

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI
Scheme of Teaching and Examination – 2018-19
M.Tech Name of the programme (JTT)
Choice Based Credit System (CBCS)

I SEMESTER										
Sl · No	Course	Course Code	CourseTitle	Teaching Hours /Week			Examination			Credits
				Theory	Field work/ Assignme nt	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	PCC	18JTT11	Advanced Textile Mathematics	04	--	03	40	60	100	4
2	PCC	18JTT12	Advanced Fiber Physics	04	--	03	40	60	100	4
3	PCC	18JTT13	Advanced Wet Processing	04	--	03	40	60	100	4
4	PCC	18JTT14	Yarn Engineering	04	--	03	40	60	100	4
5	PCC	18JTT15	Advanced Knitting and Non-wovens	04	--	03	40	60	100	4
6	PCC	18JTTL16	Laboratory - I	-	04	03	40	60	100	2
7	PCC	18RMI17	Research Methodology and IPR	02	--	03	40	60	100	2
TOTAL				22	04	21	280	420	700	24

Note: PCC: Professional core, PEC: Professional Elective.

Internship: All the students shall have to undergo mandatory internship of 6 weeks during the vacation of I and II semesters and /or II and III semesters. A University examination will be conducted during III semester and prescribed credit shall be included in the III semester. Internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take-up/complete the internship shall be declared as failed and have to complete during subsequent University examination after satisfy the internship requirements.

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II SEMESTER

Sl. No	Course	Course Code	Course Title	Teaching Hours /Week		Examination				Credits
				Theory	Field work/ Assignment	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	PCC	18JTT21	Advanced Textile & Apparel Testing	04	--	03	40	60	100	4
2	PCC	18JTT22	Advanced Silk Technology	04	--	03	40	60	100	4
3	PCC	18JTT23	Advanced Manufactured Fiber Technology	04	--	03	40	60	100	4
4	PEC	18JTT24X	Professional Elective 1	04	--	03	40	60	100	4
5	PEC	18JTT25X	Professional Elective 2	04	--	03	40	60	100	4
6	PCC	18JTTL26	Laboratory - II	--	04	03	40	60	100	2
7	PCC	18JTT27	Technical Seminar	--	02	--	100	--	100	2
TOTAL				20	06	18	340	360	700	24

Note: PCC: Professional core, PEC: Professional Elective

Professional Elective 1		Professional Elective 2	
Course Code under 18JTT24X	Course title	Course Code under 18JTT25X	Course title
18JTT241	Environmental Management for Textile Industry	18JTT251	Developments in Fabric Formation
18JTT242	Fabric Engineering	18JTT252	Variability and its Control
18JTT243	Friction in Textiles	18JTT253	Marketing Management

Note:

1. Technical Seminar: CIE marks shall be awarded by a committee comprising of HoD as Chairman, Guide/co-guide in any and a senior faculty of the department. Participation in seminar by all postgraduate students of the same and other semesters of the programme shall be mandatory.

The CIE marks awarded for Technical Seminar, shall be based on the evaluation of Seminar Report, Presentation skill and Question and Answer session in the ratio 50:25:25.

2. Internship: All the students shall have to undergo mandatory internship of 6 weeks during the vacation of I and II semesters and /or II and III semesters. A University examination will be conducted during III semester and prescribed credit shall be included in the III semester. Internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take-up/complete the internship shall be declared as failed and have to complete during subsequent University examination after satisfy the internship requirements.

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III SEMESTER											
Sl. No.	Course	Course Code	Course Title	Teaching Hours /Week			Examination			Credits	
				Theory	Field work/ Assignment	Duration in hours	CIE Marks	SEE Marks	Total Marks		
1	PCC	18JTT31	Advanced Apparel Production Technology	04	--	03	40	60	100	4	
2	PEC	18JTT32X	Professional Elective - 3	04	--	03	40	60	100	4	
3	PEC	18JTT33X	Professional Elective - 4	04	--	03	40	60	100	4	
4	Project	18JTT34	Evaluation of Project phase - 1	--	02	--	100	--	100	2	
5	INT	18JTTI35	Internship	(Completed during the intervening vacation of I and II semesters and /or II and III semesters.)			03	40	60	100	6
TOTAL				12	02	12	260	240	500	20	
Note: PCC: Professional core, PEC: Professional Elective, Proj: Project, INT: Internship,											
Professional Elective 3				Professional Elective 4							
Course Code under 18JTT32X		Course title		Course Code under 18JTT33X		Course title					
18JTT321		Industrial Engineering		18JTT331		Strategic and Technology Management					
18JTT322		Financial Management		18JTT332		Theory of Yarn Spinning					
18JTT323		Human Resource Management		18JTT333		Medical Textiles					
Note:											
<p>1. Project Phase-1: Students in consultation with the guide/co-guide if any, shall pursue literature survey and complete the preliminary requirements of selected Project work. Each student shall prepare relevant introductory project document, and present a seminar.</p> <p>CIE marks shall be awarded by a committee comprising of HOD as Chairman, Guide and a senior faculty of the department. The CIE marks awarded for project work phase -1, shall be based on the evaluation of Project Report, Project Presentation skill and Question and Answer session in the ratio 50:25:25.</p> <p>SEE (University examination) shall be as per the University norms.</p>											
<p>2. Internship: Those, who have not pursued /completed the internship shall be declared as failed and have to complete during subsequent University examinations after satisfy the internship requirements.</p> <p>Internship SEE (University examination) shall be as per the University norms.</p>											

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IV SEMESTER

Sl. No	Course	Course Code	Course Title	Teaching Hours /Week		Examination				Credits
				Theory	Practical/ Field work/ Assignment	Duration in hours	CIE Marks	SEE Marks Viva voce	Total Marks	
1	Project	18JTT41	Project work phase -2	--	04	03	40	60	100	20
TOTAL				--	04	03	40	60	100	20

Note: Proj: Project.

Note:

1. Project Phase-2:

CIE marks shall be awarded by a committee comprising of HOD as Chairman, Guide/co-guide, if any and a Senior faculty of the department. The CIE marks awarded for project work phase -2, shall be based on the evaluation of Project Report subjected to plagiarism check, Project Presentation skill and Question and Answer session in the ratio 50:25:25.

SEE shall be at the end of IV semester. Project work evaluation and Viva-Voce examination (SEE), after satisfying the plagiarism check, shall be as per the University norms.

**M.TECH. TEXTILE TECHNOLOGY
SEMESTER – I
ADVANCED TEXTILE MATHEMATICS**

Subject Code	18JTT11	IA Marks	40
No. of Lecture Hours/Week	04	Exam Hours	03
No.of Practical Hours/Week	--	No.of Credits	04
Total No. of Lecture Hours	50	Exam Marks	60

OBJECTIVES:

To provide basic mathematics concepts to solve textile industry problems and to find solutions. This course aims at updating the knowledge of students in the field of advanced textile mathematics which is very important in textile and garment fabric manufacturing calculations.

OUTCOMES:

Students can analyze the fibres, yarns, fabrics and garments with the knowledge of advanced mathematics.

MODULE - I

Confidence limits- Estimation of confidence intervals, confidence limits for large and small samples, confidence limits for standard deviation and difference in mean and SD.

Significancetests-interpretation of significance tests, single tail and double tail tests, chi-square distributions Analysis of variance- the design of experiments, randomised variation in experiments, randomisation, completely randomised design (CRD) and randomised block design (one way & two way ANOVA)

10 Hrs.

MODULE - II

Linear regression and time series-relation between variables, variation about regression line, regression equation, correlation coefficient, interpretation of “R”, equation for regression partial and multiple correlation. Components of time series, measurement of trend using method of least squares.

10 Hrs.

MODULE - III

Spinning calculations- forces acting on ring and traveller, calculations related to various drives viz, belt, rope, chain, gear etc. Details of average count and resultant count of yarn. Calculation related spin plan-preparation of spin plan for known count and known quantity of yarn produced with given spinning machinery details.

10 Hrs.

MODULE - IV

Calculations related OE spinning, Air jet spinning, and friction spinning. Calculation of no. of fibres in the yarn, calculation related to evenness of sliver, riving, single & double yarns. Weaving and knitting calculation - estimation of production of different types of preparatory machines, sizing machines and looms. Calculation of fabric weight, cloth cover, stitch density of knitted fabric, air porosity, fabric thickness. Preparation of plan for weaving industry from known machine and material parameters. **10 Hrs.**

MODULE - V

Calculations in garment manufacturing - standard time, importance of GSD & its benefits in garment industry. SAM calculations using synthetic data and time study techniques. Garments CM cost estimation using SAM. Calculation of product capacity of a factory, seam efficiency, seam strength, thread consumption factor etc. **10 Hrs.**

REFERENCES:

1. Textile Testing – J E Booth., CBS Publishers, New Delhi, 1996
2. Handbook of textile testing and quality control-Hamby and Grover, Wiley Eastern Pvt. Ltd., Delhi 1969
3. Practical statistics for textile Industry – Part-1 & 2, Gave Leaf, Textile Institute 1984
4. Textile Mathematics-Vol. 1,2 , 3, J E Booth. Butterworth's Pub London,1980
5. Textile Mechanics-Vol. 1&2, K Slater, Textile Institute Pub ,1979
6. Weaving calculation- Sen Gupta, D. B Tarpurwala& sons., 1956
7. Mechanics of Textile Machinery-W A Hanton, Langmans, Green and Co., London 1950
8. "An introduction to quality control for the apparel industry", Pradip V. Mehta
9. "Progress in textile science and technology " Vol-1 Ed., V K Kothari, AIFI., India 2000

**M.TECH. TEXTILE TECHNOLOGY
SEMESTER – I
ADVANCED FIBER PHYSICS**

Subject Code	18JTT12	IA Marks	40
No. of Lecture Hours/Week	04	Exam Hours	03
No.of Practical Hours/Week	--	No.of Credits	04
Total No. of Lecture Hours	50	Exam Marks	60

OBJECTIVES:

This course aims at updating the knowledge of students in following fields of fiber physics.

1. Investigation of fiber fine structure using various advanced instruments.
2. Elaborated study of various mechanical behavior of fibers, which includes time temperature, super position, WLF equations and mechanics of fiber in composite form, bending, frictional and torsional behavior.
3. In-depth study in moisture relations, optical, thermal and electrical properties of fibers.

OUTCOMES:

1. This course work prepares the students to face real problems related to fiber behavior in various fields of textiles viz-spinning, weaving chemical processing and garmenting.
2. As this subject deals with the most fundamental aspects of textiles (fibers), in-depth knowledge in this subject helps in carrying out any kind of research in textiles and allied fields.

MODULE - I

Introduction to macromolecular physics: Modern concepts of fiber structure. Physical methods of structural characterization of fibers, viz., DGC, TEM, SEM, WAXS, SAXS, IRS, NMR, DSC and DTA. **10 Hrs.**

MODULE - II

Deformation of elastic solid: Generalized Hook's Law, Component of Stress and strain. Linear visco-elastic behavior of fibers. **10 Hrs.**

MODULE - III

Models: Boltzmann superposition principle. Study of dynamic mechanical properties and their investigation in study of fibers. Introduction to mechanical properties of fiber composites. Temperature dependence of visco-elastic behavior. Time-Temperature Equivalence and Superposition. WLF equation. Study of fiber stiffness and torsion. **10 Hrs.**

MODULE – IV

Moisture in textiles- effect of moisture on mechanical, electrical and other properties of fibres. Studies on heats of sorption, theories of moisture sorption, molecular theory of moisture

hysteresis and rate of absorption of moisture in textiles

10 Hrs

MODULE - V

Fibre Properties: Study of optical properties, thermal, frictional, electrical, Di-electric and static properties of fibers. **10 Hrs**

REFERENCES:

1. Polymer characterization” - Hunt and James - Chapman and Hall, London, 1993
2. Mechanical properties of polymers - I M Ward
3. Mechanical properties of polymers - Nielson - Vol I, II, III.
4. Physical properties of fibers - W.R. Morton and J.W.S Hearle
5. Characterization of polymers - Campbell and White
6. Introduction to polymer visco-elasticity - Aklonis
7. Physical polymer science - L.H. Sperling

M.TECH. TEXTILE TECHNOLOGY SEMESTER – I ADVANCED WET PROCESSING

Subject Code	18JTT13	IA Marks	40
No. of Lecture Hours/Week	03	Exam Hours	03
No. of Practical Hours/Week	--	No. of Credits	04
Total No. of Lecture Hours	50	Exam Marks	60

OBJECTIVES:

This course aims at updating the knowledge of students in the field of wet processing such as different dyes and their structural aspects, dye-fibre interactions, latest developments in dyeing, printing and finishing of natural and synthetic textiles. Studies on garment processing will help students to understand various aspects and developments in garment processing.

OUTCOMES:

This Course prepares the students thoroughly with respect to advances in wet processing aspects in industry. Students can make their careers in garment and textile wet processing industries by following various principles studied in the course.

MODULE - I

Dye-Fiber Interaction: Kinetics of Dyeing. The diffusion of dye inside the fiber. Fick's laws of diffusion. Theoretical basis for dye absorption. Theories of dyeing of protein and other fibers using suitable dyes. **10 Hrs.**

MODULE - II

Regulations: Red listed textile chemicals, their sources and remedies. Pollution aspects of textile dyeing. Modern approaches to Eco-friendly wet processing of woven and knitted textiles. Eco-friendly dyes and their method of dyeing. Methods of analysis of formaldehyde, Pentachloro Phenol (PCP), chlorine compounds and heavy metals in processed and finished fabrics. Eco-labeling and various Eco-standards. **10 Hrs**

MODULE - III

Garment Dyeing: Modern developments in garment dyeing. Methods and machines. Low temperature dyeing of garments. Finishing of garments using different chemicals and auxiliaries. **10 Hrs.**

MODULE - IV

Finishing: Modern developments in finishing of natural and synthetic textiles. Finishing of textiles with various specialty chemicals. **10 Hrs.**

MODULE - V

Developments: Modern developments in textile and garment printing, color measurement and computer colour matching concepts. Latest developments in natural dyes and their application on various fibers. **10 Hrs.**

**M.TECH. TEXTILE TECHNOLOGY
SEMESTER – I
YARN ENGINEERING**

Subject Code	18JTT14	IA Marks	40
No. of Lecture Hours/Week	03	Exam Hours	03
No. of Practical Hours/Week	--	No. of Credits	04
Total No. of Lecture Hours	50	Exam Marks	60

OBJECTIVES:

1. Designing of yarn for various end uses should be studied and understood.
2. The end use performance depends on the design of yarn and quality particulars of yarn.

OUTCOMES:

This course helps students to work in apparel and technical industry with a wide knowledge on different yarns and their structural aspects. This knowledge on yarns will help correlate with fabric properties for various applications.

MODULE - I

Importance of Yarns: Designing yarns for specific end-uses. Selection of fiber /filament, structure of fiber/filament, spun yarns, multifilament yarns, textured yarns and micro denier multi filament. Yarn diameter derivation of Pierce, Grosberg and Dickson formulae. Functional properties of end products. **10 Hrs.**

MODULE - II

Yarn Structure and yarn Regularity: Geometrical properties of single and folded yarns. Derivations of related equations. Open & hexagonal packing and their merits and demerits. Twist contraction and retraction - practical applications. Twist migration and segment length in spun and filament yarns - Theoretical analysis of yarn irregularity - blend irregularity. **10 Hrs.**

MODULE - III

Transfer of Force: Transmission of force from fiber to fiber in spun yarns - mechanism of yarn breakage. **10 Hrs.**

MODULE - IV

Relationship: Effect of fiber properties and their geometrical configuration on tensile properties of yarns. Concept of elongation. **10 Hrs.**

MODULE - V

Blends: Effect of properties of constituent fibers and their composition on the behavior of blended Yarns. **10 Hrs.**

REFERENCES:

1. "Textile yarns" - B.C. Goswamy, J.G. Martindale, Wiley Interscience.
2. "Structural mechanics of fibres, yarns and fabrics" - J.W.S. Hearle, P Grosberg, S. Backer, Wiley Interscience.
3. "Spun yarn technology" – Oxtoby, Butter Worth.
4. "Technology of short staple spinning" – Vol I, II, III, W. Klein, Textile Institute.

**M.TECH. TEXTILE TECHNOLOGY
SEMESTER – I
ADVANCED KNITTING AND NONWOVENS**

Subject Code	18JTT15	IA Marks	40
No. of Lecture Hours/Week	03	Exam Hours	03
No. of Practical Hours/Week	--	No. of Credits	04
Total No. of Lecture Hours	50	Exam Marks	60

OBJECTIVES:

This course work will help the student to enhance their knowledge in modern knitting process, machines and application. Also give the student an independent knowledge about Non-woven production and application.

1. Types of knitting machines, structures, specialty of warp knits.
2. Warp knitting machines and their working to produce various warp knit structures and their uses.
3. Type of warp yarn required for warp knitting and calculations involved.
4. Non-woven production: Latest methods and techniques, application on industry. Testing of non-woven.

OUTCOMES:

Student will have an in depth knowledge about warp knitting and non-woven fabric production. It will update the knowledge about modern aspects of warp knitting and non-woven production and application.

MODULE – I

KNITTING:

Warp knit fabrics; warp knit v/s woven construction, Single needle bar structure and working mechanism, pattern mechanism. Five basic over lap/under lap variations, closed lap and open lap, direction of lapping at successive courses. Classes of warp knitting machinery, knitting cycle, Tricot, Raschel machines. Knitting elements in Raschel machine, knitting cycle in Raschel Knitting action of the single needle bar Raschel and compound needle. **10 Hrs.**

MODULE – II

Knitting elements of Tricot machines, knitting cycle in Tricot machine. Plain Tricot structures, knitted with two full set guide bars, two bar Tricot, Shark skin, Queenscord, Velour and Velvet structures, Satin, overfed pile structures, reverse lock knit. Differences between Tricot and Raschel machines and fabrics. Laying-in in warp knitting, rules governing, laying-in, fall-plate patterning, full width weft insertion, cut presser and miss press structures. **10 Hrs.**

MODULE – III

Modified warp knit machines and fabrics: Fall plate and chopper bar Raschel, co-we-nit, weft insertion in knitting. Pattern controlling mechanism, pattern wheels, electronic jacquards. Yarns for warp knitting:- Materials for warp knitting, filament and spun yarns, unconventional yarns, important yarn properties for warp knitting, winding and warping for warp knitting. Faults in warp knits. warp knitting calculations **10 Hrs.**

MODULE – IV

NONWOVENS:

Classification of non-wovens, preparatory machines for non-wovens fabric Production. Effects

of fiber arrangements in the web. Methods and technique used in non-woven production, needle punched, stitch bonded, and adhesive bonded wet laid spun bonded, spun laced laminated and moulded fabrics. Classification of binders and their properties, effect of fiber properties on non-wovens. Modern developments in non-woven productions. **10 Hrs.**

MODULE –V

Structure of non-wovens: web geometry, fiber orientation curl factor, web density. Identification, properties and application of different non-wovens. Methods of tests: porosity, tear strength, air permeability, tensile strength, 3-point bending test, fatigue test, CBR Loading, cone puncture test, absorbency test, peeling test, pilling test, study of DIN standards. **10 Hrs.**

REFERENCES:

1. “Knitting Technology” - David J Spencer.
2. “Warp Knitting” - Ajgaonkar.
3. “Non-woven fabrics” – NN Banerjee.
4. “Non-woven Bonded Fabrics” - Joachim Lünenschloss, Wilhelm Albrecht
5. “Non-woven Fabrics” – production and applications” - M.L. Gulrajani.
6. “ Non-woven Technology” – BTRA Conference papers.

M.TECH. TEXTILE TECHNOLOGY SEMESTER – I LABORATORY - I

Subject Code	18JTTL16	IA Marks	40
No. of Lecture Hours/Week	-	Exam Hours	03
No.of Practical Hours/Week	04	No.of Credits	02
Total No. of Lecture Hours	-	Exam Marks	60

OBJECTIVES:

The main objective is to understand the application of theoretical knowledge.

OUTCOMES:

The students will be able to tackle problems both in industry and business.

Collection of special knit structure and analysis of the same. Understanding relationship between

structure and geometry. Design and product development.

Collection of nonwoven samples and their characterization. Structural analysis of non- wovens. Design and product development.

Collection of functional wet processed samples. Application and use of Reflectance spectrophotometer for analysis of colour parameters.

Evaluation of dyes and finishes. Study of mechanism and kinetics of dyeing. Energy consumption and environmental impact of wet processing industry.

**M.TECH. TEXTILE TECHNOLOGY
SEMESTER – II
ADVANCED TEXTILE AND APPAREL TESTING**

Subject Code	18JTT21	IA Marks	40
No. of Lecture Hours/Week	04	Exam Hours	03
No.of Practical Hours/Week	--	No.of Credits	04
Total No. of Lecture Hours	50	Exam Marks	60

OBJECTIVES:

This subject is required to understand all testing details:

1. Fiber parameters are required to find spinning consistency index.
2. Yarn parameters are required to decide its application for knitting or weaving.
3. Fabric properties are required depending on the end use application.

OUTCOMES:

Students who have studied this subject can confidently work in QC dept. and research institutions.

MODULE – I

Advance Fibre and Yarn Testing Instruments: Study of High Volume Instrument (HVI). Advanced Fiber Information System (AFIS). Comparison of AFIS with HVI System, Yarn Hairiness and its measurement. Uster spectrograph and its analysis. Properties desired in export yarns. **10 Hrs.**

MODULE – II

Advance Fabric Testing Instruments: Objective evaluation of fabric handle by KAWABATA Evaluation system, Fabric Assurance by SimpleTesting and fabric extractions force technique. The influence of chemical and mechanical finishes on fabric handle. **10 Hrs.**

MODULE - III

Inspection: Introduction, raw material inspection, In-process Inspection - spreading, cutting, sewing, pressing and final inspection. **10 Hrs**

MODULE - IV

Apparel Testing: Soil/Stain release testing, snagging, bonded and laminated apparel fabric,

testing of fusible interlinings, buttons, zippers and sewing threads. Care labeling of apparel and textiles: American, International, British, Canadian and Japanese systems. **10 Hrs.**

MODULE - V

Quality Control Program: Planning for the quality control program, inspection and analysis of data. Tools of quality control. ISO 9000 series standards. Total Quality Management concepts. **10 Hrs.**

REFERENCES:

1. Principles of Textiles Testing” - J.E. Booth.
2. Hand book of textile testing and quality control” -B. Glover, D.S. Hamby, Wiley Eastern. Ltd.,
3. The measurement of Appearance” - Richard S. Hunter and Richard W. Harold, Wiley Interscience.
4. An introduction to quality control for the apparel industry” - Pradip V Mehta.
5. International Apparel Quality Manuals – KESF and FAST Manuals
6. Progress in Textile Science and Technology – Vol.1 Ed.by V.K.Kothari, IAFL, India, 2000

M.TECH. TEXTILE TECHNOLOGY SEMESTER – II ADVANCED SILK TECHNOLOGY

Subject Code	18JTT22	IA Marks	40
No. of Lecture Hours/Week	04	Exam Hours	03
No.of Practical Hours/Week	--	No.of Credits	04
Total No. of Lecture Hours	50	Exam Marks	60

OBJECTIVES:

This course work aims at imparting knowledge to the students at post graduate level in the following field of advanced methods of production of silk and their application in the diversified fields.

1. Present scenario of Indian Silk industry, the quality and production aspects, silk production in other countries.
2. Development in various stages of production of silk and spun silk.
3. Structural aspects of silk such as composition, micro structure, crystalline structure, etc.,
4. Recent development in silk dyeing and preparatory process.

5. Modern technology and methods in silk finishing and eco-friendly finishes.
6. Developments in processing and application of silk for non apparel purposes. Such as bio-medical application,

OUTCOMESS:

The subject will enhance the knowledge of student of new methods, new techniques of production of silk and their diversified applications. It will enable the student to learn the structure details and relationship between structure and properties of silk. Also the subject will help the student to acquire knowledge about new techniques and methods of dyeing and finishing of silk, eco friendly and economical aspects of dyeing and finishing of silk.

MODULE – I

Structure and Properties: Silk Composition of silk, amino acid composition, moisture regain, micro structure of silk, chained structure of silk, crystalline structure of silk, optical proportion of silk. Mechanical and thermal properties of silk: Tensile properties, stress-strain characteristics of silk. Visco-elastic behavior of silk, creep and stress relaxation inverse stress relaxation. Dynamic mechanical behavior and thermal behavior. **10 hrs**

MODULE – II

Indian Silk Industry and Process: Production of silk, quality of silk, problems and prospects. Present Scenario of Indian Silk Industry Production of silk produced by the other countries across the world and quality of silk produced by their Modern approach to silk cocoon production and cocoon characteristics evaluation. Recent developments in cocoon, stifling, sorting, grading, cooking and reeling. Technological developments in reeling machines and methods to increase the production of raw silk. **10 Hrs.**

MODULE – III

Production of Spun Silk: Conversion and modern approach, prospects and application, Production of Indian cottage silk and its suitability for producing traditional silk fabric with intricate designs. Production of soft silk, crepe, georgette, chiffon etc. Production of damasks and brocades and silk furnishing cloth. **10 Hrs.**

MODULE – IV

Dyeing and Finishing: Types of dye used, factors affecting dyeing behavior of silk, preparation of silk for dyeing. Recent developments in degumming, bleaching, dyeing. Dyeing of silk with reactive, direct and natural dyes. Finishing of silk fabrics: Types and methods, modern technologies involved to impart wrinkle resistant finish, stain repellent, antimicrobial finish and other specialty finishes applicable to silk and its blends. Developments in machineries, chemicals and auxiliaries used for silk dyeing and finishing. **10 Hrs**

MODULE – V

Developments: Processing of silk fibroin, filaments, hydrogels production of 3D sponges, membranes of silk, non wovens, fluorescent silks. Biomedical applications of silk such as in sutures, wound healing, tissue engineering, drug delivery systems. Silk fibre reinforced

composites. Spider silk and their applications: Types of spider silk, chemical compositions, general properties, tensile properties and application of spider silk. **10 Hrs.**

REFERENCES:

1. **Silk – Processing, Properties and Applications** - K. Murugesh Babu, Woodhead Publishing Limited, UK, 2013.
2. **“FAO Manual on silk”**.
3. **“Silk man companion”** – Central Silk Board, Bangalore
4. **“Silk wet processing”** - Dr. M. L. Gulrajani, IIT Publication.
5. **“Silk Dyeing”** - Dr. V. A. Shenai, Sewak Publications.
6. **“Silk Dyeing, Printing and Finishing”** – G H Hurst, Summer Press Publications
7. **“The Technology of Clothing Manufacture”** - Harold Carr and Barbara Latham, Wiley, 1994
8. **“Watsons Advanced Textile Design”** – Z Grosicki
9. **“Grammar of Textile Design”** – H Nisbet

M.TECH. TEXTILE TECHNOLOGY
SEMESTER – II
ADVANCED MANUFACTURED FIRE TECHNOLOGY

Subject Code	18JTT23	IA Marks	40
No. of Lecture Hours/Week	03	Exam Hours	03
No. of Practical Hours/Week	--	No. of Credits	04
Total No. of Lecture Hours	50	Exam Marks	60

OBJECTIVES:

This course work aims at imparting knowledge to the students in following fields of advanced manufactured fiber technology.

1. Physics and mechanics of fluid flow in MMF spinning.
2. High speed melt spinning, mechanism of dry and wet spinning.
3. Recent advances in MMF spinning.
4. Studies on new millennium fibers viz. ultra fine fibers, high touch fibers, Nano fibers , ultra performance fibers etc.
5. Application of fibers in various fields like bio-technology, sports, electronics, bio-mimicking, ocean etc.

OUTCOMES:

This course work prepares the students to work in most modern man-made fiber manufacturing plants in India and abroad, Subject also prepares and motivates to students to take up the

research work in the field of advanced manufactured fibers, technical and smart textiles.

MODULE – I

Structural principles of fibre forming polymers. Rheology and hydrodynamics in MMF spinning. Development of fibre structure during man-made fibre spinning. Study of various variables in melt spinning and effect of various parameters on linear density of fibres.

10 Hrs.

MODULE - II

High speed melt spinning: One step (SP) and two step spinning (TSP) process. Study of fluid flow in spin line. Modifications to be done in spinning, mechanism for high speed melt spinning. Recent developments in dry and wet technology. Study of various types of spinnerettes, orifices used for MMF spinning. Mechanism of crystallization during MMF spinning.

10 Hrs.

MODULE - III

Melt spinning of Hollow, Multicomponent, Ultra-fine and Nano fibres. Spin finish application: Composition of spin finish, various methods of spin finish application, spin finish for staple fibre production.

10 Hrs

MODULE – IV

Detailed study of mechanism of heat setting of synthetic fibres. Study of property changes in synthetic fibres during heat setting. Study of various physical and chemical methods of modifications of PET, NYLON & Acrylic fibers.

10 Hrs.

MODULE – V

New fibres: Introduction to various high performance fibres, Kevlar-LCP behaviour, dry jet spinning of Kevlar fibres, Carbon fibres, raw materials, chemistry of production, surface treatments. Recent trends in production of high performance fibres like Boron, Silicon, Glass, PBT, PBZO, PBZT and aromatic polyesters. High tech fibres, biomimetic chemistry and fibres, biotechnology and fibres, electronics and fibres, fibres in sports, fibres in ocean. **10 Hrs.**

REFERENCES:

1. High Speed Fibre Spinning” - Andrzej Ziabicki, Hiromichi Kawai, Krieger Publishing Company, 1991
2. Fundamentals of fibre formation” - Andrzej Ziabicki, Wiley, 1976
3. Manmade fibres: Science and Technology”, Vol. I, II and III – HF Mark, SM Atlas and E Cernia ,Interscience Publishers, NY
4. Manufactured Fibre Technology” – Ed.by V. B. Gupta and V K Kothari, Chapman and H all, London, 1997.

5. New Fibres” - T. Hongu and G O Phillips, Ellis Horwood, New York 1990.
6. Carbon Fibres” Third Edition -Donnet J. B, and others, Marcel Dekker, New York 1990.
7. Spinning of Man Made fibres and blends on cotton s ystems” - K R Salhotra, The Textile Association, India 2004.

M.TECH. TEXTILE TECHNOLOGY
SEMESTER – II
PROFESSIONAL ELECTIVE – 1
ENVIRONMENTAL MANAGEMENT FOR TEXTILE INDUSTRY

Subject Code	18JTT241	IA Marks	40
No. of Lecture Hours/Week	03	Exam Hours	03
No.of Practical Hours/Week	--	No.of Credits	04
Total No. of Lecture Hours	50	Exam Marks	60

OBJECTIVES:

This course aims at preparing students towards environmental aspects of textile and garment industries. They have to understand various environmental issues concerned to control pollution and know environmental laws.

OUTCOMES:

Students can help analyze the environmental related issues of garment and textile industries, governmental policies and make decisions on eco aspects of industries.

MODULE - I

Water: Source of water and their characteristics- surface water, ground water, rain water etc. Constituents of water and their effects on textilewet processing. Colour, turbidity, suspended solids, dissolved solids, PH value, acidity, alkalinity, hardness, iron and manganese, copper, chlorine organic growth. **10 Hrs.**

MODULE - II

Quality requirements: Quality requirements of water for silk reeling and textile processing. Conservation and reuse of water. Processingchemistry - fibres, chemicals, type of chemical processing. **10 Hrs.**

MODULE - III

Textiles effluent: Introduction to textiles effluent, characteristics of textiles processing,

dye manufacture and synthetic fibres formation industries, reduction and pollution control at mill state. Methods and techniques used for effluent treatments. **10 Hrs.**

MODULE - IV

Standard regulations for effluents: Effluent testing parameters- colour and physical appearance, odour, temperature, PH value total suspended solids, total dissolved solids, BOD, COD. **10 Hrs.**

MODULE - V

Environmental management: Objectives, environmental impact assessment (EIA), elements of EIA process. Important environmental laws. Environmental pollution control norms. Bio-technology and its application in environmental industries. Plasma treatments. **10 Hrs.**

REFERENCES:

1. "Textile Effluents" - PadmaVankar, NCUTE Publications, IIT, Delhi.
2. "Eco friendly processing" - NCUTE Publications.
3. "Environmental problems in chemical processing of textiles" - NCUTE Publications.
4. "Waste water-An introduction to environmental pollution", Dr. B.K. Sharma, Krishna Prakashan, Media (P) Ltd., Meerut.
5. "Water pollution" - V.P. Kudesia, PragathiPrakashan, Meerut.

**M.TECH. TEXTILE TECHNOLOGY
SEMESTER – II
PROFESSIONAL ELECTIVE – 1
FABRIC ENGINEERING**

Subject Code	18JTT242	IA Marks	40
No. of Lecture Hours/Week	03	Exam Hours	03
No. of Practical Hours/Week	--	No. of Credits	04
Total No. of Lecture Hours	50	Exam Marks	60

OBJECTIVES:

The objective of this study is to enhance the knowledge of students in modern aspects of fabric engineering. This will help to improve their knowledge on designing of new fabrics and garments.

OUTCOMES:

The result is that students will be able to design and develop new fabrics for various applications.

MODULE – I

Engineering concepts: Textile properties and textile structure – engineering concepts and approach to textile Structure – classification of multidirectional textile structure – laminar and orthogonal. Classification and standardization of fabrics. **10 Hrs.**

MODULE – II

Geometry of fabric structure: Pierce's basis and modified models – Painter – Adom's and Love's technique descriptive and mechanistic models. Kemp and Hamalton: Twin arc, Olofson – Snow dens and other models. **10 Hrs.**

MODULE – III

Tensile deformations: Tensile deformation – heaps solution – pierces solution – geometrical solutions during extension of cloth – load extensional modules – tear – various Models. **10 Hrs.**

MODULE – IV

Other deformations: Bending and tensional deformations – buckling, shear and drape of fabrics – theory various Models – behavior. **10 Hrs.**

MODULE –V

Knit structures: Geometry of knitted fabrics – weft and warp knits – various models – applications. Mechanics of knitted fabrics – theory-behaviour. **10 Hrs.**

REFERENCES:

1. **“Structural mechanics of fibres, yarns and fabrics”** Vol.I - J. W. S. Hearle, P. Grosberg, Stanley Backer, Wiley Intersci. New York.
2. **“Textile fibres, yarns and fabrics- a comparative survey of their behaviour with special reference to wool”** – E R Kaswell, Pub.Reinhold, 1953
3. **“Textile Mathematics”** - Vol I, II, III – J. E. Booth, Textile Institute
4. **“Woven Cloth Construction”** - A.T.C. Robinson & R. Marks, Textile Institute

**M.TECH. TEXTILE TECHNOLOGY
SEMESTER – II
PROFESSIONAL ELECTIVE – 1
FRICTION IN TEXTILES**

Subject Code	18JTT243	IA Marks	40
No. of Lecture Hours/Week	03	Exam Hours	03
No. of Practical Hours/Week	--	No. of Credits	04
Total No. of Lecture Hours	50	Exam Marks	60

OBJECTIVES:

The main objective of this course is to prepare the students to understand the basic principles of friction and its use in textiles. They can understand surface characteristics of fabrics, garments and yarns.

OUTCOMES:

The students will be able to use the application of friction to analyse the fabrics based on their frictional behavior.

MODULE – I

General mechanism of friction Laws of friction, theories of friction, friction in various textile processes like spinning, weaving and chemical processing etc. Detailed study of various methods of measurement of fibre friction in textiles. **10 Hrs**

MODULE – II

Theory of spin finish application, various methods of spin finish application, Spin finish application to synthetic fibres, spin finish composition for synthetic filaments, staple fibres and textured yarns. **10Hrs**

MODULE – III

Role of friction in the mechanical behaviour of fabrics. Study of surface geometry of synthetic

fibres. Resistivity and static behaviour of textile surfaces,

10Hrs

MODULE – IV

Effect of photochemical and environmental degradation on the surface properties of textile fibres. Soil release from the textile surface, stain and water repellency of textile surfaces.

10 Hrs

MODULE – V

Generation of static charges in textile process and their remedies. Role of fiber friction in garment making, Effect of friction on comfort property of textiles.

10 Hrs

REFERENCES:

1. **“Surface Characteristics of Fibres and Textiles”** - Ed.by M.J.Schick, New York: M. Dekker, c1975-1977
2. **“Friction in Textiles”** – H G Howell, Literary Licensing, LLC, 2013

**M.TECH. TEXTILE TECHNOLOGY
SEMESTER – II
PROFESSIONAL ELECTIVE – 2
DEVELOPMENTS IN FABRIC FORMATION**

Subject Code	18JTT251	IA Marks	40
No. of Lecture Hours/Week	03	Exam Hours	03
No.of Practical Hours/Week	--	No.of Credits	04
Total No. of Lecture Hours	50	Exam Marks	60

OBJECTIVES:

This course work is more useful for the students to know about the recent development in weaving sector. Many manufactures are modernizing the weaving sectors so that the knowledge about the recent development in weaving machineries is useful for the study.

1. Students can acquaint the knowledge about the modern weaving machine like Projectile, Rapier, Air jet, Water jet & multiphase concept.
2. It can update the knowledge about selvages, quality norms required, applicability etc.,
3. Students can study, geometry, style, speed, WIR applications etc.,

OUTCOMES:

Students with this knowledge can work in the modern weaving industries, garment manufacturing units with a thorough knowledge of fabric properties, manufacturing methods,

machinery knowledge.

MODULE - I

Pre requisites: Pre requisites for successful installation of shuttle less looms, yarn quality norms for unconventional weaving, preparatory process to unconventional weaving. **10 Hrs**

MODULE - II

Weft insertion methods: Weft insertion by projectile, rapier, air jet, water jet, weft insertion stages of different weaving machines.

Weft insertion by other methods by multi-phase weaving. Study of unconventional selvages, accumulators, shed geometry, weft consumption, weft unwinding tension.

10 Hrs.

MODULE - III

Controls: Productivity- its measurement and control. Material handling equipment and importance. **10 Hrs.**

MODULE - IV

Management: Management of loom shed, maintenance.

10 Hrs.

MODULE - V

Developments: Modern development in weaving machines projectile, rapier, air jet, water jet, QSC wider width machine. Techno economics of unconventional weaving machines. **10 Hrs.**

REFERENCES:

1. Principles of Weaving” – R Marks and A T C Robinson &, Textiles Institute, Manchester, 1976
2. Modern Preparation and Weaving Machinery” – A Ormerod - Butterworth, (Publishers) Limited, 1983
3. Shuttle-less Weaving Machines” - Oldrich Talavasek & Vladimir Svaty - Elsevier Science, Oxford, 1981.
4. Handbook of Weaving” – Sabit Adanur

**M.TECH. TEXTILE TECHNOLOGY
SEMESTER – II
PROFESSIONAL ELECTIVE – 2
VARIABILITY AND ITS CONTROL**

Subject Code	18JTT252	IA Marks	40
No. of Lecture Hours/Week	03	Exam Hours	03
No. of Practical Hours/Week	--	No. of Credits	04
Total No. of Lecture	50	Exam Marks	60

Hours			
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OBJECTIVES:

1. Identification of defects is first priority of industry.
2. Remedial measures and corrective action should be taken.

OUTCOMES:

Students can satisfactorily work in quality control dept.

MODULE - I

Lap formation and control of lap uniformity. Irregularities of carded, drawn and combed Silver and their control. Irregularities in roving, yarns and their control. **10 Hrs.**

MODULE - II

Influence of different materials and their blends on irregularity. Index of blend irregularity and its influence on the quality of end product. **10 Hrs**

MODULE - III

Influence of ambient conditions on the irregularity of material at various stages of processing restricted to spinning of cotton and its blends. **10 Hrs.**

MODULE - IV

Irregularities of yarns produced on ring, rotor, friction and air jet spun systems. **10 Hrs.**

MODULE - V

Instruments used for measurement of irregularity – analysis and interpretation of data and graphs remedial measures. **10 Hrs.**

REFERENCES:

1. “Textile yarns”, B.C. Goswamy, J.C. Martindale-Willey Interscience.
2. “Manual of cotton spinning”, Vol IV. Part -1-Foster Textile Inst.
3. “An Introduction to the Study of Spinning”- W E Morton, Lightning Source Incorporated, 2008
4. “Roller Drafting” - Nogeera

**M.TECH. TEXTILE TECHNOLOGY
SEMESTER – II
PROFESSIONAL ELECTIVE – 2
MARKETING MANAGEMENT**

Subject Code	18JTT253	IA Marks	40
No. of Lecture Hours/Week	03	Exam Hours	03

No.of Practical Hours/Week	--	No.of Credits	04
Total No. of Lecture Hours	50	Exam Marks	60

OBJECTIVES:

The main objective of this course is to prepare the students to understand the basic principles of marketing management as the knowledge of marketing management is extremely important in textile and garment industries.

OUTCOMES:

The students will be able to analyze marketing strategies, export and import procedures.

MODULE - I

Core concepts of marketing. Need, Want & Demand, Product, Value and satisfaction. Production concept, product concept, selling concept and Marketing concept. A model for consumer buying behaviour, factors influencing consumer behavior, buying decision process- Buying roles & stages in buying. New product development-Idea generation, Idea screening, Concept development and using, Product development. Marketing strategies in the various stages 'Product Life Cycle'. Pricing - Objectives, Influencing factors, methods, strategies for new products and existing products.

10 Hrs

MODULE - II

Channel Decisions Nature and characteristics of Marketing Channel Functions, channel dynamics, Channel Design and Management decisions. Communication process - Steps in the development of effective communication, Designing message, selection communication channels, deciding promotion mix, measuring results. Promotional Mix tools. Advertising, Sales promotion, personal selling, public relations, and direct marketing. Marketing organization & implementation: Evolution, ways of organizing the marketing departments, marketing relations with other departments.

10 Hrs

MODULE - III

E-Business frameworks -media convergence -Anatomy of E-Biz applications - Internal and External applications and integration - organizational business – ED- Implementation -Managing technology – IT bills of various governments. Introduction to web applications - technologies for Web services –Internet tools relevant for E-Business Internet applications for E-business. Types of electronic payments -Digital token based payments-Smart cards credit cards based -other emerging payments technologies -E-governance and implications - Technical specification of digitalcurrencies.

10 Hrs

MODULE - IV

Brand, Brand identity, Brand Image, Brand Personality, Brand Loyalty and the connected issues. Brand Positioning, Repositioning, Brand Equity: Conceptualization and measurement Trends in Brand Management: Brand cult, Brand alliances, Co-branding, Destination, Branding. Introduction to industrial marketing, Difference between consumer marketing and industrial

marketing, classification of industrial products, Nature of demand, Industrial marketing system. Industrial buying behaviour. **10 Hrs**

MODULE - V

The concept and the need for international marketing - the nature, scope and variety of international markets. International market Vs Local Markets, differences & Similarities. Trade groups, international regulations, trade bodies & Organization like IMF, World Bank & Conference e.g. GATT, UNCTAD, their impact on world trade Euro-dollar & Petro Dollar Market. Exchange rate fluctuations on Imports and Exports. **10 Hrs**

REFERENCES:

1. "Retail Management-A Strategic Approach" - Barry Bermans and Joel Evans, 8th edition, PHI private limited, New Delhi, 2002.
2. "The Art of Retailing" - A.J. Lamba, 1st edition, Tata McGraw Hill, New Delhi, 2003.
3. "Marketing Management" - Kotler Philip, 1st Ed., Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2004
4. "Marketing Management" - S. Jayachandra, 1st edition, Excel Publications, New Delhi, 2004
5. "The Economics of Electronic Commerce" - Soon-Young choi, Whiston, A.B., Macmillan Publishing Company, USA.
6. "Electronic commerce-A manager's guide" - Kalakota R &Whinston, A. B., Addition Wesley, USA.
7. "Advertising and Promotion" - Belch E. George & Belch A. Michael, 5th edition, Tata McGraw Hill, New Delhi, 2001.
8. "Brand building advertising: concepts and cases" - Parameswaran, Tata McGraw Hill, New Delhi, 2002 .
9. Strategic Brand Management" - Jean Noel Kapferer, Global business press, Abhinav Publishing industry, 1st ed., New Delhi, 1994.
10. Industrial Marketing, AITBS" - Hill, M Richard, Alexander S. Ralph, Cross James S, 4Ed. New Delhi 1991.
11. Direct Marketing: An Integrated Approach" - William J. McDonald, McGraw Hill, Singapore, 1st edition, 1998.

M.TECH. TEXTILE TECHNOLOGY

SEMESTER – II

LAB - II

Subject Code	18JTTL26	IA Marks	40
No. of Lecture Hours/Week	-	Exam Hours	03
No.of Practical Hours/Week	04	No.of Credits	02

Total No. of Lecture Hours	-	Exam Marks	60
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OBJECTIVES:

The main objective is to understand the application of theoretical knowledge.

OUTCOMES

The students will be able to tackle problem both in industry and business.

Analysis of HVI, AFIS, KESF and FAST result sheets. Analysis of Uster spectrograph. Comparison of specification and test methods of different standard institutions. Collection of inspection reports from industry and its analysis.

Kinematic analysis of various loom motions. Energy conservation study of different kinds of looms. Design of Product and its production planning. Collection of online monitoring systems of weave room.

**M.TECH. TEXTILE TECHNOLOGY
SEMESTER – II
TECHNICAL SEMINAR**

Subject Code	18JTT27	IA Marks	100
No. of Lecture Hours/Week	02	Exam Hours	--
No.of Practical Hours/Week	-	No.of Credits	02
Total No. of Lecture Hours	-	Exam Marks	--

OBJECTIVES:

The main objective of this course is to prepare the students to improve their presentation skills. The course also helps students to enhance their report preparation skills.

OUTCOMES:

The students become confident in presentation of ideas, reports of companies, production data, interpretation of data etc.

In the subject each student has to present a seminar on the topics suggested by the concerned faculty. At the end of the semester a detailed seminar report has to be

submitted to the department for allotment of internal assessment marks.

10 Hrs

**M.TECH. TEXTILE TECHNOLOGY
SEMESTER – III
ADVANCED APPAREL PRODUCTION TECHNOLOGY**

Subject Code	18JTT31	IA Marks	40
No. of Lecture Hours/Week	04	Exam Hours	03
No.of Practical Hours/Week	--	No.of Credits	04
Total No. of Lecture Hours	50	Exam Marks	60

Objectives:

This course work aims at imparting knowledge to the students at post graduate level in the following field of advanced methods of production of apparel.

1. Provide knowledge about apparel manufacture, functions of apparel manufacturing, advanced apparel production Technology. Application of computers and electronics in ferment designing all levels of garment production.
2. Latest developments in machinery equipment, automation etc.
3. Give an overview of Indian Apparel Industry, structure of the industry, apparel export to Europe and Western World.

Out Come:

Student will have an opportunity to learn the modern aspects of apparel production and its adaptation by Indian apparel industry. It will give overall prospects of garment manufacturing industry as an upcoming textile related industry.

MODULE - I

The nature and scope of apparel manufacturing: Types of apparel manufacture-fundamentals of apparel production. Basic types of apparel production process - major function of apparel manufacturing – engineering functions, management functions- apparel trade association. Computerized pattern making in garment production. Principle of pattern making, garment balance, Size charts, pattern grading, computerized made to measure system, Technological advances in pattern making, Gerber technology, Lectra systems, material utilizations, application/developments in computer aided apparel systems, Future trends. Computerized cutting, marker quality and geometric principle for calculating optimum marking design, principles of stitch, seam and their analysis, seam quality, computerized sewing, pressing and moulding.

10 Hrs

MODULE - II

Advances in apparel product development; Industrial change process model for clothing product development, models of new product development, product development tools and application area product life time management (PLM) Demand Led new product development future trends.

Technological advances in sewing garment: History of sewing development of the industrial saving, machine advances in sewing needledesign, advances in sewing thread technology, Advances in sewing machine automation, semi automatic sewing equipment, machine using computer numerical control. Future trends in cloth technology.

10 Hrs

MODULE - III

Development in pressing technology for garment finishing: The pressing process, pressing with pressure pressing without pressure, creaseresistant finishes and permanent creasing future trends. Packaging and ware housing: Type of packing and packing materials, quality specification, merchandise packing and shipping packing. Intra transport, ware housing, computerized storage systems.

10 Hrs

MODULE - IV

Production control: Production analysis, distribution of documents and records, types of control forms, producing many styles in one line and determining supervisory sections in production lines. Production control charts, reports, production grid principle for assigning partial production, line operators, evaluation.

10 Hrs

MODULE - V

Indian apparel industry: Overview of technology in apparel manufacturing technology, usage, regional features and structures of the industry, Indian apparel export and important product category, domestic market and domestic brands, technology status and outlook. Apparel productivity- Apparel productivity in India and Western world, global comparison characteristics of low, medium and high productivity manufacturers and factors associated with productivity actions towards higher productivity.

10 Hrs

REFERENCES:

1. **“Apparel Manufacturing Hand book: Analysis, Principles and Practice”**-- Jacob Solinger, Van Nostrand Reinhold Company 1981
2. **“Managing Productivity in the Apparel Industry”** - Rajesh Bheda, CBP Publisher and Distributors
3. **“ The Technology of Clothing Manufacture”**, Harold Carrand Barbara Latham, John Wiley & Sons
4. **“Seams Productions and Analysis”**-Radh D Clock
5. **“Advances in Apparel Production”**-Ed. by Catherine Fairhurst, Textile Institute,

**M.TECH. TEXTILE TECHNOLOGY
SEMESTER – III
PROFESSIONAL ELECTIVE – 3
INDUSTRIAL ENGINEERING**

Subject Code	18JTT321	IA Marks	40
No. of Lecture Hours/Week	03	Exam Hours	03
No. of Practical Hours/Week	--	No. of Credits	04
Total No. of Lecture Hours	50	Exam Marks	60

OBJECTIVES:

- To impart the fundamental principles of Industrial Engineering as applied to textile field
- To make the students familiar with the techniques of work study with practical textile examples

OUTCOMES:

- a) The graduates will become familiar with fundamentals of various science and technology subjects and thus acquire the capability to applying them.
- b) The graduates will be able to apply the basic concepts to design and translate the design into prototype / product and also to analyze and interpret data related to textile design, manufacturing and quality analysis.
- c) The graduates will demonstrate their ability to solve technical problems via technical approaches, self study, team work and life-long learning approaches.
- g) Graduates will become equipped with the knowledge and skills necessary for entry-level placement in both TT as well as IT companies.
- h) The graduates will develop capacity to understand professional and ethical responsibility and will display skills required for continuous and life-long learning and up gradation.
- i) The graduates will have sound foundation for entering into higher education programmes.

MODULE – I

Productivity

Scope of Industrial Engineering – industrial engineering concepts – Productivity indices – production per spindle – HOK – OHS – calculations – workloads – work assignments – Work content – added work content – reduction of work content – ineffective time – improving productivity – causes for low productivity in Spinning, Weaving, Wet Processing and garment industries. *Remedial measures for low productivity* **10 Hours**

MODULE – II

Work Study

Definition – Purpose – Techniques of work study – Procedure for work study

Method Study

Definition – Procedure – Process chart and symbols – process sequence chart – outline process chart, flow process charts (man type – material type – equipment type), charts using time scale – multiple activity charts. Diagrams: string diagram – cycle graph, chrono cycle graph – travel chart. Textile and garment industry examples. Flow diagram for Textile and Garment Industry

10 Hours

MODULE – III

Motion Study

Operation analysis – motion analysis – motion economy – two handed process chart – micro motion study – Therbligs – SIIMO chart – Textile and garment industry examples.

Time Study

Procedure – Equipments – Techniques of time study – Stop watch method – Predetermined Motion Time Standards (PMTS) – Rating. Allowances – Standard Time – Standard data – Textile and garment industry examples. Calculation of Standard Minutes Value (SMV)

10 Hours

MODULE – IV

Layout

Layout planning – Types of layout – process, product, combination and fixed.

Line Balancing

Objectives – Procedure – Techniques – Applications in Textile and garment units. Layout for Textile and garment units

10 Hours

MODULE – V

Material Handling

Objectives – principles of material handling – relationship of material handling to plant lay-out – material handling equipments – Descriptions and characteristics – Specialized material handling equipments for Textile and garment units.

Work Environment and Services

Lighting – Ventilation – Temperature Control and Humidity Control – Noise Control – Safety – Ergonomics. Hygiene – Feeding and Convenience related services

10 Hours

REFERENCES:

1. O. P. Khanna, *Industrial Engineering and Management*, Dhanpat Rai Publications (P) Ltd., NewDelhi, 2004.
2. Johnson Maurice, *Introduction to Work Study*, International Labour Organization, Geneva, 1995.
3. Jacob Solinger, *Apparel Manufacturing Hand Book-Analysis, Principles and Practice*, Boblin

Media Corp, Columbia, 1991.

1. Rajesh Bheda, Managing Productivity of Apparel industry, CBS Publishers and Distributors, New Delhi 2002.
2. W. G. Ireson and E. L. Grant, Handbook of Industrial Engineering and Management, Prentice Hall of India, New Delhi, 1988.
3. Kiell B. Zandin and Maynard's Industrial Engineering Hand Book, Mc Graw Hill, Inc., New York, 2001.
4. James M. Apple, Plant Layout and Materials Handling, John Wiley & Sons, 1997.
5. Ralph M. Barnes, Motion and Time Study Design and Measurement of Work, John Wiley & Sons, New York, 1992.
6. Elwood S. Buffa, Modern Production and Operations Management, Wiley Eastern, 1991.
7. A. J. Chuter, Introduction to Clothing Production Management, Blackwell Publishing, Oxford, 2004.
8. Introduction to Work Study, ILO, Geneva, Universal Publishing Corporation, Mumbai, 2006.

**M.TECH. TEXTILE TECHNOLOGY
SEMESTER – III
PROFESSIONAL ELECTIVE – 3
FINANCIAL MANAGEMENT**

Subject Code	18JTT322	IA Marks	40
No. of Lecture Hours/Week	03	Exam Hours	03
No.of Practical Hours/Week	--	No.of Credits	04
Total No. of Lecture Hours	50	Exam Marks	60

OBJECTIVES:

The main objective of this course is to prepare the students to understand the basic principles of financial management as the knowledge of financial management is extremely important in textile and garment industries.

OUTCOMES:

The students will be able to analyze financial statements, balance sheets and audited reports.

MODULE - I

Financial Management: An overview, function and goals of financial management, financial planning and major financial decision areas. **10 Hrs**

MODULE - II

Capital structure: Theories of capital structure, NI and NOI approaches, capital structure decision, EBIT – EPS analysis. RO – ROE analysis, cash flow analysis. **10 Hrs**

MODULE - III

Capital Budgeting: Methods of capital budgeting, investment criteria, NPV, IRR, Pay Back Period, Risk analysis in capital budgeting. **10 Hrs**

MODULE - IV

Working Capital Management: Current assets, Cash and Inventory management, EOQ, ABC analysis. **10 Hrs**

MODULE - V

Financial Analysis and Planning: Financial ratios, Break – even analysis and Leverages, application of financial analysis. **10 Hrs**

REFERENCES:

1. “Financial Management – Theory and Practice, 8th Edition” – Prasanna Chandra, Tata McGraw Hill, New Delhi
2. “Fundamentals of Financial Management” – James C. Van Horne, John Martin Wachowicz, Financial Times/Prentice Hall, 2008
3. “Financial Management” –Keown Scott
4. “Financial Management” –M.Y.Khan and Jain.

**M.TECH. TEXTILE TECHNOLOGY
SEMESTER – III
PROGRAM ELECTIVE – 3
HUMAN RESOURCE MANAGEMENT**

Subject Code	18JTT323	IA Marks	40
No. of Lecture Hours/Week	03	Exam Hours	03
No.of Practical Hours/Week	--	No.of Credits	04
Total No. of Lecture Hours	50	Exam Marks	60

OBJECTIVES:

The main objective of this course is to prepare the students to understand the basic principles of HR management as the knowledge of HR management is extremely important in textile and garment industries.

OUTCOMES:

The students will be able to analyze recruitment procedures, incentive schemes and wage/salary administration procedures.

MODULE - I

Introduction to human resource management with reference to objectives and policies. Functions of HRM, Scope, importance and impact on Textile Industry. **10 Hrs**

MODULE - II

Importance of job analysis and job specifications. Different types of job evaluation programmes. Basis of promotion, demotion, transfers, Methods of training personnel for higher performance and productivity. Grievance Handling – procedure for grievance handling. **10 Hrs**

MODULE - III

Modern methods of recruitment and selection. Industrial disputes, procedure for settlement of disputes. **10 Hrs**

MODULE - IV

Welfare measures, bonus facilities, Wage and salary administration and incentive schemes. **10 Hrs**

MODULE - V

Motivation and Morale. Labour Management relations. Objectives and functions of trade unions. Factories act and their importance. **10 Hrs**

REFERENCES:

1. Human Resource Management – P Subba Rao, Himalaya Publishing, New Delhi
2. Human Resource Management – Gary Dessler and Biju Varkkey, Prentice Hall
3. Personnel Management” - Edwin B. Flippo, McGraw-Hill, 1986
4. Personnel Management” - Subratha Ghosh
5. Management of Personnel in Indian Enterprises - N.N. Chatterjee, Allied Book Agency, 1978
6. Personnel Management - Derek Torrington, Laura Hall, Prentice-Hall, 19 87

**M.TECH. TEXTILE TECHNOLOGY
SEMESTER – III
PROFESSIONAL ELECTIVE – 4
STRATEGIC AND TECHNOLOGY MANAGEMENT**

Subject Code	18JTT331	IA Marks	40
No. of Lecture Hours/Week	03	Exam Hours	03
No.of Practical Hours/Week	--	No.of Credits	04
Total No. of Lecture Hours	50	Exam Marks	60

OBJECTIVES:

In the present scenario the strategic management techniques are useful in following areas.

1. The new strategies are useful in increasing the productivity and quality to meet the global challenges.
2. The concept of strategic management can be successfully adopted in garment industry.
3. Students can update their knowledge about the modern management concept and they can adopt these concepts in the garment sector.

OUTCOMES:

The new management concepts can prepare the students to take up the new challenges in the present global scenario.

MODULE - I

Management information system: Introduction and background frame work-information needed economics System view - role of MIS on various levels - structure of MIS – Information network - system life cycle - data flow - decision trees. **10 Hrs.**

MODULE - II

Corporate strategy and planning: Concept of frame work, corporate management, role, Function skill. **10 Hrs.**

MODULE - III

Strategic analysis: cost dynamics - portfolio analysis – financial analysis, Strategic choices. Alternating - diversification-mergers and acquisition implementation and evaluation of strategy. **10 Hrs.**

MODULE - IV

Strategic management and leadership: Role of leadership - process of leadership – line structure, styles. **10 Hrs.**

MODULE - V

Technology management: Technology life cycle – transformation – alternatives – appropriate technology - technology change – technology transfer – models. Technology Absorption Assessment – evaluation, diffusion. **10 Hrs.**

REFERENCES:

1. Management Information Systems: conceptual foundation, structure and development” - David G.B, McGraw hill New York
2. Effective Leadership”, “The Skills of Leadership - John Adair, Wildwood House
3. Strategic Management – An Integrated Approach - Charles WL Hill and Gareth R Jones.

M.TECH. TEXTILE TECHNOLOGY SEMESTER – III PROFESSIONAL ELECTIVE – 4 THEORY OF YARN SPINNING

Subject Code	18JTT332	IA Marks	40
No. of Lecture Hours/Week	03	Exam Hours	03
No. of Practical Hours/Week	--	No. of Credits	04
Total No. of Lecture Hours	50	Exam Marks	60

OBJECTIVES:

1. Fiber properties should be understood to predict the count of yarn that can be spun.
2. Yarn quality depends on fiber parameters.
3. Spinning details are the basic objectives of textile industry.

OUTCOMES:

Students who have studied this can develop new yarn production methods, fancy yarn production systems. The course will help them set machine parameters thoroughly for all types of spinning.

MODULE – I

FIBRE DISPERSION: Ginning of cotton; the necessity of fibre-individualization; fibre opening in blow- room machinery; the mechanism of fibre-dispersion during carding operation; the minimum requirements during carding and the new approaches to improve fibre-dispersion in carding operation. Neps formation and theory of hook formation. **10 Hrs.**

MODULE - II

FIBRE PROCESSING: Methods adopted to clean the fibre from trash, short fibres and neps;

role of blow-room, card and comber in fibre cleaning. Definition of fibre-extent; influence of fibre-extent on yarn quality; improvement of fibre-extent by straightening actions in carding, drafting and combing. **10 Hrs**

MODULE - III

ATTENUATION: Principle of rollers drafting and its application in yarn production; drafting irregularities-their causes and remedies; the function of aprons in roller drafting; limitation of apron-drafting and the scope for improvement; mechanism of wire-point drafting and its application in yarn production; merits and demerits of wire-point drafting. Comparison of wire-point drafting with roller drafting. **10 Hrs.**

MODULE – IV

TWISTING: Effect of twisting of staple-fibre strand on its strength ;meaning of twist multiplier and the basis of selection of required twist;fundamental requirement to create real twist in a strand; mechanism of different twisting principle-ring-twisting, open-end twisting, air-jet twisting, up-twisting, two-for- one twisting, hollow-spindle twisting. **10 Hrs.**

MODULE – V

LEVELLING and FIBRE BLENDING: Influence of intermediate product uniformity on yarn uniformity; methods of leveling adopted during spinning processes. Importance of fibre-mix homogeneity on yarn quality; types of mixing during spinning preparatory process; assessment of blend efficiency. **10 Hrs.**

REFERENCES:

1. Spun Yarn Technology” -Oxtoby E, Butterworth's, London, 1987.
2. The Technology of Short-staple Spinning” - Klein W, The Textile Institute, Manchester, 1998.
3. A practical Guide to Opening and Carding” - Klein W, The Textile Institute, Manchester, 1999.
4. A Practical Guide to Combing, Drawing and the Roving Frame” - Klein W, The Textile Institute, Manchester, 1999.
5. A practical Guide to Ring Spinning” - Klein W, The Textile Institute, Manchester, 1999.

**M.TECH. TEXTILE TECHNOLOGY
SEMESTER – III
PROFESSIONAL ELECTIVE – 4
MEDICAL TEXTILES**

Subject Code	18JTT333	IA Marks	40
No. of Lecture Hours/Week	03	Exam Hours	03
No.of Practical	--	No.of Credits	04

Hours/Week			
Total No. of Lecture Hours	50	Exam Marks	60

MEDICAL TEXTILES

OBJECTIVES

To enable the students to learn about

- Different types of biomaterials and
- Biomedical application of textile structures.

OUTCOME

Upon completion of this course, the student shall know the

- Types of materials available for biomedical applications
- Functional requirements of textile structures for specific end uses and
- Selection and characterization of textile materials used for biomedical applications.

MODULE - I

Biomaterials–introduction, types; natural, polymeric and biological biomaterials **10 Hrs**

MODULE - II

Textile based healthcare and hygiene products; application of nano technology in medical hygiene textiles; advanced textile materials in healthcare; infection control and barrier materials; plasma treated barrier materials. **10 Hrs**

MODULE - III

Bandages and pressure garments - elastic and non elastic compression bandages, support and retention bandages; bandaging textiles; evaluation of bandages; bandages for various end uses. **10 Hrs**

MODULE - IV

Wound – types, healing process; requirements of wound dressing; wound care materials – types, advantages and limitations; Testing of wound dressings; advanced wound dressings **10 Hrs**

MODULE - V

Implantable products; sutures – requirements, classifications, specifications, materials and their applications; vascular grafts, artificial ligaments, artificial tendons; scaffolds for tissue engineering; intelligent textiles for medical applications **10 Hrs**

References:

1. Allison Mathews and Martin Hardingham ., “Medical and Hygiene Textile Production - A hand book”, Intermediate Technology Publications, 1994.
2. Anand S.C., Kennedy J.F. Miraftab M. and Rajendran S., “Medical Textiles and Biomaterials for Health care”, Wood head Publishing Ltd. 2006.
3. Joon B. Park. and Joseph D. Bronzino., “Biomaterials – Principles and Applications”,CRC Press Boca Raton London, NewYork, Washington , D.C. 2002
4. Anand S., “ Medical Textiles”, Textile Institute, 1996, ISBN: 185573317X
5. Horrocks A.R. and Anand S.C, “Technical Textiles”, Textile Institute,1999, ISBN: 185573317X.
6. Adanur S., “ Wellington Sears Handbook of Industrial Textiles”” Technomic Publishing Co., Inc., Lancaster Pennsylvania 1995, ISBN 1-56676-340-1.
7. Michael Szycher and Steven James Lee, “Modern Wound Dressing: A Systematic Approach to Wound Healing”, Journal of Biomaterials Applications, 1992
8. Rajendran S., “Advanced Textiles for Wound Care”, Woodhead Publishing Ltd., 2009, ISBN 1 84569 2713.