

**Scheme and Syllabi of
M. TECH. TEXTILE ENGINEERING (PART TIME) Batch-2011**

Schedule of Teaching:

Lectures	Tutorial	Total
	(per week)	
4	0	4

Schedule of Examination

Examination	Time in Hrs	Sessional Examination Marks	External Theory Marks	Viva	Total Marks
All Theory subjects	3Hrs	50	100	-	150
Project	-	50	-	50	100
Seminar	-	100	-		100
Dissertation	Satisfactory/ Not-Satisfactory				

Course Code	Course Name
Semester I	
MTTE-101	Advances in Fibre Production Technologies
MTTE-102	Advances in Yarn Production Technologies
MTTE-XXX	Elective 1
Semester II	
MTTE-201	Advances in Fabrics Production Technologies
MTTE-202	Structural Mechanics of Yarns
Semester III	
MTTE-301	Structural Mechanics of Fabrics
PGRM	Research Methodology
MTTE-XXX	Elective 2
Semester IV	
MTTE-401	Knitting and Nonwoven Technology
MTTE-XXX	Elective 3
Semester V	
MTTE-501	Technical Textiles
MTTE-XXX	Elective 4
MTTE -502	Project
MTTE-503	Seminar
Semester VI	
MTTE-601	Dissertation

Eligibility Criteria

B.E./B.Tech. in Textile Technology, Textile Engineering, Textile Chemistry, Man-made Fibre, Fibre Technology, Fashion Technology, Apparel Engineering, Carpet Technology or equivalent with minimum aggregate marks of 55 % .

Duration: Three years (6 Semesters)

Total number of seats: 25

Number of Courses: 12 (Theory);

Project & Seminar: 01

Dissertation: 01 Semester

Semester-wise breakup of courses

Semester

Number of courses/ Seminar

I

3 Theory Courses

II

2 Theory Courses

III

3 Theory Courses

IV

2 Theory Courses

V

2 Theory Courses, Project, Seminar

VI

Dissertation

1. A student will take and complete a total of 12 courses, followed by 01 Project, 01 Seminar, 01 dissertation.
2. The student can submit his/her dissertation at the end of 6th Semester.
3. The proposal for dissertation can be submitted in the beginning of 5th semester

Note:

- I. Maximum duration for clearing the M. Tech Program shall be 5 years. In exceptional cases the duration for completing the program can be extended by one year with the permission of the competent authority.
- II. There can be maximum of two supervisors for the dissertation. One should be atleast from the Department of Textile Technology of the Parent Institute.

Classes will be held on Saturday and Sunday only.

Detailed Syllabus of Core Courses

MTTE- 101 Advances in Fibre Production Technologies

General definition of Man Made or manufactured fibres, introduction to general principles of spinning and spinning processes. Basic principles of fluid flow during fiber spinning, factors affecting shear viscosity. Elongational flow, spinnability and flow instabilities. Extruder design, spin head, spinneret, quench chamber. Spin finish application, wind up mechanism. Manufacture and specifications of raw materials and monomers. Types, methods of manufacture, mechanism of polymerisation and production techniques of viscose, nylon 6 and 66, PET, PAN and PP. Introduction to new developments. Other fibres including PU, PVA, PE, PVC and polyvinylidene chloride. Primary and secondary variables and their effect on melt spinning. High speed spinning, spinning of microfibre, solution spinning process: Dry and wet spinning. Heat-setting of fibres.

Books Recommended:

1. Vaidya A A, "Production of Synthetic Fibres", 1stEd., Prentice Hall of India, New Delhi, 1988.
2. Gupta V B and Kothari V K, "Manufactured Fibre Technology", 1stEd., Chapman and Hall, London, 1997
3. Mark H F, Atlas S M and Cernia E, "Man Made Fibre Science and Technology", Vol. 1, 2,3, 1st Ed., Willey Inter Science Publishers, New York, 1967.
4. Macintyre J E, "Synthetic Fibres", Woodhead Fibre Science Series, UK, 2003.
5. Fourne F, "Synthetic Fibres: Machines and Equipment, Manufacture, Properties", Hanser Publisher, Munich, 1999.

MTTE- 102 Advances in Yarn Production Technologies

Fiber quality requirements for different spinning technologies. Systems of yarn manufacture in cotton, worsted, woolen and semi worsted system. Comparative study of new spinning technologies. Concept of opening and cleaning. Aerodynamics and its role in blowroom. Theories of Carding. Drafting theories. Developments in comber. Quality aspect of roving. Balloon theory in spinning. Significance of modern developments in spinning process. Modern high speed draft spinning systems. Machine and process variables affecting the structure and properties of spun yarns. Introduction to core spinning, cover spinning, Siro-spinning and compact spinning.

Processing of wool and man made fibres in new spinning systems. Non conventional methods of yarn manufacture. Air-vortex yarn. Quality standards of different yarns with emphasis on USTER standard

Books Recommended:

1. Grosberg P and Iype C, “Yarn Production-Theoretical Aspects”, 1stEd., The Textile Institute,UK, 1999.
2. Chattopadhyay R, “Advances in Technology of Yarn Production”, 1stEd., NCUTE, New Delhi,2002.
3. Rao M V S and Talele A B, “A Guide to Crimping / Texturing Technology”, 1stEd., Nasnal Printers and its Associates, Surat,1992.
4. Klein W, “Manual of Textile Technology-New Spinning Systems”, Vol.5, 1stEd., The Textile Institute, UK, 1993.

MTTE- 201 Advances in Fabric Production Technologies

Development trends in winding, warping and sizing machines for improving quality of preparation and cost reduction. Loom development trends and objectives. Kinematics of sley and heald motion with reference to shuttle loom. Mechanism of shuttle checking. Analysis of warp tension during weaving. Theoretical analysis of weft insertion in shuttleless loom. Cloth fell position, beat-up force and pick spacing. Electronic control of different motions of loom. Techno-economics of different methods of fabric production. Types of weft knitting machines and its cam profile. Quality control in weft and warp knitted fabrics. Mechanics of knitted loop formation. Designing nonwoven for engineering applications. Effect of machine, fiber and process variables on the properties of nonwoven fabrics. Developments in nonwoven machineries. Value loss of fabric. Stitching and garment making. Concept of smart textiles.

Books Recommended:

- 1.Marks R and Robinsons A T C, “Principles of weaving”, Textile Institute, UK, 1986.
- 2.Ormerod A, “Modern preparations and weaving machinery”, Butterworth and Co., UK, 1983.
- 3.Talavasek O and Svaty V, “Shuttleless weaving machine”, Elsevier Scientific Publishing Co., Amsterdam, 1981.
- 4.Lunenschloss J and Albrecht W, “Nonwoven Bonded Fabric”, Ellis and Horwood Ltd., UK, 1985

MTTE 202 Structural Mechanics of Yarns

Elements of yarn geometry. Geometry of helix and its application to yarn structure. Geometry of folded yarn. Yarn diameter and density. Theoretical analysis of effect of fiber properties and their geometrical configuration on the tensile and bending properties of yarn. Theories and analysis of yarn strength and irregularity. Fiber migration characteristics of continuous filament and spun yarns. Breakage of continuous filament and spun yarns. Effect of properties of constituent fibres and blend composition on behavior of composite yarns. Effect of yarn structure on different properties of yarns. Structure and property relationship of ring, rotor, air-jet and friction spun yarns.

Books Recommended:

1. Hearle J W S, Grosberg P and Backer S, "Structural mechanics of fibres yarns and fabrics", Wiley Interscience, New York, 1969.
2. Goswami B C Martindale J G and Scardino F, "structure and applications", Wiley Interscience Publisher, New York, 1995.
3. Hearle J W S, Thwaites J J and Amirbayat J, "Mechanics of flexible fibre assemblies", Sijthff and Noordhoff International Publishers BV, Alphen aan den Rijn, Netherlands, 1980.

MTTE- 301 Structural Mechanics of Fabrics

Engineering approach for fabric formation, cloth geometry, practical aspect of cloth geometry, jammed structure, racetrack section of yarn. Fabric cover factor and its significance. Graphical relationship in cloth geometry for plain, twill and sateen weaves. Theoretical investigation of weavability limit of yarns. Elastic thread model for fabric. Concept of fabric relaxation. Tensile and tearing behaviour of fabric. Bending deformation of fabric, bending hysteresis of woven fabric. Buckling, shear and drape behaviour of woven fabric. Geometrical and mechanical properties of warp and weft knitted fabrics. Mechanical properties of nonwoven needle punch and stitch bonded fabric. Formability, tailorability and hand of apparel fabric.

Books Recommended :

1. Hearle J W S, Grosberg P and Backer S, "Structural Mechanics of Fibres Yarns and Fabrics", Wiley Interscience, New York, 1969.
2. Peirce F T and Womersley J R, "Cloth Geometry", The Textile Institute, Manchester, 1978.
3. Hearle J W S, Thwaites J J and Amirbayat J, "Mechanics of Flexible Fibre Assemblies", Sijthff and Noordhoff International Publishers BV, Alphen aan den Rijn, Netherlands, 1980.

PGRM Research Methodology

Overview of research

Research and its type, identifying and defining research problem and introduction to different research designs. Essential constituents of literature review, Basic principles of experimental design, completely randomized, randomized block, latin square, Factorial, response surfaces.

Methods of data collection

Primary and secondary data, methods of primary data collection, classification secondary data, designing questionnaires and schedules.

Sampling Methods

Probability sampling: simple random sampling, systematic sampling, stratified sampling, cluster sampling and multistage sampling. Non –probability sampling: convenience sampling, judgement sampling, quota sampling. Sampling distributions.

Processing and analysis of data

Statistical measure and their significance: Central tendencies, variation, skewness, kurtosis, time series analysis. Correlation and regression, Testing of Hypothesis: Parameters (t, z and f) Chi square, ANOVA and non parametric tests.

Multivariate analysis

Multiple regression, factor analysis, Discriminant analysis, cluster analysis,

Multidimensional scaling

Reliability and Validity

Test-retested reliability, alternative-form reliability, internal-comparison reliability and scorer reliability, content validity, criterion related validity and construct validity.

Essentials of report writing

Note: Application and uses of various software for case studies should be essential.

Reference Books:

Levin, R.I and Rubin, D.S, Statistics for management, 7th edition, Pearson Education: New Delhi.

Malhotra, N.K., marketing Research An Applied Orientation, 4th edition Pearson Education: New Delhi.

Zikmund, W.G., Business Research Method, 7th edition, Thomson South Western.

Krishnaswami, K.N., Sivakumar, A.I and Mathirajan, M., Management Research Methodology, Pearson Education: New Delhi.

Kothari, C.R., Research Methodology Methods and Techniques by New Age International Publishers, 2nd edition.

MTTE- 401 Knitting and Nonwoven Technology

Weft and warp knitting machines, Different forces acting on needle butt, dynamics of knitting process, mechanics of loop formation, different machines, process and yarn parameters affecting the yarn tension in knitting zone and loop length, development in knitting machines, design and performance of high speed knitting cam, yarn feeding devices on circular knitting machine, warp knitted fabric and its different industrial uses, geometry and properties of knitted fabrics, process control in knitting, classification and areas of application of nonwoven fabrics, different methods of production of nonwoven fabric, effect of machine, fiber and process variables on properties of nonwoven fabrics, failure mechanism in nonwoven fabrics, prediction of needle punch nonwoven fabric behaviour.

Books Recommended:

- 1.Spencer D J, "Knitting Technology", 2nd Ed., Pergamon Press, 1989.
- 2.Lunenschloss J and Albrecht W, "Nonwoven Bonded Fabric", Ellis and Horwood Ltd., UK, 1985.
- 3.Albrecht W, Fuchs H & Kittelmann, "Nonwoven Fabrics", Wiley-VCH Weinheim, 2003.
- 4.Mrstina V & Fejgal F, "Needle Punching Textile Technology", Elsevier, 1990.
- 5.Krcma Radco, "Manual of nonwovens", Textile Trade Press, UK,1971
- 6.Gulrajani M L, "Book of Papers of International Conference on Nonwovens", The Textile Institute, UK, 1992

MTTE- 501 Technical Textiles

Definition and scope for technical textiles, brief idea about technical fibres, role of yarn and fabric construction. Filtration textiles: Definition of filtration parameters, filtration requirements
Geotextiles: Brief idea about geosynthetics and their uses, essential properties of geotextiles, geotextile testing and evaluation, application examples of geotextiles. Medical textiles:

Classification of medical textiles, description of different medical textiles. Protective Clothing: Brief idea about different type of protective clothing, functional requirement of textiles in defence including ballistic protection materials and parachute cloth, flame retardant clothing, chemical protective clothing. General technical textile: Textiles in agriculture, electronics, power transmission belting, hoses, canvas covers and tarpaulins.

Books Recommended

- 1.“Handbook of Technical Textiles”, Ed. A R Horrocks and S C Anand, Woodhead Publication Ltd., Cambridge, 2000.
- 2.“Modern Textile Characterization Methods”, Ed. M Raheel, Marcel Dekker, Inc., 1996.
- 3.“Engineering with Geosynthetics”, Ed. G V Rao and G V S Raju, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1990.
- 4.Mukhopadhyay S K and Partridge J F, “Automotive Textiles”, Vol. 29, No. ½, The Textile Institute, 1999.

Departmental Elective

MTTE 103 Physical Properties of Fibres

Moisture absorption and desorption of fibres, sorption isotherms, heat of sorption and theory of sorption, swelling of fibres. Mechanism of deformation of fibres, principles of elasticity and visco-elasticity. Stress-strain behaviour of textile fibres. Creep and stress relaxation. Dynamic mechanical properties of fiber. Model theory. Time temperature superposition principle, thermodynamic analysis of deformation. Fiber friction, its nature, theory, application and measurement. Birefringence and its measurement. Thermal transition and its importance. Dielectric properties of fiber. Static electricity and measurement of static charge in fibres. Fiber micro structure, x-ray analysis, IR spectroscopy and SEM.

Books Recommended:

1. Meredith R, The Mechanical Properties of Textile Fibres, North Holland Publishing Co; Amsterdam 1959.
2. Morton W E and Hearle J W S, Physical Properties of Textile Fibres, 1st reprint, The Textile Institute, Manchester, 1986.
3. Gupta V B and Kothari V K, "Manufactured Fibre Technology" 1st Ed., Chapman and Hall, London, 1997.
4. Hearle JWS, Polymers and their properties, Vol. I, John Wiley and Sons, NY, 1982

MTTE 104 Production Management in Textiles

Operations management in corporate profitability and competitiveness, types and characteristics of manufacturing and service systems. Operations planning control: Planning production in aggregate terms, quality assurance. Plant layout: Features, basic principles, types of layout, merits and demerits, optimization of a product/line layout and process layout. Location of Facilities: Nature of location decision, situations that influence location decision, backward areas and industrial policy, behavioral aspects in location planning. Purchasing; Objectives, value engineering, vendor relations, selection of vendors. Material Requirement Planning: MRP Calculations, material handling. Job Evaluation: Incentive schemes, job redesign. Work measurement techniques. Different types of pollution: Water, air, solid waste, soil, noise, odours etc. Pollution caused by textile industries. Waste definition, characteristics and perspectives. Different types of waste.

Books recommended:

1. Raymond M R, "Production and operations management", Mcgraw-Hill international Edition, New York,1993.
2. Buffa S E and Sarin R, "Modern Production/Operations Management", John Willey and Sons, Delhi,1995.
3. Collard R, "Total quality", Jaico Publishing House, Mumbai, 1988.
4. Sharma S K, Sharma Sand Sharma T, "Industrial Engineering and Operations Management", S K Kataria and sons, Delhi, 1996.
5. Asolekar S, "Environmental problems in chemical processing of textiles" 1st Ed. NCUTE, Department of Textile Technology, IIT-Delhi, 2000.

MTTE 204 Colouration and Finishing Technology

Preparatory processes for synthetic textiles and their blends. Heat setting -Mechanism and effect on properties of textiles. Developments in dyeing of synthetic textiles and their blends. Dyeing of micro-fibres. Mass coloration of synthetic textiles. Printing of synthetic/blended textiles in direct, resist and discharge styles. Transfer printing of polyester, cotton, wool and their blends. Quality control in chemical processing. Anti-crease finishes and latest development in it. Controlled application techniques. Anti-stat, soil release and flame-retardant finishes. Garment processing. Energy conservation, minimization of wastage of energy during chemical processing of textiles, low temperature processing of textiles. Waste water load in various areas of chemical processing and ways to reduce it.

Books Recommended:

1. Peters R H, "Textile chemistry", Vol. -II and III, Elsevier Publishing Company, London, 1967.
2. Nunn D M, "The dyeing of synthetic polymer and acetate fibres", Dyers Company Publication Trust, London, 1979.
3. Miles L W C, "Textile printing", Dyers Company Publication Trust, Bradford, England, 1981.
4. Hall A J, "Textile finishing", Haywood Books, London, 1996.
5. Bird C L and Boston W S, "The theory of coloration of textiles", Dyers Company Publication Trust, Bradford, England, 1975.
6. Smethurst G, "Basic water treatment", IBT Publications, Delhi, 1989.

MTTE 302 Post Spinning Operations

Drawing Process, neck drawing, initiation and propagation of neck, neck stabilization. natural draw ratio, effect of temperature and strain rate on neck drawing, prediction of neck formation, influence of drawing on structure and properties of filament, spin-draw process. Texturing and warping process. Material and process variables in texturing and their influence on yarn quality. Recent advances in texturing, testing and evaluation of textured yarn. Properties of fabrics made from textured yarn. Heat Setting process, parameters for heat setting, equipment for heat setting and evaluation of degree of set. Post spinning operation on multifilament sewing threads.

Books recommended:

1. Gupta V B and Kothari V K, "Manufactured fibre technology", 1stEd., Chapman and Hall, London, 1997
2. Mark H F, Atlas S M, Cernia E, "Man made fibre science and technology", 1st Ed., Vol. I, II, III, Willey Interscience Publishers, New York, 1967.
3. Macintyre J E, "Synthetic fibres", Woodhead Fibre Science Series, UK, 2003.
4. Fourne F, "Synthetic fibres: Machines and equipment, manufacture, properties", Hanser Publisher, Munich, 1999.

MTTE 303 Costing, Project Formulation and Appraisal

Costing-elements of costs, expenses excluded from cost, cost sheet, cost concept, cost classification, treatment of stock. Project Planning –Capital expenditure, phases of capital budgeting, generation and screening of project ideas, project rating index, resource allocation framework. Project Analysis -Feasibility study, product life cycle, market analysis, market planning, market survey and characterisation of markets, demand analysis, demand forecasting, technical analysis, project charts and layouts. Financial analysis –Cost of project, means of finance, projected financial statements, working capital requirement, estimate of sale and production, cost of production, cash flow, time value of money and cost of capital. Appraisal criteria –net present value, benefit cost ratio, internal rate of return, payback period, analysis of risk and social cost benefit analysis. Project implementation -Network techniques, PERT, CPM. Project Review and Administration

Books Recommended:

1. Jain S P, Narang K L and Dhingra T R, "Cost Accounting", 6thEd., Kalyani publishers, N Delhi, 2000.
2. Kerzner H, "Project Management" 1st Ed., CBS Publishers and distributors, Delhi, 1987.
3. Prasana C, "Projects-Planning, Analysis, Selection, Implementation and Review", 6thEd., Tata Mc

Grawhill Publishing Co. Ltd., N. Delhi, 1996.

4.Ormerod A, "Textile Project Management", The Textile Institute, Manchester UK, 1992.

MTTE-304 Characterisation of Polymers and Fibres

(Note: Subject will be taught by Faculty of Chemistry)

Molecular weight and dimension: Number and weight average molecular weight. Different approaches of determination of molecular weight. Methods of determination of molecular weight, viz., end group analysis, osmometry, light scattering, viscometry, GPC. Characterisation of structure, different techniques of structure characterization, viz., IR Spectroscopy, NMR Spectroscopy, UV-VIS Spectroscopy, Raman Spectroscopy. X-ray scattering and analysis of structure. Thermal characterisation: Differential scanning calorimetry, Differential thermal Analysis, Thermo gravimetric analysis, Dynamic mechanical analysis. Microscopy: optical and electron microscopy. Determination of fiber density.

Books recommended:

- 1 "Polymers; Polymer characterization and analysis", . Ed., J I Kroschwitz, John Wiley and Sons, 1990.
- 2 "Thermal characterization of polymeric materials", . Ed. E A Turi, Vol I and II, Academic Press, 1997.
3. Billmeyer F W, "Text book of polymer science", John Wiley and Sons, 1984.

MTTE 402 Process Control in Spinning & Weaving

Optimum fibre-mix for various end use requirements. Yarn realization. Waste control in blowroom and card for all types of fibres spun on cotton system .Minimizing lea count variation. Controlling yarn irregularity, imperfections and faults. Yarn tenacity and elongation. Hairiness. Machinery audit. Indices of productivity. Production of high quality export yarns. Trouble Shooting, some case studies. Role of ambient temperature and humidity. Life of accessories. Work load. Principles for control of productivity in different sections, Contribution of control in yarn winding, warping, sizing & weaving to the cost of production in fabric manufacture. Splicing, machine allocation and load distribution, Control of migration in sizing, size droppings, sizing materials, Loom allocation. Control of value loss in fabrics through evaluation & grading of fabric defects. Temperature and humidity control & its effect on performance. Control of loom accessories. Control of loss of efficiency by snap study. Controls in the process of high twist yarns, blended yarns, filament yarns in warp and weft. Controls in the winding for processing yarns for dyeing & knitting. Controlling sloughing off during winding, warping & weaving. on-line data system and its use in controls.

Books Recommended:

1. Process Control in Spinning by ATIRA
2. Process Control in Weaving by ATIRA
3. Process control in spinning by R. Chattopadhyay IIT, NCUTE, Delhi
4. Quality control in spinning by SITRA

MTTE 403 Computer Programming and its Applications

Fundamentals of Computer Programming, Programming Methodology: Structured Programming and concepts of Object-Oriented Programming.

Programming in C++ - Statements and Expressions, Control statements. Structure, Functions: Function Overloading etc.

C++ as Object-Oriented Programming Language- Classes and Objects, Data Abstraction, Inheritance - Multilevel and Multiple inheritance etc., Polymorphism- operator overloading and virtual functions, file handling. Application development using C++.

Books Recommended:

1. Fundamentals of Computer Programming & Information Technology, by Sumita Arora, Dhanpat Roy & Sons.
2. Object Oriented Programming using C++, by E. Balagurusamy.
3. Object Oriented Programming with C++, by Robert Lafore, Galgotia Publication.

MTTE 404 Environmental Practices in Textiles

Introduction to environment. The impact of human upon the environment. Improvement of environment quality. Role of environmental engineer. Different types of pollution : Water, air, solid waste, soil, noise, odours etc. Pollution caused by textile industries. Waste definition, characteristics and perspectives. Different types of waste. Waste water collection, treatment and disposal. Solid waste generation, collection and disposal. The textile effluents. Textile waste characteristics. Textile waste water problems. Chemicals used in textile industry. Treatment of textile effluents and its testing.

Books Recommended:

1. Asolekar S, "Environmental problems in chemical processing of textiles" 1st Ed. NCUTE, Department of Textile Technology, IIT-Delhi, 2000.
2. Padma V, "Textile Effluents" 1st Ed. NCUTE, Department of Textile Technology, IIT-Delhi, 2002.
3. Edmund B, "The Treatment of Industrial Wastes" 2nd Ed., Tata McGraw-Hill, New Delhi, 1976
4. Rao M N, "Environmental Engineering" 2nd Ed., Tata McGraw-Hill, New Delhi, 1993

MTTE 502 Quality Management

Introduction to Quality Management, concept of Modern Quality management, service quality and product quality. On-line quality control, Role of off-line and on-line quality control. Off-line quality control, Basic concept, pre-requisite steps of off-line Q.C., Z.D. on way to off-line quality control. Leadership for quality Management; Attitude and involvement of top management, Communication. Strategic quality Planning, the process and strategic quality management, definition of quality control, Relationship with HRM. Management of process quality; Product and process control, statistical quality control and basic approach to it, 6 sigma limit, TPM, quality function deployment, just-in-time, just-in-case. Organizing for TQM. Cost of Quality. Universal standards of quality; ISO around the world, certification, quality manuals, documentation and implementation. Case studies.

Books recommended:

1. Ross E, "Total Quality Management", Kogan Page USA, 1989.
2. Raju S S M, "Total Quality Management", Tata Mcgraw Hill Publishing Co., 1985.
3. Fiegenbaum V A, "Total Quality Management", Mcgraw Hill International, 1990.
4. Tenner R A and Detoro JI, "Total Quality Management", Addison-Wesley Publishing Co., 1986.

MTTE 503 Garment Manufacturing Technology

Introduction to garment manufacturing and Indian apparel industry. Pattern alteration techniques. Principles of fittings. Selection of fabrics, trims and accessories. Methods of fabric inspection. Interlining, trade pattern design and grading, types of seam and stitches. Sewing machinery and its special attachment. Apparel production system and practices. Production planning and control. Bundling techniques. Batch, piece and sectional assembling. Special finishes on garments such as stone wash. Labeling system. Checking, Pressing, folding and packing standards for domestic and export market. Checking and quality control. Ready to wear garment. Garment comfort. Kawabata and FAST evaluation system. Plant layout for a garment unit. Application of CAD and CAD Min garment manufacturing. Phasing of MFA and its implications and export documentations.

Books Recommended:

1. Cooklin Gerry, "Garment Technology for fashion Designers", Om BookService Delhi, 1997.
2. Carr Harold and Barbara, "The Technology of clothing Manufacture", Om Book Service, Delhi, 1998

3. Mehta P V and Bhardwaj S K “ Managing Quality in Apparel Industry”, New Age International (P) Ltd., Delhi-2002
4. “Garment Technology NCUTE Series”, Ed. Bhattacharye A, NCUTE-IIT, Delhi, 2003.
5. Aldrich W, “Metric pattern cutting”, Om Book Service, Delhi-1998.
6. Wilson J, “Hand book of Textile Design”, Woodhead publishing Ltd., UK, 2002.

MTTE 504 High performance Fibres and their Composites

Polyamide fibres: Aliphatic polyamide (N6 and 66) and their application in rubber tyre. Fully aromatic polyamides or aramid fibres (Nomex and Kevlar), their manufacture, structure, properties and applications. Carbon fibres: Different precursors, preoxidation, carbonization, graphitization, structure and properties. application in composite. Flexible chain high performance fibres, manufacture and application in composite. Glassfiber, manufacture, properties and application in composite. Nanocomposite: Introduction, advantages and different nanomaterials commonly used as fillers (Carbon nanotubes, carbon nanofibres and Nano clay). Definition of composite. General introduction to fibres and resins for composites. Composite fabrication techniques. Matrices and interphase.

Books Recommended:

1. Mc Crum N G, Buckley C P and Bucknall C B, “Principle of Polymer Engineering”, Oxford University Press, New York, 1990.
2. “High Performance Fibres”, Ed. J W Steare, Woodhead Publishing Co., England, 2001.
3. Hull D, “An introduction to composite materials”, Cambridge University Press, UK, 1981.
4. Broody H, “Synthetic Fiber Materials”, Longman Scientific and Technical, UK, 1994

List of Departmental Electives

Subject Code	Course Name	Contact Hours
MTTE-103	Physical Properties of Fibres	4 Hrs
MTTE-104	Production Managements in Textile	4 Hrs
MTTE-302	Post Spinning Operation	4 Hrs
MTTE-303	Costing, Project Formulation and Appraisal	4 Hrs
MTTE-304	Characterization of Polymers and fibres	4 Hrs
MTTE-305	Coloration and finishing Technology	4 Hrs
MTTE-402	Process Control in spinning and Weaving	4 Hrs
MTTE-403	Computer Programming and Its Application	4 Hrs
MTTE-404	Environmental practices in Textiles	4 Hrs
MTTE-502	Quality Management	4 Hrs
MTTE-503	Garments Manufacturing Technology	4 Hrs
MTTE-504	High Performance Fibres and Composites	4 Hrs