

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELGAUM
SCHEME OF TEACHING AND EXAMINATION FOR
M.TECH. TEXTILE TECHNOLOGY

I Semester

CREDIT BASED

Subject Code	Name of the Subject	Teaching hours/week		Duration of Exam in Hours	Marks for		Total Marks	CREDITS
		Lecture	Practical / Field Work / Assignment/ Tutorials		I.A.	Exam		
16JTT11	Advanced Fiber Physics	4	--	3	20	80	100	4
16JTT12	Advanced Knitting and Nonwovens	4	--	3	20	80	100	4
16JTT13	Advanced Wet Processing	4	--	3	20	80	100	4
16JTT14	Research Methodology	4	--	3	20	80	100	4
16JTT15	Elective-I	3	--	3	20	80	100	3
16JTT16	Lab Component	--	3	3	20	80	100	2
16JTT17	Seminar	--	3	--	100	--	100	1
Total		19	6	18	220	480	700	22

Elective – I

Advanced Textile Mathematics	16JTT151	Yarn Engineering	16JTT152
Strategic and Technology Management	16JTT153	Application of IT in Textiles	16JTT154

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELGAUM
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II Semester

CREDIT BASED

Subject Code	Name of the Subject	Teaching hours/week		Duration of Exam in Hours	Marks for		Total Marks	CREDITS
		Lecture	Practical / Field Work / Assignment/ Tutorials		I.A.	Exam		
16JTT21	Advanced Textile & Apparel Testing	4	--	3	20	80	100	4
16JTT22	Environmental Management for Textile Industry	4	--	3	20	80	100	4
16JTT23	Advanced Silk Technology	4	--	3	20	80	100	4
16JTT24	Developments in Fabric Formation	4	--	3	20	80	100	4
16JTT25	Elective-II	3	--	3	20	80	100	3
16JTT26	Lab Component		3	3	20	80	100	2
16JTT27	Seminar	--	3	--	100	--	100	1
	**Project Phase-I (6 week Duration)	--	--	--	--	--	--	--
Total		19	6	18	220	480	700	22

Elective – II

Fabric Engineering	16JTT251	Human Resource Management	16JTT252
Advanced Manufactured Fiber Technology	16JTT253	Variability and it's Control	16JTT254

**** Between the II Semester and III Semester, after availing a vocation of 2 weeks.**

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III Semester: INTERNSHIP

CREDIT BASED

Subject Code	Subject	No. of Hrs./Week		Duration of the Exam in Hours	Marks for		Total Marks	CREDITS
		Lecture	Practical / Field Work		I.A.	Exam		
16JTT31	Seminar / Presentation on Internship (After 8 weeks from the date of commencement)	-	-	-	25	-	25	20
16JTT32	Report on Internship	-	-	-	25	--	25	
16JTT33	Evaluation and Viva-Voce of Internship	-	-	--	-	50	50	
16JTT34	Evaluation of Project Phase-I	--	--	--	50	--	50	
	Total	-	-	-	100	50	150	21

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IV Semester

CREDIT BASED

Subject Code	Subject	No. of Hrs./Week		Duration of Exam in Hours	Marks for		Total Marks	CREDITS
		Lecture	Field Work / Assignment / Tutorials		I.A.	Exam		
16JTT41	Advanced Apparel Production Technology	4	--	3	20	80	100	4
16JTT42X	Elective-III	3	--	3	20	80	100	3
16JTT43	Evaluation of Project Phase-II	-	-	-	50	-	50	3
16JTT44	Evaluation of Project Work and Viva-voce	-	-	--	-	100+100	200	10
Total		7	--	6	90	360	450	20

Elective – III

Friction in Textiles	16JTT421	Theory of Yarn Spinning	16JTT422
Marketing Management	16JTT423	Financial Management	16JTT424

Note:

1. Project Phase-1: 6-week duration shall be carried out between 2nd and 3rd Semester vacation. Candidates in consultation with the guide shall carry out literature survey/ visit industries to finalize the topic of Project.

2. Project Phase-2: 16-week duration during 4th semester. Evaluation shall be done by the committee constituted comprising of HOD as Chairman, Guide and senior faculty of the department.

3. Project Evaluation: Evaluation shall be taken up at the end of 4th semester. Project work evaluation and Viva-Voce examination shall be conducted

4. Project evaluation:

a. Internal Examiner shall carry out the evaluation for 100 marks.

b. External Examiner shall carry out the evaluation for 100 marks.

c. The average of marks allotted by the internal and external examiner shall be the final marks of the project evaluation.

d. Viva-Voce examination of Project work shall be conducted jointly by Internal and External examiner for 100 marks.

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

Subject code	: 16JTT11	IA Marks	: 20
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	: 80

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.

OUTCOME:

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.

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.**

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

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.**

Moisture Properties: Study of molecular theory of moisture hysteresis, 2 and 3 phase moisture adsorption theories. Heat of sorption in textile fibers. Effect of moisture on mechanical properties of fibers. **10 Hrs.**

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

REFERENCE BOOKS:

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 KNITTING AND NONWOVENS**

Subject code	: 16JTT12	IA Marks	: 20
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	: 80

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.

Outcome: 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.

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.**

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. 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. **10 Hrs.**

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 **5 Hrs.**

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. **13 Hrs.**

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. **12 Hrs.**

REFERENCE BOOKS:

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
ADVANCED WET PROCESSING

Subject code	:	16JTT13	IA Marks	:	20
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	:	80

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.

OUTCOME:

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.

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.**

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**

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.**

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

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.**

REFERENCE BOOKS:

1. “Textile Colouration” - C.L.BIRD.
2. “Textile Printing” – LWC Miles.
3. “Chemical Technology of Textile fibers” – ER Troatman.
4. “Dyeing and printing with natural dyes” - M.L.Gulrajani.
5. “Eco-friendly Textile wet processing-coordinator” N CUTE Publication - Dr. R.Ashokan
6. “Environment Problems in chemical processing of Tex tiles, NCUTE Publication - Dr.A.Asokan, Ms. Yogita
7. “Finishing of Khadi Garments” - Dr.R.B.Chavan, R.Chattopadhyay, R.P.Tewari, IIT Delhi.
8. “Instrumental Colour measurement and computer aided colour matching for textiles - H.S.Shah & R.S.Gandhi.

M.TECH. TEXTILE TECHNOLOGY
SEMESTER – I
RESEARCH METHODOLOGY

Subject code	: 16JTT14	IA Marks	: 20
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	: 80

OBJECTIVES:

1. Statistical tests are essentially required to substantiate the results of any technical projects.
2. Statistical test clearly indicate the significant difference between the samples through F and T-tests.

OUTCOME:

Students can apply the principles of statistics to any problems related to yarn manufacture, fabric construction and garment designing satisfactorily and can work in apparel manufacturing and research institutions.

Research Methodology: Introduction, meaning of research, objectives, types and significance of research, defining a research problem, formulation of a hypothesis, research design and features of good design, methods of data collection, primary and secondary data, designing a questionnaire. Interpretation of results and report writing. **10 Hrs.**

Descriptive Statistics, Probability and Distribution: Basic statistical concepts, Measures of central tendency and dispersion. Elements of Probability, Addition and multiplication theorems of probability, Examples, probability distributions. Binomial, Poisson and normal Distributions. **10 Hrs**

Sampling Techniques Statistical Inference: Random sampling, simple random sampling and stratified random sampling. Non-sampling errors. Random sampling, simple random sampling and stratified random sampling. Non-sampling errors. Statistical hypotheses, Type-1 and Type-2 errors, level of significance, size and power of a test. Definition of Chi-square, t and F distributions. Central limit theorem. Tests for the mean, equality of two means, variance (for large and small samples), large sample tests for proportions, Chi-square test for goodness of fit and independence of attributes in contingency tables. Confidence interval. **10 Hrs.**

Design of Experiments, Correlation and Regression: Analysis of variance. One way and 2 way classified data. Design of Experiments.

Analysis of completely randomized, randomized block. Factorial experiments 22 and 23 factorial experiments, Yates technique. Problem of related variables. Product moment correlation coefficient and its properties. Simple linear regression and multiple linear regression. Coefficient of determination. **10 Hrs.**

Multivariate Data Analysis: Introduction. Multivariate normal distributions. Mean vector, variance, covariance matrix and correlation matrix and their estimation for multivariate data. Step wise regression. Selection of best subject of variables. Classification and discrimination problems. Factor analysis .Principal component analysis. Illustrative examples, Multivariate data analysis using SPSS software. Illustrative examples. **10 Hrs.**

REFERENCE BOOKS:

1. “**Probability & Statistics for Engineers and Scientists**” **VI Edition** - R E Walpole, Raymond H Myers, Sharon L Myers, Prentice Hall.
2. “**Fundamentals of mathematical statistics**” - Gupta, S.C and Kapoor V.K, Sultan Chand & L Co. New Delhi.
3. “**Fundamentals of Applied statistics**” - Gupta, S.C and Kapoor V.K. Sultan Chand & L Co. New Delhi
4. “**Introduction to probability and statistics for engineers and scientists**” - S. M. Ross, Elsevier Publications.
5. “**Probability and Applied Statistics for Engineers**” - D. C. Montgomery, Wiley International, Student Ed.
6. “**Probability and Statistics for engineers**” - Miller and Freund
7. “**Applied multivariate statistical analysis**” - Johnson R and Wichern (1992), Third Ed. Prentice Hall India.

M.TECH. TEXTILE TECHNOLOGY
SEMESTER – I
ELECTIVE – I : ADVANCED TEXTILE MATHEMATICS

Subject code	: 16JTT151	IA Marks	: 20
No. of Lecture Hours / Week	: 04	Exam Hours	: 03
No. of Practical Hours / Week	: ---	No. of Credits	: 03
Total No. of Lecture Hours	: 50	Exam Marks	: 80

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.

OUTCOME:

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

Confidence limits- Estimation of confidence intervals, confidence limits for large and small samples, confidence limits for standard deviation and difference in mean and SD. **6 Hrs**

Significance tests-interpretation of significance tests, single tail and double tail tests, chi-square distributions **4 Hrs.**

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.**

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.**

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. 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. **8 Hrs.**

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. **8 Hrs.**

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. **4 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. Fetterworths Pub London,1980
5. Textile Mechanics-Vol 1&2, K Slater, Textile Institute Pub ,1979
6. Weaving calculation- Sen Gupta, D. B Tarparwala& 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. Mehata
9. “Progress in textile science and technology “ Vol-1 Ed., V K Kotari, AIFI., India 2000

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

Subject code	: 16JTT152	IA Marks	: 20
No. of Lecture Hours / Week	: 04	Exam Hours	: 03
No. of Practical Hours / Week	: ---	No. of Credits	: 03
Total No. of Lecture Hours	: 50	Exam Marks	: 80

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.

OUTCOME:

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.

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.**

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.**

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

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

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

REFERENCE BOOKS:

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
ELECTIVE – I : STRATEGIC AND TECHNOLOGY MANAGEMENT

Subject code	: 16JTT153	IA Marks	: 20
No. of Lecture Hours / Week	: 04	Exam Hours	: 03
No. of Practical Hours / Week	: ---	No. of Credits	: 03
Total No. of Lecture Hours	: 50	Exam Marks	: 80

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.

OUTCOME:

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

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.**

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

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

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

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

REFERENCE BOOKS:

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 – I
ELECTIVE – I : APPLICATION OF IT IN TEXTILES

Subject code	:	16JTT154	IA Marks	:	20
No. of Lecture Hours / Week	:	04	Exam Hours	:	03
No. of Practical Hours / Week	:	---	No. of Credits	:	03
Total No. of Lecture Hours	:	50	Exam Marks	:	80

OBJECTIVES:

The main objective is to understand the use of IT in textile and garment industries. Knowledge of CAD/CAM can enhance the knowledge of students.

OUTCOME

The students will be able to secure good positions in textile and garment industries where IT application is predominant. They will be able to handle advanced software related to textiles and garment design and manufacture.

Introduction to IT in Textiles: information technology and the web paradigm, E-business application for textile industry. **10 Hrs**

Enterprise resource planning: Structure of ERP, General Principles involved in the application of ERP, ERP models, ERP selections for the textile industry. **10 Hrs**

Internet and internet concepts: Internet based manufacturing EDI for textile businesses, logistics management, management information systems in spinning, weaving and wet processing sections. **10 Hrs**

Applications: CAD \ CAM in Textiles. Information technology in fashion and garment industry. **10 Hrs**

Management: Total quality management and information technology. **10 Hrs**

REFERENCE BOOKS:

1. **“Texinfotech - 99, Resume of papers”** - IT in Textiles in the New Millennium, July 1999, IIT, Delhi.
2. **“Texinfotech - 2000, International Conference”, Resume of papers, New Delhi, 2000**
3. **“E-Commerce”** - Kamlesh K. Bajaj & Debjani Nag -TATA, McGraw HILL Co. Ltd, New Delhi.
4. **“Electronic Commerce”** - Gary P. Schneider

M.TECH. TEXTILE TECHNOLOGY
SEMESTER – I
LAB COMPONENT

Subject code	:	16JTT16	IA Marks	:	20
No. of Lecture Hours / Week	:	--	Exam Hours	:	03
No. of Practical Hours / Week	:	03	No. of Credits	:	02
Total No. of Practical Hours	:	16	Exam Marks	:	80

OBJECTIVES:

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

OUTCOME

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 – I
SEMINAR

Subject code	:	16JTT17	IA Marks	:	100
No. of Lecture Hours / Week	:	--	Exam Hours	:	--
No. of Practical Hours / Week	:	03	No. of Credits	:	01
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.

OUTCOME:

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

In this 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.

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

Subject code	: 16JTT21	IA Marks	: 20
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	: 80

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.

OUTCOME:

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

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.**

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

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

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.**

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.**

REFERENCE BOOKS:

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”** - KES- F and FAST manuals.
6. **“Progress in Textile Science and Technology”** - Vol-1, Ed. V.K. Kothari, IAFL, India, 2000.

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

Subject code	:	16JTT22	IA Marks	:	20
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	:	80

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.

OUTCOME:

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

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

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

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.**

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.**

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.**

REFERENCE BOOKS:

1. **“Textile Effluents”** - Padma Vankar, 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, Pragathi Prakashan, Meerut.

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

Subject code	:	16JTT23	IA Marks	:	20
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	:	80

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.

- Present scenario of Indian Silk industry, the quality and production aspects, silk production in other countries.
- Development in various stages of production of silk and spun silk.
- Structural aspects of silk such as composition, micro structure, crystalline structure, etc.,
- Recent development in silk dyeing and preparatory process.
- Modern technology and methods in silk finishing and eco-friendly finishes.
- Developments in processing and application of silk for non apparel purposes. Such as bio-medical application,

Out Comes:

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.

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.

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.**

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.**

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**

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.**

REFERENCE BOOKS:

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
DEVELOPMENTS IN FABRIC FORMATION

Subject code	: 16JTT24	IA Marks	: 20
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	: 80

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.,

OUTCOME:

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.

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

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.**

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

Management: Management of loom shed, maintenance. **10 Hrs**

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

REFERENCE BOOKS:

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
ELECTIVE – II : FABRIC ENGINEERING**

Subject code	:	16JTT251	IA Marks	:	20
No. of Lecture Hours / Week	:	04	Exam Hours	:	03
No. of Practical Hours / Week	:	---	No. of Credits	:	03
Total No. of Lecture Hours	:	50	Exam Marks	:	80

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.

OUTCOME:

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

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.**

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.**

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

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

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

REFERENCE BOOKS:

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
ELECTIVE – II : HUMAN RESOURCE MANAGEMENT

Subject code	: 16JTT252	IA Marks	: 20
No. of Lecture Hours / Week	: 04	Exam Hours	: 03
No. of Practical Hours / Week	: ---	No. of Credits	: 03
Total No. of Lecture Hours	: 50	Exam Marks	: 80

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.

OUTCOME

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

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

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**

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

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

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

REFERENCE BOOKS:

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 – II
ELECTIVE – II : ADVANCED MANUFACTURED FIBRE TECHNOLOGY

Subject code	: 16JTT253	IA Marks	: 20
No. of Lecture Hours / Week	: 04	Exam Hours	: 03
No. of Practical Hours / Week	: ---	No. of Credits	: 03
Total No. of Lecture Hours	: 50	Exam Marks	: 80

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.,

OUTCOME:

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.

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.**

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.**

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**

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.**

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.**

REFERENCE BOOKS:

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
ELECTIVE – II : VARIABILITY AND ITS CONTROL

Subject code	: 16JTT254	IA Marks	: 20
No. of Lecture Hours / Week	: 04	Exam Hours	: 03
No. of Practical Hours / Week	: ---	No. of Credits	: 03
Total No. of Lecture Hours	: 50	Exam Marks	: 80

OBJECTIVES:

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

OUTCOME:

Students can satisfactorily work in quality control dept.

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.**

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

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

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

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

REFERENCE BOOKS:

1. “Textile yarns”, B.C. Goswamy, J.C. Martindale-Wiley 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 LAB COMPONENT

Subject code	:	16JTT26	IA Marks	:	20
No. of Lecture Hours / Week	:	--	Exam Hours	:	03
No. of Practical Hours / Week	:	03	No. of Credits	:	02
Total No. of Practical Hours	:	16	Exam Marks	:	80

OBJECTIVES:

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

OUTCOME

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
SEMINAR

Subject code	:	16JTT27	IA Marks	:	100
No. of Lecture Hours / Week	:	--	Exam Hours	:	--
No. of Practical Hours / Week	:	03	No. of Credits	:	01
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.

OUTCOME:

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.

M.TECH. TEXTILE TECHNOLOGY
SEMESTER – IV
ADVANCED APPAREL PRODUCTION TECHNOLOGY

Subject code	:	16JTT41	IA Marks	:	20
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	:	80

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.

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

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. **10 Hrs**

Technological advances in sewing garment: History of sewing development of the industrial saving, machine advances in sewing needle design, 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**

Development in pressing technology for garment finishing: The pressing process, pressing with pressure pressing without pressure, crease resistant 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**

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**

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.**

REFERENCE BOOKS:

1. **“Apparel Manufacturing Hand book: Analysis, Princip les 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, Woodhead Publications Limited, Cambridge.

M.TECH. TEXTILE TECHNOLOGY
SEMESTER – IV
ELECTIVE – III: FRICTION IN TEXTILES

Subject code	: 16JTT421	IA Marks	: 20
No. of Lecture Hours / Week	: 04	Exam Hours	: 03
No. of Practical Hours / Week	: ---	No. of Credits	: 03
Total No. of Lecture Hours	: 50	Exam Marks	: 80

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.

OUTCOME

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

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. Role of friction in the mechanical behaviour of fabrics. **10 Hrs**

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

Abrasion of textile surfaces measurement of abrasion resistance, factors affecting the abrasion resistance. **10 Hrs**

Resistivity and static behaviour of textile surfaces, 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**

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 – IV
ELECTIVE – III: THEORY OF YARN SPINNING

Subject code	: 16JTT422	IA Marks	: 20
No. of Lecture Hours / Week	: 04	Exam Hours	: 03
No. of Practical Hours / Week	: ---	No. of Credits	: 03
Total No. of Lecture Hours	: 50	Exam Marks	: 80

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.

OUTCOME:

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

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.

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**

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.**

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.**

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

REFERENCE BOOKS:

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 – IV
ELECTIVE – III: MARKETING MANAGEMENT

Subject code	: 16JTT423	IA Marks	: 20
No. of Lecture Hours / Week	: 04	Exam Hours	: 03
No. of Practical Hours / Week	: ---	No. of Credits	: 03
Total No. of Lecture Hours	: 50	Exam Marks	: 80

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.

OUTCOME

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

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.**

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.**

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 digital currencies. **10 Hrs.**

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.**

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.

REFERENCE BOOKS:

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 – IV
ELECTIVE – III: FINANCIAL MANAGEMENT

Subject code	: 16JTT424	IA Marks	: 20
No. of Lecture Hours / Week	: 04	Exam Hours	: 03
No. of Practical Hours / Week	: ---	No. of Credits	: 03
Total No. of Lecture Hours	: 50	Exam Marks	: 80

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.

OUTCOME

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

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

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

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

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

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

REFERENCE BOOKS:

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.