loop method.
 11. Determine the Lea C.S.P by Lea CSP Tester and Auto-sorter and compare the results.
 12. Fibre Testing by HVI
 13. Determine moisture content/regain of a fibre sample by hot air oven method.
 14. Determine crimp (crimp %) of a given manmade fibre sample.
 15. Determine fibre fineness of a manmade fibres/filaments by:
 - ◆ whole fibre method
 - ◆ vibroscope
 16. Tensile properties of a staple fibre by:
 - ◆ vibromat
 - ◆ Instron/zwick UTM
- Determine stress relaxation and creep recovery of fibre.

LAB VIII: TEXTILE CHEMICAL PROCESSING-II

Subject Code: BTEX1-521

**LT P C
0 0 2 1**

Duration: 20 Hours

At least 10 experiments are to be performed by each student

1. To dye cotton with Azoic dyes
2. To dye cotton with Vat dyes
3. To dye cotton with Indigoid dyes
4. To dye wool fibre with
 - a. Reactive dyes
 - b. Acid dye
 - c. Metal complex dyes
5. To dye silk with acid dyes / acid mordant dyes
6. To dye polyester with disperse dyes
7. To dye nylon with acid dyes / metal complex dye
8. To dye acrylic with basic dyes
9. To print cotton fabric with hand block method in direct style
10. To print cotton fabric with hand block in discharge style
11. To print cotton fabric with hand block in resist style
12. Study of fastness properties of different dyed samples
13. Identification of dyes on dyed textiles
14. To dye the fabric with direct dye and it's after treatment
15. To dye the fabric with reactive dyes
16. To dye fabric with Sulphur dyes

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Lab IX: FABRIC STRUCTURE & ANALYSIS

Subject- BTEX1-522

**LT P C
0 0 2 1**

Duration: 20 Hours

At least 10 experiments are to be performed by each student

1. Analysis of different fabric samples to know their particulars as stated:
2. For Yarns:- Ends & Picks/inch, Warp & Weft Count & Crimp, Warp & Weft Crimp, Ply & Twist.
3. For Fabrics:- Tape length, Reed width, Denting order, Weight of warp & Weft & fabrics, Weight per square yard, Warp & weft cover, Colour plan, and use.

Study of the following fabrics samples:

1. Plain & derivatives
2. Twill & derivatives
3. Diamonds & Drapers
4. Honey comb
5. Huck-a-back
6. Mockleno
7. Welts & Piques
8. Stripe & Cheques
9. Satin / Sateen
10. Crepe
11. Terry pile
12. Colour & Weave effect.
13. Double Cloth

THEORY OF TEXTILE STRUCTURE

Subject Code: BTEX 1-624

**LT P C
3 1 0 4**

Duration: 40 Hours

UNIT-I (5 Hours)

Yarn Geometry: Basic geometry of twisted yarns. The idealized helical yarn structure and deviation. Real Yarn: Twist contraction and retraction, packing of fibres in yarn, Forms of Twisting.

UNIT-II (8 Hours)

Fibre Migration: Ideal migration, Parameters affecting migration, characterization of migration behavior, mechanism of migration in single and plied structure. Criteria for interchange of fibre position. Conditions for migration to occur, combination of the mechanics of migration.

UNIT-III (12 Hours)

Structural Mechanics: Extension of yarn under small load. Analysis of tensile forces of yarn under stress. Prediction of breakage, Nature of rupture for continuous filament yarn. Extension and breakage of spun yarn: Traditional view and approach by Hearle and El-Sheikh. Blended Yarn: Blended yarn structure, Hamburgers Theory. Structure property relationship of ring, rotor, air-jet, friction spun yarn.

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UNIT-IV (15 Hours)

Fabric Geometry: Engineering approach to the analysis of fabric, Pierce geometrical model relationship between h, p, c, Crimp interchange, Jammed Structure, concept of similar cloth. Minimum possible cover factor. Race track geometry, close limit of weaving, concept of similar fabric. Pierce elastic thread model, Geometry of plain knitted fabric. Fabric Properties: An elementary idea about tensile, bending, shear and drape behavior of fabric. An elementary idea about fabric objective measurement.

Recommended Books:-

1. J.W.S. Hearle, P. Grosberg and S. Backer, 'Structural Mechanics of Fibres Yarns and Fabrics', Wiley Inter-Science, New York, 1969.
2. B.C. Goswami, J.G. Martindale and F. Scardino, "Textured Yarn Technology, Structure and Applications", Wiley Interscience Publisher, New York, 1995.
3. F.T. Peirce and J.R. Womersley, 'Cloth Geometry', Reprint, The Textile Institute, Manchester, 1978.

PROCESS CONTROL IN TEXTILES

Subject Code: BTEX1-624

LT P C

Duration: 40 Hours

3 1 0 4

UNIT-I (5 Hours)

Control of mixing quality and Cost; Formulation of LPP; Bale Management. Control of yarn realization; Control of waste and cleaning in a spinning line; improving the machines performance and optimization.

UNIT-II (12 Hours)

Control of yarn quality; Yarn faults and package defects; Controls for quality, Machine stoppage and productivity in winding, warping, warping, sizing, drawing, pirn winding and weaving;

UNIT-III (12 Hours)

Calculations pertaining to production, efficiency and machine allocation in winding, warping, sizing and looms; Standard norms for settings, speeds and production rates. Fabric defects and their control.

UNIT-IV (11 Hours)

Grey fabric inspection, Standard for damages of cotton fabrics, norms for cause wise defects in grey fabrics Control & norms of hard waste in various processes; Care, selection and consumption norms of accessories.

Machinery audit: Measurement and analysis of productivity: Means to improve productivity

Recommended Books

1. ATIRA, 'Process Control in Spinning'.
2. K.R. Salhotra, 'Spinning of Man-Made & their Blends in Cotton System'.
3. R. Chatopadhaya, 'Process Control in Spinning', I.I.T. Delhi.
4. SITRA, 'Quality Control in Spinning', Coimbatore, **1994.**
5. ATIRA, 'Process Control in Weaving'.

KNITTING TECHNOLOGY

Subject Code: BTEX1-626

**LT P C
3 1 0 4**

Duration-40 Hours

UNIT– I (5 Hours)

BASIC concept of Knitting: Basic warp and weft knitting. Difference between warp and weft knitting. Classification of knitting machine and their application. Comparison of knitted and woven fabrics.

UNIT– II (15 Hours)

WEFT KNITTING:

Study Of Knitting Elements: Types and specifications of needles. Functions of sinkers. Basic knitting action of Beard, Latch and Compound needles

Study of Different Types of Stitches: knit, tuck and float and their effects on fabric properties and structures.

Knitting Cam Systems for Plain, Rib, Interlock and Purl structures. Machine and mechanism for producing basic structures viz. - Plain, Rib, Interlock and Purl and their derivatives.

Properties & Uses of different types of weft knitted fabrics. **Introduction to Patterning** in Circular knitting machine: General concept, Four cam track system, Pattern wheel and Pattern drum and design area calculations. Electronic needle selection. Computer controlled knitting machines.

Hand Operated Flat V-bed Knitting Machine and its cam system.

UNIT– III (10 Hours)

WARP KNITTING:

Study of Knitting Elements in Tricot and Raschel knitting machine and loop formation processes. **Pattern mechanism**, development of designs and properties of different warp knitted fabrics. Uses of warp knitted fabrics. Study of Let-off and take-up mechanisms.

UNIT– IV (10 Hours)

Concept of Loop Length and their effect on fabric structure & properties. Control of loop length and Positive Feed devices.

Basic study of knitting tensioning devices and stop **motions**.

Calculations: Production calculations of knitting machines and fabric weight in g/m².

Calculations of wales and courses per inch from k-factors. Tightness Factor and related calculations.

Recommended Books

1. D.J. Spencer, 'Knitting Technology', 3rd Edn., Woodhead Publishing Limited, England, 2001.
2. S.C. Ray, 'Fundamentals and Advances in Knitting Technology', Woodhead Publishing India Limited, New Delhi, 2013.
3. C. Mazza and P. Zonda, 'Knitting: Reference Book of Textile Technologies', 2nd Edn., ACIMIT, Italy, 2001.
4. J.E. Booth, 'Textile Mathematics', Volumes – 3, Textile Institute, Manchester, 1975.

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TEXTILE TESTING-II

Subject Code: BTEX1-627

**LT P C
3 1 0 4**

Duration-40 Hours

UNIT-I (5 Hours)

Testing of yarn: Innovations in yarn testing instruments (dynamic, continuous and on-line testing of yarn quality).

UNIT-II (18 Hours)

Testing of Fabric: Measurement of fabric dimensions and other physical properties such as thickness, weight, crimp, shrinkage, air-permeability, thermal properties, wettability, water proofness, and flame resistance, Fabric low stress mechanical properties such as smoothness, stiffness, softness and shear, drape behavior. Test related to fabric appearance such as pilling, crease recovery. Fabric handle and factors influencing it, fabric comfort. Serviceability testing parameters such as abrasion resistance, fabric strength, tear strength, bursting strength test, honey dew, stickiness measurement, assessment of barre and other form of fabric defects.

UNIT-III (7 Hours)

Testing of Garments: Tests related to garment appearance and performance such as measurement of seam pucker, seams slippage and seam strength etc.

UNIT-IV (10 Hours)

Statistical Techniques: Concept of reproducibility and repeatability, methods pertaining to fibre, yarn and fabric testing, concept of quality, quality assurance, textile product leveling, international quality parameters and standards like Uster standards and ASTM.

Recommended Books:

1. B.P. Saville, 'Physical Testing of Textiles', Woodhead Publishing Ltd., Cambridge, 2002.
2. J.E. Booth, 'Principles of Textile Testing', CBS Publishers and Distributors, New Delhi, 1999.
3. P. Angappan and R. Gopalakrishnan, 'Textile Testing', SSM Institute of Textile Technology, Komarapalayam, 2002.
4. A. Basu, 'Textile Testing', SITRA, Coimbatore, 2002.
5. V.K. Kothari, 'Textile Fibers: Developments and Innovations', IAFL Publications, New Delhi, 2000.
6. V.K. Kothari, 'Progress in Textile: Science & Technology', Vol. 1, Testing & Quality Control, IAFL Publications, New Delhi, 1999.

LAB X: KNITTING TECHNOLOGY

Subject Code: BTEX 1-628

**LT P C
0 0 2 1**

Duration-20 Hours

At least 10 experiments are to be performed by each student

1. List of Experiments.
2. To study the path of yarn through plain knitting machine.
3. To study the different knitting elements including the cam system.
4. To study the driving mechanism of Circular Knitting Machine.
5. To study the cloth take-down mechanism of Circular Knitting Machine.

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6. To study the rib knitting m/c including arrangement of dial and cylinder needles, cam system and driving mechanism.
7. To study the Interlock knitting m/c including arrangement of dial and cylinder needles, cam system & driving mechanism.
8. To study cam system of V - bed Flat Knitting Machine.
9. To study passage of yarn of Hand Operated V - bed Flat Knitting Machine.
10. Preparation of Fabric samples (rib, circular, half cardigan and full cardigan in V-bed rib knitting machine).
11. To study the effect on loop length with the change in cam setting in Single Feeder Circular Knitting Machine.
12. To study the Positive Feed Device (IRO) on a Circular Knitting Machine.
13. To analyze plain, rib and Interlock knitted fabrics and their derivatives (course per inch, wales per inch, loop length, GSM & needle diagram).

LAB XI: TEXTILE TESTING-II

Subject Code: BTEX 1-629

**L T P C
0 0 2 1**

Duration-20 Hours

At least 10 experiments are to be performed by each student

1. Classmate fault analysis (yarn fault classifying system)
2. Determine coefficient of friction of a spun yarn and see the effect of waxing on coefficient of friction.
3. Characterize a woven fabric with respect to its dimensional properties.
 1. thread density
 2. yarn number
 3. yarn crimp
 4. weave
 5. cover factor
 6. Areal density
 7. skewness
 8. Thickness
2. Determine the tensile strength and elongation of a woven fabric and compare the Load-elongation curve with Non-woven and knitted fabric.
3. Determine the tear resistance of a fabric using Elmendorf Tear Tester.
4. Determine the bursting strength of a fabric on a hydraulic bursting tester.
5. Determine the abrasion resistance of a fabric.
6. Determine the pilling propensity of a fabric.
7. Determine the crease recovery of fabric and observe effect of loading time & recovery time on crease recovery.
8. Determine the Drape coefficient of a fabric sample.
9. Determine the compression property of a fabric (thickness).
10. Determine the Air permeability, water permeability and water repellency of a fabric.
11. Determine the stiffness of a fabric, knitability of hosiery yarn.

KINEMATICS OF TEXTILE MACHINES

Subject Code : BTEX 1-730

**LT P C
3 1 0 4**

Duration-40 Hours

UNIT – I (10 Hours)

Machine elements and drives Introduction to drives, selection of drives, primary machine elements, special purpose drives and devices

Belt drives

Types of drives, selection of drives; Flat belt- leather and reinforced belts, analysis of belt tensions, positions of slack and tight sides, condition for maximum power transmission, selection of belt and pulley diameter, V belt- construction, force analysis; Round belt-friction spinning machine; Clutching action in card; Variable speed drives in textile machines- cone and stepped pulleys, conical discs; Adjustment of belt tensions- movable motor in main drives of textile machines, tension pulleys in card and friction spinning machine; Comparison of flat and V belts; Applications of belt drives in textile machines.

UNIT – II (15 HOURS)

Gears

Design aspects of gears nomenclature, basic relationship; conjugate action; Involute properties- involute profile of teeth; Construction of tooth with involute profile; Contact ratio-arc of action; Pressure angle; Interference- elimination of interference, periodic faults in fibre assemblies- defective gears; back lash; Internal gears & rack and pinion in textile machines; lubrication of gears, Helical gears- notation of hand, Parallel helical gears- geometry, force analysis; thrust loads; Crossed helical gears- card & roving machines; Worm gears- features, terminology, single and double envelop worms; Applications of helical, bevel & worm gears in textile machines.

Gear Trains

Gear trains- simple, compound, reverted; Epicyclic tabulation and formula methods; two degrees of freedom; Epicyclic gear trains in roving machine- bobbin diameter and speeds of bobbin, roving stretch, relation between bobbin speed and bottom cone pulley speed.

UNIT – III (15 HOURS)

Cone Pulleys

Cone pulleys in roving machine- design aspects, steps to design, hyperbolic and straight cone pulleys, shifting of belt, belt slippage and corrections for belt position, belt shifting mechanism for straight cone pulleys, finer adjustment of belt shifting; Cone pulleys for piano-feed regulation.

Brakes

Mechanical brakes- block brake with short shoe, analysis of forces acting on drum, Block brake in lap former; Pivoted block brake with long shoe, spindle brake; brake on warp beam, Internal expanding brake; Band brakes, brake for warp let-off, differential band brake; disk brakes,

UNIT-IV (5 HOURS)

Bearings

Sliding contact bearings-types, Lubrication in bush bearings- thick & thin film lubrication, Coefficient of friction in boundary & hydrodynamic regions, hydrostatic & hydrodynamic bearings; Types of ball and roller bearings, Applications of rolling contact bearings in textile machines.

**MRSPTU B. TECH TEXTILE ENGINEERING STUDY SYLLABUS 2016 BATCH
ONWARDS**

Cam Devices

Classification of cam mechanisms; Design and profile of tappet devices in shedding mechanism in power loom.

Recommended Books:

1. N. Gokarnashan, 'Mechanics and Calculation of Textile Machinery', Woodhead Publishing India, Delhi, 2015.
2. G. Nagarajan, 'Textile Mechanisms in Spinning and Weaving machines', Woodhead Publishing India, Delhi, 2015.
3. S.S. Ratan, 'Theory of Machines'.
4. J.E. Booth, 'Textile Mathematics', Volumes – 2 & 3, Textile Institute, M.

MECHANICS OF TEXTILE PROCESSES

Subject Code: BTEX 1-832

**LT P C
3 1 0 4**

Duration-40 Hours

UNIT-I (4 Hours)

Forces acting on fibre during opening and cleaning processes. Analysis of piano feed regulating motion. Design of Cone drums for Scutcher. Evaluation of Blow Room performance.

UNIT-II (20 Hours)

Mechanics of fibre entanglement and hook formation during carding. Degree of combing in carding process. Theories of carding. Forces acting in carding zone. Analysis of flat actions; opening, cleaning, accumulation of flat strip on stationary flat. Carding Index. Transfer mechanism of fibres, Doffing arc, Analysis of its significance. Analysis of stripping process. Cylinder load and transfer efficiency. Configuration and estimation of degree of disorder. Effect of different parameters on hook formation,

UNIT-III (6 Hours)

Fibre straightening & hook removal in roller drafting. Mechanism of package building and twisting in speed frame. Design of Cone drums for roving frame. Differential gearing in Roving frame. Balloon theory in spinning. Analysis of forces in yarn & traveller. Analysis of yarn tension during unwinding.

UNIT-IV (10 Hours)

Kinematics of sley and heald motion. Shed depth diagram. Shedding cam design. Mathematical treatment of picking. Friction and impactal checking with swell. Theoretical understanding of causes of pick variation by beat-up force, Bumping condition.

Recommended Books:

1. C.A. Lawrence, 'Fundamentals of Spun Yarn Technology', CRC Press, 2003.
2. W. Klein, 'The technology of Short-Staple Spinning', Textile Institute, 1986.
3. J.E. Booth, 'Textile Mathematics', Textile Institute, 1975.
4. M.H. Mohamed, 'Weaving: Conversion of Yam to Fabric', Merrow Publishing Co. Ltd., 1992.
5. R. Marks and A.T.C Robinson, 'Principles of Weaving', Textile Institute, 1976.

**MRSPTU B. TECH TEXTILE ENGINEERING STUDY SYLLABUS 2016 BATCH
ONWARDS**

MILL PLANNING AND MANAGEMENT

Subject: BTEX1-833

**LT P C
3 1 0 4**

Duration-40 Hours

UNIT -I (8 Hours)

Introduction: Introduction to mill planning and management, Functions of management, Forms of business organizations, Mill organization.

UNIT- II (10 Hours)

Mill Location: Mill location and site selection, Concept, Various factors affecting plant location.

Factory Buildings: Benefit of good buildings, Shape of factory buildings, Different types of factory building for Textile Mills and their advantages and disadvantages.

Plant Layout: Objectives of good plant layout, Types of plant layout, Plant layout Procedure, Calculation for different machines required and lay-out plan for Spinning, Weaving, and chemical processing.

UNIT-III (12 Hours)

Air Conditioning and Humidification: Air conditioning and humidification in Textile Mills, different measurements of underground duct for air-conditioning, calculations of total heat, air circulation required etc. Different terms and definitions like Dry Bulb Temp, Wet bulb temp. humidity ratio etc. Basic concept about Psychometric chart, different humidification systems used in Textile Mills.

Material Handling: Functions and Principles of material handling, Selection of material handling equipment, types, advantages, different terms related to it, ways to reduce material handling expenditure.

Lighting: Lights, different basic terms related to lighting calculations, different lamp shades and its uses. Concept of room index, concept of height and distance ratio related to lighting, calculations on lamp numbers and positioning depending on required illumination level etc.

UNIT- IV (10 Hours)

Working environment: Different measures of good working environment. Brief Idea about Environmental Pollution from textile industry and Its Control.

Noise and its Control: Different types of Noise, primary idea about dB and different standards of it for different departments, Different remedial measures to minimize noise of different department.

Cost: Different costs, Elements of cost, Costing the products, Method of selection of cotton to minimize mixing cost, yarn selling price, conversion cost, cost reduction techniques, impact of end breaks in ring spinning on productivity and cost.

Recommended Books:

1. O.P. Khanna, Industrial Engineering and Management, Dhanpat Roy Publications, New Delhi, India, 2009.
2. P.R. Lord, Hand Book of Yarn Production, Wood Head Publishing, Cambridge, England, 2003.
3. K. Aswathapa, K.S. Bhat, 'Production and Operation Management', Himalayan Publishing House, Banglore, India, 2002.
4. D.M. Parate,, 'Noise in Loom-Shed: Analysis and Remedies', Man Made Textile in India, 1996, No.187-189.

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ONWARDS**

5. S.K. Chinta, A.I. Washif, C.D. Kane and J.R. Desai, 'Noise Pollution', Colourage, 1996.

PROJECT (PHASE-II)

Subject Code: BTEX1-834

**LT P C
3 1 0 4**

Duration-40 Hours

UNIT-I

A comprehensive problem involving the various technologies of textile engineering should be framed. The students are required to complete their project work and submit a comprehensive report.

NON CONVENTIONAL YARN MANUFACTURE

Subject Code: BTEX 1-656

**LT P C
3 1 0 4**

Duration-40 Hours

UNIT-I (10 Hours)

Introduction: Summary of new spinning processes. Possibilities & limitations use of various spinning processes. Fibre Characteristics required for different, leading spinning Technologies. Rotor Spinning: Tasks of the rotor spinning machine, Principle of operation, Raw material requirements & preparation, Yarn formation, Specifications of different organs and effect of each on the process and product quality. New developments.

UNIT-II (5 Hours)

Air-jet Spinning: Principle and raw material preparation. Process and machine parameters affecting product quality. Principle of vortex yarn manufacture. Difference between air jet spun and vortex spun yarn structure.

UNIT-III (10Hours)

Friction Spinning: Principle and raw material preparation, process and machine parameters affecting product quality. Difference between DREF-II and DREF-III yarn structures and properties.

Compact Spinning: Principle and raw material preparation. Comparative assessment of the structure and performance with respect to ring yarn.

UNIT-IV (10 Hours)

Other Spinning system: Self twist, twist less, wrap spinning, Air-Vortex spinning, Electrostatic spinning, Core spinning, Siro spinning, Bobtex yarn manufacture, solo spun yarn manufacture. New Developments. Structure and properties of different types of yarns.

Recommended Books:

1. R. Salhotra K. and S.M. Ishtiaque, 'Rotor Spinning: Its Advantages, limitations and Prospects in India', 1st Edn., National Information Centre for Textile and Allied Subjects, 1995.
2. W. Klein, 'Manual of Textile Technology: New Spinning Systems', 1st Edn', The Textile Institute, Manchester, U.K., 1993.
3. C.A. Lawrence, 'Fundamentals of Spun Yarn Technology', 1st Edn., CRC Press LLC, Florida, USA, 2003.
4. R. Chattopadhyay and S.M. Ishtiaque, 'Advances in Yarn Manufacturing Process', Department of Textile Technology, IIT Delhi, 1991.

**MRSPTU B. TECH TEXTILE ENGINEERING STUDY SYLLABUS 2016 BATCH
ONWARDS**

ADVANCED FABRIC STRUCTURE

Subject Code: BTEX 1-657

**LT P C
3 1 0 4**

Duration-40 Hours

UNIT-I (10 Hours)

Backed Fabric: Type of backed fabric, weaving plans, conditions of dropping and lifting stitching ends/picks, wadded backed fabrics. Gauze & Leno Weaves: Feature of these weaves, method of preparation, weaving plans, types. Extra attachments required and control of these attachments. Methods to control tension over crossing ends.

UNIT-II (10 Hours)

Double Fabric: Objectives of preparation, types, specialties of these types and their weaving plans (self-stitched, center stitched, interchangeable thread/fabric etc.), Principle of Dropping & Sifting of stitching ends/picks. Extra warp and Extra weft figuring: Method Of preparation, comparison of two of two methods. Control over compactness of weaves.

UNIT-III (10 Hours)

Warp & Weft Pile Fabrics: - Terry pile structure, method of production, extra attachments required. All-over pile structures, figuring with pile threads. Card cutting, warp pile fabrics produced on face to face principles, All- over and corded velveteen, weft plushes, figured weft pile fabrics. Tapestry structures: - Warp and weft faced tapestry, structures in single and combination.

UNIT-IV (10 Hours)

Damask and Compound Brocades: - Damask and its preparation. Figured warp rib and multi-weft brocades.

Spool and Gripper Axminster carpets: - Spool axminster system: Spool setting its presentation, loom operation, Tuft insertion. Gripper axminster system: Selection of pile colours, Tuft insertion and general features. Spool-Gripper system.

Recommended Books:

1. Watson, 'Advance Watsons Textile Design & Colour', Butterworth Co. & Publishers Ltd, 1989.
2. Nisbeth, 'Grammar of Textile', **1994.**
3. R. Marks and A.T.C. Robinson, 'Principles of Weaving', Textile Institute, 1976.

PROCESS CONTROL IN TEXTILE CHEMICAL PROCESSING

Subject: BTEX1-658

**LT P C
3 1 0 4**

Duration-40 Hours

UNIT-I (10 Hours)

Review of different steps of chemical Processing of Textiles. Process parameters involved: - Optimized Process Parameters of each process imparted to textiles in pre-treatment viz. Singeing, desizing, scouring, bleaching, mercerization.

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ONWARDS**

UNIT-II (10 Hours)

Optimized dyeing parameters for dyeing for printing of different fibres through various styles. Optimized finishing parameters to impart various finishes on different fibres. Process parameters/process modification/any other changes.

UNIT-III (10 Hours)

Change in quality due to selection of impure starting chemicals/faulty fabric/machine handling. Analysis of various chemical processing steps in terms process and quality control. Methods to assess quality of processed product after every stage of processing and that of final product.

UNIT-IV (10 Hours)

Standardization of instruments/machineries, analysis of colour to check impurity percentage, evaluation of chemicals to check their efficiencies.

Recommended Books

1. 'ATIRA's Process & Quality Control in Chemical Processing'.

NON-WOVEN TECHNOLOGY

Subject Code : BTEX 1-759

LT P C

Duration-40 Hours

3 1 0 4

UNIT-I (5 Hours)

Introduction to nonwovens, Classification of non-woven fabrics. Raw material - fibre - natural, synthetic, Various industrially produced fibres.

UNIT-II (10 Hours)

Web formation: Dry-laid nonwovens from staple fibres, Wet laid nonwovens, Melt blown technology,

UNIT-III (10 Hours)

Spun bond technology. Needle punched nonwovens, Developments in needle punching machine, Spun lace (hydro entanglement technology), Thermal bonding of nonwoven fabrics.

UNIT-IV (10 Hours)

Chemical bonding of nonwoven fabric: Various types of binder, their properties and formulations, various bonding techniques. Stitch bonding, End uses of non-woven fabric

Recommended Books:

1. Albrecht, Wilhelm, 'Nonwoven Fabrics: Raw Materials, Manufacture, Applications, Characteristics, Testing Processes', Wiley VCH, 2006.
2. S. Russel, 'Handbook of Nonwovens', Woodhead Publishing, 2006.

TEXTURING TECHNOLOGY

Subject Code: BTEX 1-760

LT P C

Duration-40 Hours

3 1 0 4

UNIT-I (5 Hours)

Importance of texturing, classification of textured yarns. Methods of texturizing.

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ONWARDS**

UNIT-II (10 Hours)

False twist texturing machines. Properties of False twist textured yarns. Stiffer box crimping. Methods and machines for stiffer box texturizing system. Edge crimping: Methods and machines for edge crimping. Gear crimping.

UNIT-III (5 Hours)

Knit-de-Knit texturizing system. Principle of draw texturizing: draw texturizing machine, machine settings.

UNIT-IV (10 Hours)

Principle and process of Air-jet texturizing. Effects of machine variables on Air-jet textured yarn. Properties of Air-jet textured yarn. Modern developments in Air-jet texturizing. Testing of textured yarns: Strength and elongation test. Degree of texturizing and stability test for textured yarns.

Recommended Books:

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

GARMENT MANUFACTURING TECHNOLOGY

Subject Code: BTEX 1761

**LT P C
3 1 0 4**

Duration-40 Hours

UNIT- I (10 Hours)

Brief outlook of garment manufacturing industry and its classification. Concept of garment design and proportion. Functions of Designing Department.

UNIT – II (15 Hours)

Anthropometrics; garment sizing. Pattern making and grading. Principles of marker making; spreading and cutting. Cutting methods. Quality control in cutting room. Stitch classification, seam types and applications. Sewing faults, their causes and remedies. Choice of sewing needles and threads. Different types of sewing machines and their principles. Work aids- folders, presser feet, feeding systems. Outline of fusing and pressing machines.

UNIT- III (10 Hours)

Outline of various Apparel Production Systems and Material Handling. Quality control systems in garment manufacturing. Low stress mechanical properties of fabrics and their effect on garment production sequences. Preliminary ideas on Garment dyeing and finishing.

UNIT- IV (5 Hours)

Physiological and psychological aspects of fabric comfort. Heat and moisture relations in clothing.

Recommended books:-

1. R. Nayak & R. Padhye, 'Woodhead Publishing Limited, Cambridge, UK, 2015.

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ONWARDS**

2. G. Cooklin, 'Introduction to Garment Manufacture', Blackwell Sciences, UK, 2001.
3. Colovic Gordana, 'Management of Technology Systems in Garment Industry', Woodhead Publishing, India Ltd., New Delhi, 2011.
4. T. Brackenbury, 'Knitted Clothing Technology', Blackwell Sciences, UK.
5. R.M. Liang & J. Webster, 'Stitches and Seams', Textile Institute, Manchester, UK, 1994.
6. S. Das, 'Quality Characterization in Apparel', Woodhead Publishing India Ltd., New Delhi, 2009.
7. A. Das & R. Alagirusamy, 'Science in Clothing Comfort', Woodhead Publishing India Ltd., New Delhi, 2010.

MARKETING & FINANCIAL MANAGEMENT IN TEXTILES

Subject Code: BTEX1-762

**LT P C
3 1 0 4**

Duration-40 Hours

UNIT-I (10 Hours)

MARKETING MANAGEMENT: Marketing- its definition & core concepts. Marketing Management, Production concept. Product concept. Selling concept, Marketing and societal Marketing concept. Marketing Information system. Marketing Research Process and various research designs. Consumers

UNIT-II (10 Hours)

Behavior, factoring affecting CB, Buyer decision Process and Type of Buying Behavior. Marketing Mix: Product-Levels of Product, Product hierarchy, stages in New Product development. Product life cycle & its stages. Product Mix, Product time. Branding - Packaging and labeling. Price - Pricing strategies & setting the price. Place - Channels of distribution, functions & its flow. Promotion -

UNIT-III (10 Hours)

Mix: Advertising, sales Promotion. Personnel selling & Public relations, Factors in setting the Promotion mix. With supporting examples from Textile Industry.

Financial Management: Management Accounting - Accounting concepts and financial statements. Various finance functions & financial objectives of firms. Sources of finance cost classification and cost of capital. Working capital

UNIT-IV (10 Hours)

Management - Concept of gross & net W C, classification of working capital. Factors determining the requirement of working capital. Capital Structure - Factors affecting capital structure. Capital Budgeting - its importance & methods of capital Budgeting.

Recommended Books:

1. Philip Kotler, 'Marketing Management'.
2. I.M. Pandey, 'Financial Management'.

**MRSPTU B. TECH TEXTILE ENGINEERING STUDY SYLLABUS 2016 BATCH
ONWARDS**

POST SPINNING OPERATIONS

Subject Code: BTEX 1-763

**LT P C
3 1 0 4**

Duration-40 Hours

UNIT- I (5 Hours)

Objectives: Objectives of post spinning operations.

UNIT- II (12 Hours)

Drawing & Stretching: Stretching or drawing, drawing conditions, phenomenon of necking. Influences of drawing conditions on the structure and properties of fibres. Machines for stretching continuous filament yarn. Draw warping. Stretching of polyester & acrylic tow. Draw warping. Drawing of tow for production of staple fibre.

UNIT- III (13 Hours)

Heat setting Preliminary heat setting, crimping, drying and final heat setting, cutting & packing of staple fibres. Heat setting, objectives of heat setting. Influence the heat setting process parameters such as time, temperature and tension. Heat setting conditions for polyester polyamide, acrylic and polypropylene.

UNIT- IV (10 Hours)

Texturing: Introduction to texturing. Different methods for texturing, factors influencing properties of false twist, draw textured and air jet textured yarns.

Recommended Books:

1. A.A. Vaidya, 'Production of Synthetic fibres', Prentice hall India Pvt. Ltd., **1988**.
2. 'Texturin', MANTRA.
3. Marks, Atlas, Cernia, 'Man-Made Fibre Sc.& Tech.', Vol.-I, II, III, Interscience Publishers, **1976-68**.
4. Mukherjee, 'Recent Advances in Fibre Science'.

WASTE MANAGEMENT & POLLUTION CONTROL IN TEXTILE INDUSTRIES

Subject Code: BTEX 1-764

**LT P C
3 1 0 4**

Duration-40 Hours

UNIT-I (10 Hours)

Impact of Man on Environment: The Biosphere, the hydrologic cycle, the nutrient cycle, consequences of population growth, energy problem, pollution of air, water, soil & noise.

UNIT-II (10 Hours)

Air Pollution: Definition, concentration, classification & properties of air pollutants. Emission sources, Effect of air pollution on health, vegetation & material damages. Laws and standards. Basic concept of air pollution control methods & equipment. Role of Textile Industry in creating air pollution. Textile fabric as an air pollution control medium.

UNIT-III (14 Hours)

Water Pollution: Definition & concentrations, classification & properties of water pollutants. Sources of water pollution. Effect of water pollution on health, vegetation & material damages. Laws & Standards. Role of textile industry in creating water pollution, e.g., effluents from sizing, desizing, scouring, bleaching, dyeing & finishing. Character of the effluents from different

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ONWARDS**

processes. Methods to control pollution from textile industry effluents. Techniques of effluent treatment.

UNIT-IV (6 Hours)

Noise Pollution: Role of textile industry in creating noise pollution. Measures to reduce noise pollution in textile industry.

Recommended Books:

1. S. Asolekar, 'Environmental problems in Chemical Processing of Textiles', 1st Edn., NCUTE, Department of Textile Technology, IIT-Delhi, 2000.
2. Padma Vankar, 'Textile Effluents', 1st Edn., NCUTE, Department of Textile Technology, IIT-Delhi, 2002.
3. B. Edmund, 'The Treatment of Industrial Wastes', 2nd Edn., McGraw-Hill Kogakusha, New Delhi, 1976.
4. Peavy, Rowe and Tchobanoglous, 'Environmental Engineering', 2nd Edn., McGraw-Hill, Singapore, 1985.
5. O.P. 'Khanna, Industrial Engg. and Management'.

TECHNICAL TEXTILES

Subject Code: BTEX 1-865

**LT P C
3 1 0 4**

Duration-40 Hours

UNIT-I (10 Hours)

Introduction: Definition and scope of Technical Textiles, Brief idea about technical fibres, composite materials and uses.

Filtration Textiles: Textiles as filter media. Characteristics of filter material. Basic idea of theory of filtration. Characteristics of fibres to use in different filter media. Application of woven, nonwoven and knitted fabric in filter media.

UNIT-II (11 Hours)

Medical Textiles: Introduction, Classification of Medical textiles, Textiles as hygienic products. Description of different Medical Textiles, Mechanisms of absorption and distribution of liquids in absorbent products like diapers.

Protective Textiles: Introduction to protective clothing, functional requirement of textiles in defense, Brief idea about ballistic protective clothing, Chemical protective clothing, flame retardant fabrics.

UNIT-III (5 Hours)

Sports Textiles: Functional requirement of different types of products. Cords: Method of production and applications.

UNIT-IV (14 Hours)

Geotextiles: Brief idea about geosynthetic. Geogrid, Geomembrane and Geocomposite. Designing and manufacture of geotextiles. Geotextiles properties and test methods. Geotextiles - functions and mechanism in separation, reinforcement, stabilization filtration & drainage. Agricultural application of Textile.

Recommended Books:

1. A.R. Horrocks and S.C. Anand, 'Hand Book of Technical Textile', Woodhead Publishing Ltd, Cambridge, 2002.

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ONWARDS**

2. G.V. Rao and G.V.S. Raju, 'Engineering with Geosynthetic', Tata McGraw Hills Publication, New Delhi., 1990.
3. Adanaur, Sabit, 'Wellington Sears Hand book of Industrial Textiles', Technimic Publishing company Pennsylvania USA., 1995.
4. V.K. Kothari, 'Progress in Textile: Science & Technology', Vol. 3, 'Technical Textile: Technology', Developments and Applications, IAFL Publications, New Delhi, 2008.

HIGH PERFORMANCE AND SPECIALITY FIBRES

Subject Code: BTEX1-866

**LT P C
3 1 0 4**

Duration-40 Hours

UNIT-I (10 Hours)

Polymerization, spinning and properties of aromatic polyamides, high molecular weight polyester, rigid rod and ladder polymers such as BBL, PBZT, PBO, PBI.

UNIT-II (10 Hours)

Manufacturing of carbon fibres from PAN precursors, viscose and pitch fibres. Glass fibres. Liquid crystal fibres. Gel spinning of polyethylene. Aramids- Introduction, polymer preparation, Spinning, Structure and properties, applications.

UNIT-III (10 Hours)

Hollow and profile fibres, design of spinnerets for such fibres. Membrane technology. Blended and Bicomponent fibres. Medical textiles. Super absorbent fibres.

UNIT-IV (10 Hours)

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

Recommended Books:

1. N.G. Mc Crum, C.P. Buckley and C.B. Bucknall, 'Principle of Polymer Engineering', Oxford University Press, New York, 1990.
2. 'High Performance Fibres'. Ed. J.W. Stteare, Woodhead Publishing Co., England, 2001.
3. D. Hull, 'An Introduction to Composite Materials', Cambridge University Press, UK, 1981.
4. H. Broody, 'Synthetic Fiber Materials', Longman Scientific and Technical, UK, 1994.
5. T. Hongu, New fibres, Ellis Horwood, New York, 1990.

MULTI-FIBRE PROCESS

Subject Code: BTEX1-867

**LT P C
3 1 0 4**

Duration-40 Hours

UNIT-I (10 Hours)

Survey of established practices for the spinning of man- made fibres using different spinning system with emphasis on fibre and yarn properties and involving engineering principle.

UNIT-II (10 Hours)

Purpose of blending of manmade fibres. Selection of fibre specifications for blending. Measures of blend intimacy. Effect of blend composition & fibre characteristics on properties of blended yarn. Blend mechanics. Advantages & disadvantages of different blending technique. Tinting for a blend.

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ONWARDS**

UNIT-III (10 Hours)

Processing of short & long staple manmade fibres on cotton system of spinning. Spinning of dyed fibres. Spinning of manmade fibres on rotor spinning system.

UNIT-IV (10 Hours)

Processing of long fibres on worsted/woolen system of spinning. Silk reeling. Introduction to twisting & spinning of silk fibres. Introduction to Jute spinning. Jute blending. End uses of jute and jute blended yarn & fabrics.

Recommended Books:

1. K.R. Salhotra, Spinning of Man-Made & its Blend on Cotton System’.
2. R.R. Atkinson, ‘Jute Spinning’.
3. Ya. Lipenkov, ‘Wool Spinning’, Vol.-I, II.
4. ‘Manual of Silk Reeling & Spinning’, F.A.O.

NONCONVENTIONAL FABRIC MANUFACTURE

Subject Code: BTEX1-868

**LT P C
3 1 0 4**

Duration-40 Hours

UNIT-I (10 Hours)

Yarn preparation for shuttle less Weaving: Weft Preparation for shuttle less loom, warping and Sizing. Maximum speed of shuttle loom, Design problem of shuttle Loom, Basic concept in increasing the weft insertion rate in weaving machine.

Projectile Weaving machine: Basic principle of projectile loom, sequence of weft Insertion, cam drive shedding mechanism, beat-up torsion bar Picking system, loom timing, checking of gripper, Let-off and Take-up motion, Tuck-in selvedge formation, returns of gripper. Technical specifications.

UNIT-II (10 Hours)

Air jet weaving machine: Problem of air jet principle of weft Insertion. Path of the yarn in the air jet loom sequence of Weft invention in air jet loom. Design of Elite confuser Guide, Design of profile reed, & relay jet.

Loom Timing: Technical specification. Water-jet: Weft incretion mechanism, quality of warp Required for water- jet, selvedge formation, Environment

Problem in quality of water, Problem of water-jet loom.

Rapier Weaving Machine: Different types of rapier weaving Machines. Weft insertion sequence in rapier weaving process. Different methods to drive the rapier head. Single phase Double acting rapier.

Velocity of the rapier. Loom timing, Technical Specification of rapier weaving machine.

UNIT-III (10 Hours)

Multiphase Weaving Machine: Basic concept of multiphase weaving. Shedding operation in warp way and weft way Multiphase loom. Advantages & disadvantages of multiphase Weaving process.

Circular Loom: Yarn path & Weft incretion in Circular loom.

Narrow Fabric Loom: Different type of narrow fabric mechanism of weft insertion and fabric formation in narrow fabric weaving machine.

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ONWARDS**

Carpet Weaving: Woven carpet, its design, and process of manufacturing, (wilt on & Brussels). Technical specifications and its uses.

UNIT-IV (10 Hours)

Nonwoven Technology: Fibers used in non-woven, on woven Fabric and its classification reason for development, Web making (Parallel, transverse, cross and random lay Web). Elementary idea about manufacturing adhesive bonded and needle punch fabric. Uses of nonwovens.

Multiracial Warp Knitted Fabric: Concept of multiracial Fabric. Method of manufacturing the multiracial Warp knitted Fabric, its uses as Technical Textiles.

Recommended Books:

1. Albrecht, Wilhelm, 'Nonwoven Fabrics: Raw Materials, Manufacture, Applications, Characteristics, Testing Processes', Wiley VCH, **2006**.
2. S. Russel, 'Handbook of Nonwovens', Woodhead Publishing, **2006**.
3. R. Marks and A.T.C. Robinson, 'Principles of Weaving', Textile Institute, **1976**.
4. Banerjee, Prabir Kumar, 'Principles of Fabric Formation', CRC Press, **2015**.
5. P.R Lord & M.H. Mohamod, 'Weaving: Conversion of Yam to Fabric', Merrow Publishing Co. Ltd., **1992**.
6. V. Choogin and Valeriy, 'Mechanisms of Flat Weaving Technology', Woodhead Publishing, **2013**.