

REVISED SYLLABUS W.E.F.01ST JULY, 2005

**T.Y.B.TEXT. (MMTT) SEMESTER-I**

SR. NO.	COMMITTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
			L	T	DR	PR	TP	TW	OE	PE	SUB. TOTAL
5.1	TT/MMTT/TPE/TC	TEXTILE ELECTRONICS-II	3	---	---	2	100	---	---	50	150
5.2	MMTT	MANMADE STAPLE YARN MANUFACTURE-III	4	---	---	2	100	50	---	---	150
5.3	MMTT	MANMADE FABRIC MANUFACTURE-III	4	---	---	2	100	50	---	---	150
5.4	TT/MMTT	CHEMICAL PROCESSING OF TEXTILES-II	3	---	---	2	100	25	---	50	175
<b>5.5</b>	<b>* MMTT</b>	<b>* PHYSICAL PROPERTIES OF MAN MADE FIBRE &amp; TESTING</b>	<b>3</b>	<b>---</b>	<b>---</b>	<b>2</b>	<b>100</b>	<b>25</b>	<b>---</b>	<b>---</b>	<b>125</b>
5.6	TT/MMTT	MECHANICS OF TEXTILE MACHINES	3	---	---	---	100	---	---	---	100
5.7	TT/MMTT/TPE/TC	INPLANT TRAINING-I	---	---	---	---	---	50	---	---	50
			20	---	---	10	600	200	---	100	900
L =LECTURES T =TUTORIALS DR=DRAWING PR=PRACTICALS			TP=THEORY PAPER TW=TERM WORK OE=ORAL EXAMINATION PE=PRACTICAL XAMINATION								

## **THIRD YEAR B.TEXT. - SEMESTER - I**

### **5.1 TEXTILE ELECTRONICS-II (MMTT)**

Lectures	-	3 hrs/week.
Practicals	-	2 hrs/week.
Theory Paper	-	100 marks.
Practical Exam.	-	50 marks.
Subject Total	-	150 marks.

#### **1) Digital Electronics and Number System :-**

Difference between digital and analog, digital gates, working, truth table & Boolean equation, with examples from TTL family.

Digital Circuits :- Introduction to multiplexers, Demultiplexers, Encoders, decoders, Flip Flop – R-S, D & J – K, Registers Latches, binary counter, buffers, Tri state devices, memories – RAM, ROM, EPROM.

Introduction to Number systems :- Decimal, Binary, hexadecimal, conversion of numbers from one system to other. Binary arithmetic – addition, subtraction, two's complement representation.

#### **2) 8085 Microprocessor :-**

Introduction to microprocessor, features of 8085, Architecture of 8085 – Register section, ALU, Timing & Control etc. Demultiplexing of address data bus. Generation of control signals, Example of microprocessor based system, 8085 machine cycles and bus timing. Memory interfacing to 8085.

#### **3) Programming of 8085 :-**

Instruction classification, instruction and data formats, addressing modes, complete instruction set, assembly language programming, Execution of programs, programming with looping, counting & indexing techniques. Time delay's & counters.

#### **4) Stacks and Subroutine :-**

Stack, subroutine, call & Return instructions advanced subroutine concepts.

**5) Interfacing Input / output devices :-**

Basic interfacing concept, interfacing output displays, interfacing input devices, difference between peripheral Input/output memory mapped Input/out.

**6) Interrupts :-**

Concept of interrupts, software & hardware interrupts, Description of interrupt process, vectored interrupts, programming using interrupts.

**7) Interfacing of peripherals & other I/O devices :-**

8255 PPI interfacing & programming, interfacing of keyboard (matrix) & display, interfacing of thumbwheel switches, stepper motor, D/A & A/D converters, Relays etc.

**8) Introduction to Microcontroller:-**

Introduction to microcontroller, Block diagram of microcontroller, Difference between microprocessor and microcontroller, Features of 8051 microcontroller, Introduction to PLC & its applications.

**9) Applications of Microprocessor in Textiles :-**

Use of Microprocessor / Microcontroller in Sizing Machine, Jet dyeing machine, advanced looms, Spinning machines, Ring data System, Auto levelers, On-line monitoring systems, Evenness tester.

**LIST OF EXPERIMENTS**

- 1) Study of basic gates.
- 2) Study of flip flops
- 3) Assembly language programmes ( 6 to 8)
- 4) Interfacing of 8255 in simple I / O & BSR mode.
- 5) Interfacing of Seven segment display.
- 6) Interfacing of keyboard.
- 7) Interfacing of stepper motor.
- 8) Interfacing of D/A converter.
- 9) Interfacing of A/D converter.
- 10) Interfacing of thumbwheel.

## **REFERENCE BOOKS**

- 1) Digital Principles and applications by Malvino & leach.
- 2) Microprocessor Architecture, Programming and applications with 8085 by Ramesh Gaonkar.
- 3) Microprocessor & Digital system by Douglas Hall.
- 4) Fundamentals of microprocessors & microcomputers by B. Ram.
- 5) The 8051 Microcontroller Architecture, Programming and Applications by Kenneth J, Ayala.
- 6) Machine manuals of USTER, LOPHE, PREMIER

### THIRD YEAR B.TEXT. - SEMESTER - I

#### **5.4 CHEMICAL PROCESSING OF TEXTILES-II (MMTT)**

Lectures	-	3 hrs/week.
Practicals	-	2 hrs/week.
Theory Paper	-	100 marks.
Term Work	-	25 marks
Practical Exam.	-	50 marks
Subject Total	-	175 marks.

1. Elements of Dyeing – Principles of dyeing, Classification of dyes based on application methods, dye fibre interactions and concepts like exhaustion, expression, percentage shade and affinity.
1. Dyeing of cellulosic fibres with direct, vat, reactive, sulphur dyes and azoic colours.
2. Dyeing of Polyester & its blends like polyester-cotton, polyester-viscose, polyester-wool.
3. Dyeing of silk, wool, acrylic, & nylon.
4. Evaluation of fastness properties like wash fastness, rubbing fastness and light fastness
5. Introduction to Loose fibre dyeing machines, package dyeing machine. Jigger dyeing machine, winch dyeing machine, padding mangle, jet dyeing & soft flow dyeing machine.
6. Concept of printing. Various ingredients used in preparation of printing paste.
8. Various styles of printing such as direct, resist and discharge by using direct, reactive and disperse dyes.
9. Printing with pigments.
10. Introduction to various methods of printing such as table, flat bed & rotary.
11. Concept of inkjet / digital printing.
12. Objects of finishing, classification of finishes. Resin finishing, mechanism of resin finishing. Concept of anti crease, wash-n-wear & durable press.

13. Heat setting and weight reduction of polyester material.
14. Concept of speciality finishes like soil release, water repellent and flame retardant finishes
15. Various finishing machinery such as stenter, calendars, sanforising and drying machine.

### **LIST OF EXPERIMENTS**

1. Dyeing of cotton with various classes of dyes such as direct, vat, reactive, and sulphur on OBBD Machine.
2. Dyeing of wool and silk with acid & metal complex dyes on OBBD Machine.
3. Dyeing of 100% polyester with disperse dye by using HTHP beaker dyeing machine.
4. Dyeing of polyester-cotton by using beaker dyeing machine.
5. Demonstration of dyeing of cotton on Jigger, winch, Padding mangle, Package dyeing, soft flow dyeing machine and garment dyeing machine.
6. Printing of cotton with pigments.
7. Printing of cotton with reactive dyes for direct and discharge style.
8. Chemical identification of fibres.
9. Chemical identification of dyes on fibres.
10. Evaluation of light, wash, rubbing and fastness.
11. Demonstration of computer colour matching system

### **REFERENCE BOOKS**

- 1) Dyeing Of Polyester & Its Blends by M.L. Gulrajani.
- 2) Dyeing Of Chemical Technology Of Textile Fibres by E.R. Trotman.
- 3) Technology Of Dyeing by V.A. Shenai.
- 4) Textile Printing by L.W.C. Miles.
- 5) Technology Of Printing by V.A. Shenai.
- 6) An Introduction To Textile Printing by W. Clarke.
- 7) Textile Finishing by A.J. Hall.

- 8) Introduction To Textile Finishing by J.T. Marsh
- 9) Technology of Finishing by V.A. Shenai.

## THIRD YEAR B.TEXT. - SEMESTER - I

### **5.6 MECHANICS OF TEXTILE MACHINES (MMTT)**

Lectures	-	3 hrs/week.
Theory Paper	-	100 marks.
Sub. Total	-	100 marks

#### 1. Frictional Drives :-

Introduction, Drum drive – Belt drives – Conditions of critical slippage of belts – belt drive plus frictional disc drive (texturising machine), the timing belt drive, cone drum belt drives.

#### 2. Positive Drives :-

Chain & sprocket drum - Gear drives – types of gears – terms used in study of gears – pitch measurement, ratio of gear trains – selection of gears for change wheels, Epicyclic gear trains – velocity ratio – differential gearing in comber & Speedframe. Planetary mechanisms in Coiling – Rack and Pinion – Screw traversing mechanism.

#### **3. Intermittent Rotary Motion :-**

Introduction – Ratchet and pawl, Mechanisms – Let off & take up motions in weaving machines – variation in pick spacing – Geneva wheel.

#### 4. Cams & Eccentric: -

Introduction – Basic types of cams – Motion of cam follower – linear cam – parabolic cam – Use of positive cams – SHM – Determination of Acceleration in SHM – Cylindrical Cam. The crank and connecting rod – the loom sley movement

#### 5. Linkage Mechanisms :-

Introduction – The four bar linkage – SHM calculation of dwell clearance on a loom – modified SHM – Multiple – Bar Linkage – Double Beat up mechanism – Combined ratchet and linkage. Mechanisms – complex combined mechanisms – driving detaching rollers of comber.

#### 6. Balancing of Machines :-

Vibration of machine, Balancing of machinery – Unbalance, Production balancing, Field balancing, Concepts of definitions – Theoretical considerations

in balancing – Balancing of rotors / Cards cylinder Practical aspects of balancing. Measurement & control unbalance.

#### 7. Clutches & Brakes :-

Introduction – Clutches – Jaw / toothed clutches, Friction clutches, Materials for friction lining, Cone Clutches.

Brakes - Mechanical brakes, Block brake with short shoe, Pivotal double block brake, Internal expanding brake, Band brakes.

#### 8. Selection Mechanisms :-

Introduction – methods of storing information – the grouping of machine parts for selection – converting information into movement – some mechanical switching mechanisms – Dobby selection mechanisms – high speed mechanical switching mechanisms – additional complex mechanical switches – the movement of the information store.

#### 9. Control Mechanisms :-

Introduction – the elements of control mechanisms – a comparison of open loop & closed loop system – the detecting element – the detailed of broken ends – the control of yarn / cloth tension – control of sliver thickness – detection of full and empty packages.

#### **10. Mechanics of Spinning & Weaving Machines :-**

C and M factors in Blow room, Design of Beater & Chamber, Transfer efficiency of card, Inertia of Carding, Coiling of sliver, Card Wires, Drafting force and friction field in roller drafting, coils spacing in speed frame, Centrifugal force of flyers, Arrangement in two rows, Yarn tension in ring spinning, Balloon theory, Package density, Traveller friction.

Study of mechanisms in winding, Build of various packages. Design of grooved drums for various packages. Design changes in Beam warping drive for high speed. Sectional warping drum design. Mechanism of squeezing, sow box design. Mechanical design changes of shedding mechanism. Picking

mechanism theories for different shuttleless weaving techniques. Kinematics of different sley drives.

### **REFERENCE BOOKS**

- 1) Textile Mathematics, Vol-I By J.E. Booth, The Textile Institute, Publication.
- 2) Textile Mathematics, Vol-II By J.E. Booth, The Textile Institute, Publication.
- 3) Textile Mathematics, Vol-III By J.E. Booth, The Textile Institute, Publication.
- 4) Control Methodology in Textile Engineering & Economics By John W.s. Hearle, Journal of the Textile Inst. Vol.83, No.3, 1992, The Textile Institute Publication
- 5) Mechanics for Textile Students, By W.A. Hanton, The Textile Inst. Publication.
- 6) Mechanics of Spinning Machines By R.S. Rengasamy, NCUTE Publication
- 7) Textile Mechanics Vol.I, By K. Slater, The Textile Inst. Publication.
- 8) Textile Mechanics, Vol.-II, By K. Slater, The Textile Inst. Publication.
- 9) An Introduction to Textile Mechanisms By P. Grosberg, The General Publishing Company.

### **THIRD YEAR B. TEXT - SEMESTER-I**

#### **5.7 INPLANT TRAINING - I (MMTT)**

Duration	:	4 Weeks
Term Work	:	50 Marks

- 1) As a part of curriculum, students are required to undergo an Inplant training for the period of Four Weeks, after the completion of second semester of Second Year B. Text.
- 2) During this period, students are required to study the machinery, industrial practices & the other relevant data, information as per the guidelines given by the Institute.
- 3) The students are required to submit a Inplant Training Report on the basis of above training.
- 4) Term work marks are assigned on the basis of students performance in the viva – voce, conducted by Internal Examiner immediately after inplant training. A viva-voce will be conducted in the first semester of Third Year B. Text.
- 5) If the performance of the student is found to be unsatisfactory, his terms will not be granted.

### **THIRD YEAR B.TEXT. - SEMESTER - I**

#### **5.2 MAN MADE STAPLE YARN MANUFACTURE-III (MMTT)**

Lectures	-	4 hrs/week.
Practicals	-	2 hrs/week.
Theory Paper	-	100 marks.
Term Work	-	50 marks
Subject Total	-	150 marks.

##### **1) Yarn doubling & folding :-**

- a) Objects of yarn doubling & folding. Basic concepts in twisting. Study of ring doubler. Twisting of filament yarns – objectives.
- b) Study of Two for one twister – construction, working, machine design aspect, calculation related to the production, twist. Effect of twist on filament yarn characteristics.
- c) Twist setting of yarns
- d) Modification required for twisting different filament yarns.

##### **2) Rotor Spinning:-**

- a) Limitations of ring spinning, classification of spinning systems, stages involved in rotor spinning.
- b) Raw material requirement & preparation for rotor spinning.
- c) Yarn forming principle, study of constructional details at each stage.
- d) Process parameters & yarn properties.
- e) Automation, techno-economics of open end spinning.
- f) Role of spin finish as delustering agent of man made fibres in rotor spinning.

##### **Unconventional spinning systems:-**

- a) Friction spinning :-
  - i) Operating principle & raw material requirements, stages involved in friction spinning.
  - ii) Working principle of different spinning systems.

- iii) Yarn properties & applications.
- b) Air jet spinning :-
  - i) Raw material requirement, stages involved, operating principle.
  - ii) Principles and working of MJS, MTS & MVS.
  - iii) Yarn properties, process variables, limitations.
- c) Other spinning systems :-
  - i) Selfil, Plyfil, Parafil, Bobtex, SIRO spinning system-introduction.
  - ii) Raw material requirements, operating principles & yarn properties produced from these spinning systems.
  - iii) Advantages & limitations of these spinning systems.

### **LIST OF EXPERIMENTS**

- 1) Tools & gauges used in spinning.
- 2) Study of ring doubler, passage, gearing & calculations.
- 3) Study of TFO passage, gearing & calculations.
- 4) Manufacturing of air jet spun yarns at different process variables.
- 5) Manufacturing of rotor spun yarns by varying different process parameters.
- 6) Study of Air jet spinning machine constructional details & passage.
- 7) Study of passage, gearing & calculations of rotor spinning.
- 8) Study of passage, gearing & calculation of air jet machine.
- 9) Production of slub yarn & other fancy yarn by using fancy yarn device.
- 10) Manufacturing of Siro / Wrap spun yarns at different process parameters.
- 11) Study of Hollow doubler / Air covering machine – Passage, driving arrangement & calculations..
- 12) Industrial visit.

### **REFERENCE BOOKS**

- 1) Fundamentals of Spinning – P. Lord.
- 2) Fundamentals of Spinning Technology - C.A. Lawrance.
- 3) Trade Literature by Murata, Vijay Lakshmi, Schlafhorst.
- 4) NCUTE Pilot Programme in Spinning.

- 5) Advances in Yarn Manufacture- Edited by S.M. Istiaque.
- 6) Textile Progress in Open End Spinning – C.A. Lawarance.
- 7) Textile Progress in Friction Spinning – R.V. Mohendragowda.
- 8) Two for One Twister Technology & Technique – H.S. Kulkarni & HVS Murthy.
- 9) New Spinning Systems, Short Staple Services, Vol.-V, - H. Stalder.
- 10) Air Jet Spinning : Textile Progress by Textile Institute.

### THIRD YEAR B. TEXT - SEMESTER-I

#### 5.3 MAN MADE FABRIC MANUFACTURE-III (MMTT)

Lectures	:	4 Hrs / Week
Practicals	:	2 Hrs / Week
Theory Paper	:	100 Marks
Term Work	:	50 Marks
Subject Total	:	150 Marks

1. **Air Jet weft Insertion:** - Introduction, History of Air jet weft insertion, overview of weft insertion elements, insertion main nozzles designs, relay nozzle designs, configurations, Loom settings, Air supply & energy consumption, Influence of yarn characteristics on weft insertion, Optimisation of settings, Weft stops & breaks, application of air jet weaving, functional characteristics & features of modern air jet weaving machines, (Dornier, Smit, Picanol, Sulzer).
2. **Water Jet Weft Insertion:-** Introduction, Design, Requirements, Picking mechanism, weft insertion elements, influence of yarn characteristics, features of water jet looms, applications of water jet weft insertion system. Comparison with air jet.
3. **Multiphase Weaving:-** Introduction, Classification, Methods to form warp wise and weft wise sheds, methods of picking, methods of beat up, limitations of multiphase weaving, applications,
4. **Circular Weaving:-** Introduction, Classification as per number of shuttles, shedding, picking, beating, cloth collection, supply of warp yarn, stop motions for warp & weft, productivity, applications of circular weaving.
5. **Triaxial Weaving:** - Introduction, Properties of triaxial woven fabrics, applications, weaving equipment for triaxial weaving.
6. **Narrow Fabric Weaving:-**
  - a. Preparation – Machines & processes for assembling warps, various warping processes used weft preparation.

- b. Technology of narrow fabric weaving – Machine construction, Shuttle looms, needle looms, warp feed systems from beams, creel, for elastomeric yarns, shedding, weft insertion systems, take up.
  - c. Application of weaves in narrow fabric weaving.
7. **Manufacture of Labels:** - Introduction, labels with woven selvedge & cut selvedge.
  8. **Braiding:** - Introduction classification (rounds & flat braids), applications, raw material used for braids, machines used for braiding
  9. **Non Woven:-** History, Classification of non wovens, Production and computation of it in India & in World, Fibre web preparation & web laying, cross lapping, Basic methods of bonding needle punching, thermal bonding, adhesive bonding, stitching, Factors affecting the structure & properties of the fabric, Properties, application.
  10. **Geo Textiles:-** Definition, History of geotextile, Classification of geotextiles, Raw material for geotextiles, Functions of geotextiles in various applications, Application of geotextiles in paved roads, roads, rail track, soil erosion & drainage.
  11. **Flat Knitting:-**
    1. Basic elements & their functions of flat knitting machine. Hand and machine operated flat knitting machines & their knitting actions.
    2. Machine operation for various stiches such as Miss, Tuck, Transfer, drop stitch.Design with and without needle selection, bed racking, new formed and transfer loop for hand and machine operated machines. Concept of seamless knitting.
  12. **Warp Knitting:-**
    1. Passage of yarn through warp knitting machine. Essential elements of warp knitting machine. Knitting cycle of Tricot and Raschel warp knitting machine. Study and representation of single and two guide bars structures.

2. Multi guide bar Tricot & Raschel machines. Weft insertion techniques, Terry technique, Sinker pile fabrics, full plate, cut press & miss press techniques.
3. Crochet machines – General principles old and new patterning devices.
4. Straight bar frame – Knitting elements and their operation through one complete cycle.
5. Methods for calculating runner ratios for each bar for different structures.

### **LIST OF EXPERIMENTS**

1. Study of all aspects of flat knitting machine.
2. Study of all aspects of warp knitting machine
3. Design setting on warp knitting machine & operation.
4. Study of dobby CAD software
5. Application of dobby CAD software - creation of weaves.
6. Study of needle loom and braiding machine.
7. Overhauling of Sulzer picking motion.
8. Study of style change on Dornier and projectile weaving machines.
9. Study of control panel of Dornier & settings.
10. Visit to rapier weaving shed
11. Visit to Knitting unit.
12. Visit to Circular weaving unit.

### **REFERENCE BOOKS**

1. Handbook of weaving – Sabit Adanur.
2. Modern preparation and weaving machinery – A Ormerod
3. Shuttleless weaving machine – Svaty.
4. Shuttleless Looms – J. J. Vincent
5. Shuttleless weaving machine – O. Talavasele, V. Svaty
6. Narrow Fabric Weaving - Sauer Lander Verlag
7. Narrow Fabric Group Conference – Textile Institute

8. Braiding and Braiding Machinery – W. A. Douglass
9. Warp Knitting production – Raz S.
10. Warp Knitting production – D. F. Pailing
11. Knitting – D. B. Ajgaonkar
12. Knitting Fabric Technology – National Knitted
13. Knitting Technology a Comprehensive handbook & Practical Guide –  
Spencer, David. J.

### **THIRD YEAR B. TEXT - SEMESTER-I**

#### **5.5 PHYSICAL PROPERTIES OF MAN-MADE FIBRES & TESTING (MMTT)**

Lectures	:	3 Hrs / Week
Practicals	:	2 Hrs / Week
Theory Paper	:	100 Marks
Term Work	:	25 Marks
Subject Total	:	125 Marks

1. Testing of filament yarns & man made staple fibres –  
Denier, tenacity and elongation, spin finish content of the yarn or fibre, frictional properties, fibre density, antistatic property, shrinkage behaviour, moisture content, viscosity, evenness testing, draw force of filament yarns, shrinkage force of filament yarn, crimp contraction of textured yarn, textured yarn tester(tyt), dye uniformity of textured yarns, number of crimps in staple fibres, Entanglements testing of element yarns,
2. Testing of Air textured yarns – Loop dimensions, loop instability, bulkiness.
3. Testing of elastomeric & industrial yarns.
4. Sampling for determination of fibre properties -  
Importance, general requirements – random sample, biased sample, numerical and length biased samples, - extent bias, avoidance of extent bias, sampling technique –Squaring method – cut square method, zoning techniques, dye sampling for wool, tong sampling method, core sampling of raw wool.
5. Longitudinal dimensions (Fibre length) -  
Technical Significance of fibre length, frequency, weight and length distributions,length distribution and fibre diagrams, the staple length of cotton, crimp. Fibre length measurement - - oil plate method – comb sorter method, Balls sorter, scanning method, cutting and weighing method.
6. Transverse dimensions (Fineness & Maturity) -

Terms and definitions, fibre dimension relationship, - The technical significance of fibre fineness – Variation in fineness, measures of fineness, measurement of fineness - gravimetric method, Airflow method, vibroscope method.

The maturity of cotton, - Technical significance – measures of fibre maturity – methods measurement of fibre maturity – the causticaire method, polarised light method, differential dyeing method, microscopic method.

7. Fibre strength - Introduction, terminology, stress-strain curve & its importance, factors influencing fibre strength, measurement of fibre strength. Single fibre strength – Instron, Bundle strength – Stelometer & pressley method. Importance of fibre strength.

8. Study of modern fibre testing instruments such as High Volume Instruments and AFIS.

9. Fibre Quality Index and its significance

10. Identification of fibres (Cotton, wool, silk, viscose, rayon, nylon, polyester & acrylic fibres) : solubility test, burning test, cross sectional & longitudinal views of fibres.

11. Neps – Definition – importance – testing of neps in card web – nepping potential – Nep testing in fibrous materials – Testing of neps in yarns.

## **LIST OF EXPERIMENTS**

1. Identification of Textile Fibres by Microscopy Method.
2. Fibre Maturity Measurement by Caustic Soda (NaOH) Method.
3. Fibre Fineness by Cut-Weight Method.
4. Determination of span length and uniformity ratio BY HVI
5. Measurement of crimp in man made staple fibres.
6. Measurement of fineness and maturity by airflow instrument.

7. Determination yarn Number and its variation.
8. Determination of Twist in Single and Double Yarn.
9. Study creep & stress relaxation of filament yarn.
10. Determination of density of fibre.
11. Evaluation of filament denier.
12. Study of filament friction.

### **REFERENCE BOOKS**

- 1) Textile Testing by Angappan & Gopalkrishnan.
- 2) Physical Testing of Textiles by J.E. Booth.
- 3) Manuals of HVI, AFIS
- 4) Manual of Spinning by P. Lord.
- 5) Textile Testing by Skinkle.
- 6) Handbook of Indian Standards.
- 7) Production of Synthetic Fibres by A.A. Vaidya.
- 8) Manufactured Fibre Technology by Prof. V.B. Gupta & V.K. Kothari.
- 9) BISFA Series on Manmade Fibres / Filament Yarns Testing.
- 10) BS Handbook.
- 11) ASTM Handbook.

**T.Y.B.TEXT. (MMTT) SEMESTER-II**

SR. NO.	COMMITTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
			L	T	DR	PR	TP	TW	OE	PE	SUB. TOTAL
6.1	TT/MMTT/TPE/T C	ADVANCED COMPUTER PROGRAMMING	3	---	---	2	100	50	---	50	200
<b>6.2</b>	<b>MMTT</b>	<b>* MANMADE FIBRE SCIENCE</b>	<b>4</b>	<b>---</b>	<b>---</b>	<b>---</b>	<b>100</b>	<b>50</b>	<b>---</b>	<b>---</b>	<b>150</b>
6.3	TT/MMTT	UTILITY ENGINEERING IN TEXTILE	3	---	---	---	100	---	---	---	100
<b>6.4</b>	<b>MMTT</b>	<b>* PHYSICAL PROPERTIES OF MANMADE YARNS &amp; FABRICS</b>	<b>4</b>	<b>---</b>	<b>---</b>	<b>3</b>	<b>100</b>	<b>50</b>	<b>---</b>	<b>50</b>	<b>200</b>
6.5	MMTT	HIGH PERFORMANCE FIBRES	4	---	---	---	100	---	---	---	100
6.6	MMTT	TEXTURISING & SPECIALITY YARNS	4	---	---	3	100	50	---	---	150
			22	---	---	8	600	200	---	100	900
L =LECTURES T =TUTORIALS DR=DRAWING PR=PRACTICALS			TP=THEORY PAPER TW=TERM WORK OE=ORAL EXAMINATION PE=PRACTICAL XAMINATION								

## **THIRD YEAR B. TEXT. SYLLABUS - SEMESTER - II**

### **6.1 ADVANCED COMPUTER PROGRAMMING (MMTT)**

Lectures	-	3 hrs/week.
Practicals	-	2 hrs/week.
Theory Paper	-	100 marks.
Term Work	-	50 Marks
Practical Exam.	-	50 marks.
Subject Total	-	200 marks.

#### **1. Introduction to Windows:**

Managing windows, working with disks, folders and files, finding lost files, creating backups, shortcut keys, installing and removing programmes, printing in windows, printer setting, fonts, installing fonts.

#### **2. Networking Concepts:**

Introduction to network, use of computer networks, network topologies, network types – LAN, MAN, WAN, network hardware components – cables, connectors, NIC, Hub, Switch etc. Network operating system, client/server architecture, Internet and its applications.

#### **3. Database Management:**

Introduction to database, records, Relational database management systems, structural query languages (SQL), SQL commands – Select, Insert, update, delete, joins – inner join, outer join, equijoin.

#### **4. Visual Basic Fundamentals:**

Introduction, projects in visual basic, project explorer, setting project options, Visual Basic code – understanding procedures, subroutines, functions, comments, code window & its features, controlling program flow, conditional branching, loops.

#### **5. Visual Basic Data Types:**

Data types in visual basic, - byte, Integer, long, single, double, currency, Boolean, data, string, object, variant, declaring variables, variable scope &

life time, data conversion, arrays, constants, user defined data types.

**6. Designing User Interface:**

Forms, form properties, form events, loading, unloading, showing & hiding forms controls in visual Basic – label, buttons, text box, list, dropdown selection list, checkbox, option button, timer control, setting tab order, manus in visual basic.

**7. Dialogs:**

Introduction, message box, input box, common dialog.

**8. Programming Database Access :**

Introduction, Record set object – definition, properties, methods & events, records, working with record set in code, visual basic data control, Introduction to ADO.

**LIST OF EXPERIMENTS**

1. Study of Windows 98 operating system.
2. Working with Start Button, Desktop, Explorer, Control Panel.
3. Study of network System with commands from Novell Network.
4. Creating databases, tables using Ms-access.
5. Working with SQL Commands like Select, Insert, Update, Delete, etc.
6. Creating simple form in Visual Basic.
7. Writing applications in Visual Basic using multiple forms, various controls (like radio button, list etc.) and database application using data control for
  - ◆ Finding mean, SD, CV% of yarn strength testing machine
  - ◆ Finding twist & its SD, mean & CV%
  - ◆ To calculate production of winding m/c, warping m/c, sizing m/c, looms, (Weaving Machine.), blow room, card, speed frame, ring frame etc (Spinning Machine).
  - ◆ Finding % exhaustion of dye bath.

- ◆ Finding correlation between whiteness & strength.
- ◆ Finding at add on of finish.

## **REFERENCE BOOKS**

1. Windows 95 for busy people – Ron Mansfield (Tata McGraw-Hill Edition)
2. Computer Guide to Networking – Peter Norton (Techmedia publication)
3. Computer Networks (Third Edition)
4. SQL for professional – Swapna Kishore, Rajesh Naik (Tata McGraw-Hill editon)
5. Guide to Visual Basic 6 – Peter Norton (Techmedia Publication)
6. Beginning Visual Basic 6 – Peter Wright (WROX Publication)

## THIRD YEAR B. TEXT - SEMESTER-II

### 6.3 UTILITY ENGINEERING IN TEXTILE (MMTT)

Lectures	:	3 Hrs / Week
Theory Paper	:	100 Marks
Subject Total	:	100 Marks

#### 1) Humidification in Textile Mills:-

Need for humidification in Textile Mills, Ambient conditions required in various departments of a textile mill. Psychrometry - definition, use of psychrometric charts, various psychrometric processes like cooling, heating, humidification, de-humidification, etc. Aspects of evaporating cooling method & refrigerative cooling method. Study of arrangements & layout of standard humidification methods for spinning, weaving & knitting processes – Return air ducts, Return Air Plenum, Filters, Return Air fans, Dampers, Supply Air Fans, Washers, Eliminators, Supply Air Plenum, Supply Air Duct, Diffusers etc. Study of the construction of each component.

Design considerations for a humidification plant & air circulation systems, Calculations related to the heat load in the department, air circulation & the design features of the plant such as fan capacity, Sizes of Dampers, Washers, Ducts, Return Air & Supply Air openings in the department. Automatic controls in humidification plants. Study of recent developments in humidification plant used in spinning, weaving, knitting departments.

#### 2) Pumps, Compressors & Fans used in Textile Mill:-

Classification & characteristics of various types of pumps. Study of types of pumps used in textile mills

Compressors: - Compression methods, intermittent, continuous. Classification of compressors & brief study of construction, working, advantages, limitations of each type. Compressed air requirement in Textile mills, Calculation of compressor capacity. Compressor accessories such as reservoir, dryer, lubrication system, filters, cooling towers, etc.

Fans: - Classification, construction & working of different classes of fans. Centrifugal, Axial flow & Radial flow. Fan capacity, power & efficiency. Fan selection. Pneumatic conveying of materials in textile mills.

**3) Requirement of quality & quantity of water for spinning & weaving mills.**

**4) Selection of Drives :-**

Selection of drives, AC and DC motors, starters, losses, efficiency, speed control, of AC and DC motors, vector control, soft starters, inverters for speed control, design features of energy efficient motors, motor capacity calculation for Air compressors, blowers, pumps, hydraulic systems. Motors used in textile industry, Pneumatic systems: Basic components, functions, operation of Pneumatic circuit.

**5) Illumination:-**

Definitions :- Flux, intensity, solid angle, illumination, utilisation, factor, maintenance factor, laws of illumination, numerical problems on illumination, energy efficient systems, energy efficient lamps, standard values of illumination (LUX) for different departments in textile industry. Study of different lamps. Discharge Lamps, Flu. Tube, Sodium Vap Lamp, Mercury Vapor Lamp, Metal halid Lamp, C.F.L. LED.

**6) Energy Management:-**

Electrical power required in Textile mills. Maximum demand, Average demand, Power factor, Load factor, Calculation related to energy requirement. Methods of power measurement & tariff. Control of maximum demand for saving. Power factor control for saving. Load factor and saving.

Receiving & Distribution of Power in Textiles – High Tension substation – Transformers, Capacitors, Switch yard, Panels, etc. Types of cables – sizes &

calculations. Methods of Power distribution in the department. Methods of procuring H.T. supply and policies and charges and deposits based on connected load and maximum demand.

Methods of captive generation – Brief introduction to D.G set & furnace oil, calculation of techno-economic viability.

Energy Audit - Principle, energy measurement & energy conservation. Recent developments in energy efficient equipments. Harmonics in supply. Concept of power quality. Concept of payback and investment in the corrective action taken after auditing.

### **REFERENCE BOOKS**

- 1) Air Conditioning & Refrigeration by Arora & Domkundwar.
- 2) Air Conditioning & Refrigeration by Khurmi & Gupta.
- 3) Manual of Humidification – Batliboi Ltd.,
- 4) Air Conditioning in Textiles by S.P. Patel.
- 5) Compressors by Royce N Brown.
- 6) Refrigeration & Air Conditioning by P.L. Ballaney.
- 7) Refrigeration & Air Conditioning by P. Arora.
- 8) Utilisation and traction by S.L. Uppal.
- 9) Power system by V.K. Mehta.
- 10) Electrical power system by dr. H.P. Inamdar.
- 11) Utilisation of electrical power and electric traction by J.B. Gupta.
- 12) Mill Engineering by Prof. Pudbidri.
- 13) Electrification in Textile Industry by Willum Style.
- 14) Planning for Demand side management in electricity sector. Tat Mcgraw Hill, New Delhi.
- 15) Industrial load management – Theory and practice and simulation by Bjork C.O. – Elsevier the Netharland
- 16) Electrical Energy Management in Textiel Mills by Nitra, Ghazibad.
- 17) Energy Management by Ocallaghan Paul (Mcgraw Hill books co.England)

- 18) Textile Eng. Progress by Nissan
- 19) Energy Conservation – TI – Tex Progress.
- 20) Electrical Energy Management in Textile Mills – Training Programme.

## **THIRD YEAR B.TEXT. – SEMESTER-II**

### **6.2 MAN MADE FIBRE SCIENCE (MMTT)**

Lectures	:	4 Hrs / Week
Theory Paper	:	100 Marks
Term Work	:	50 Marks
Subject Total	:	150 Marks

1. Fibre structure-Requirements of fibre formation- molecular weight and degree of polymerisation-useful limits of polymerization- crystalline and amorphous regions-molecular structure of fibres-morphological models-one phase, two phase, three phase models,-morphology of various fibres.
2. Techniques for investigation of fiber structure
  - a. Optical properties of textile fibres- Refractive Index- Double refraction, Birefringence. Optical heterogeneity in fibres-The factors influencing the birefringence of a fibre, Measurement of birefringence -the beckeline method-compensator method-interference microscopy- refractometer method-Significance of birefringence, Optical dichroism and its importance
  - b. X-ray Diffraction Investigations-Introduction, Production and origin of X-rays-Bragg's law of x-ray diffraction-crystal structure-miller indices-determination of fibre structural parameters by x-ray diffractometer and fibre diagram techniques-small angle scattering
  - c. Electron Microscopy –Principle of electron microscope- Transmission and scanning electron microscopes and their principle, working and applications
  - d. Infrared Spectroscopy –Spectroscopy, Beer-Lambert law, Principles of IR-Spectroscopy, Principle and working of IR spectrophotometer, Applications, IR-Dichroism and its importance
  - e. NMR Spectroscopy – Principles of NMR spectroscopy, principle & working of NMR Spectrometer, applications of NMR.
3. Mechanical Properties of Textile fibres

- a. Tensile properties\_Terminology, the factors influencing the tensile properties of fibres
  - b. Effects of variability- variability –weak link effect, Pierces formula-derivation- Spencer Smith theory, Composite specimen effects-variability in practice
  - c. Elastic recovery-Definitions-Effects of test conditions on elastic recovery of fibres- Mechanical conditioning of fibres-swelling recovery
  - d. Forces in various directions-bending and twisting of fibres, derivation of flexular and torsional rigidity , shear modulus-shear strength-general elastic deformation-compression
  - e. Theories of Mechanical Properties-approaches-structural effects in fibres-theories of time dependence-thermodynamic effects, Boltzmann super position principle, creep-stress relaxation, stress-strain curve, dynamic mechanical properties, their measurement and importance, factors influencing them.
4. Model theory of viscoelasticity-linear viscoelasticity, viscoelastic models- Features of Eyring model, concept of iso-stress, iso strain & Takayanagi model.
  5. Rubber elasticity, effect of cross links on the properties of fibres.
  6. Mathematical & molecular modeling of fibres.
  7. Fibre Friction- Consequence of friction in textiles, measurement of friction-empirical results-the nature of friction
  8. Thermal properties-Introduction-Specific heat capacity, thermal conductivity, structural changes in fibres on heating and setting, Transition in fibres- primary and secondary transitions and their significance, factors influencing them, degradation and decomposition, Thermal expansion of fibres. Principle, working & applications of DSC, DTA, DMA.
- a. Electrical properties: Static electricity-its generation and consequence- measurement of static electricity, Dielectric properties-permittivity, dielectric constant, dissipation factor, power factor, factors influencing the

dielectric properties, measurement of dielectric behavior of fibres, Electric resistance-Specific resistance- Measurement of resistance-Factors influencing the electrical resistance of fibres.

### **TERM WORK**

Students should complete term work assigned to them on the above topic.

### **REFERENCE BOOKS**

1. Fibre Science- Edited by J.M. Preston, Published by the textile institute, Manchester
2. Physical Methods of Investigation of Textiles, Edited by Meredith R. and Hearle J.W.S.-Published by Textile Book published Inc. New York
3. Physics of fibres- An Introductory Survey-Woods H. J. Published by the Institute of Physics-London, 1955
4. Applied Fibre Science- Vol I-Edited by F. Happey published by Academic Press, London
5. Physical Properties of Textile Fibres-Morton W. E. and Hearle J.W.S. published by the Textile Institute Manchester
6. Fibre Microscopy-Stores J. L. published by London National Trade Pr
7. Structure/Property relationship in Textile Fibres-Textile Progress Vol. 20 No. 4 The Textile Institute Manchester
8. Textile Fibres Yarns and Fabrics – Kaswell E. R. published by Reinhold Publishing Corporation- New York, 1954

## THIRD YEAR B. TEXT. - SEMESTER-II

### 6.4 PHYSICAL PROPERTIES OF MAN MADE YARNS & FABRICS (MMTT)

Lectures	:	4 Hrs / Week
Practicals	:	3 Hrs / Week
Theory Paper	:	100 Marks
Practical Exam.	:	50 Marks
Term Work	:	50 Marks
Subject Total	:	200 Marks

1. Linear density of yarn - Count or yarn number Direct and indirect systems of yarn numbering – Measurement of yarn number or count, Yarn count and yarn diameter.

2. Twist and Twist Measurement - Definition – Twist direction – Amount of twist – Twist multiplier/Factor –Function of twist in yarn structure – Twist and yarn strength – Effect of twist in yarn on fabric properties – Measurement of twist in single and double yarns – Straightened fibre method – continuous twist tester – Twist contraction method, twist to break test – Twist measurement by microscope.

3. Yarn Strength –

a) Single thread strength - The effect of fibre properties on the yarn strength, factors affecting the tensile properties & the results obtained from testing instruments. Different principles of tensile testing of yarns – The pendulum lever principle, the inclined plane principle, the strain gauge transducer principle, the machine working on these principles. Comparison of Tensolab, Tensorapid, Instron.

b) Lea Strength - The lea CSP or Break factor & its significance – Description of lea strength tester, comparison of lea & single thread test results, ballistic test & its importance.

4. Evenness of Yarn – Classification of variation, Expression of irregularity, Basic irregularity, index of irregularity. Addition of irregularities, Measurement of yarn irregularities, visual examination, cutting & weighing method, electronic capacitance principle, variation of thickness under compression, photoelectric testers, Analysis of irregularity –  $V_L$  –  $B_L$  curves, spectrogram analysis, correlogram, causes of irregularity, interpretation of results of irregularity tests, effect of irregularity on the fabric behaviour.

Imperfections & classimat faults, principle & working of uster classimat, Analysis of classimat faults, Hairiness in spun yarn, causes & reduction of Hairiness. Measurement of hairiness.

5. Sampling of Fabrics.

6. Dimensional characteristics - Length, width & thickness and their measurement, importance of thickness.

7. Threads/Unit length – EPI and PPI, count warp count, weft count, weight of fabric – weight per unit length, weight per unit area, warp & weft crimp, effect of crimp on the fabric properties, Measurement of crimp, fabric cover – cover factor.

8. Fabric Strength – Tensile strength testing – cut strip method, Grab test method, comparison between strip test & grab test, Tear strength testing – Measurement of tear strength – different methods of testing, ballistic test, bursting test & its measurement.

9. Fabric abrasion & Handle of fabric – Serviceability, wear, abrasion, testing of abrasion resistance, assessment of abrasion damage, the BFT abrasion testing machine, Martindale abrasion tester.

10. Pilling of fabrics Pills, mechanism of pilling, factors responsible for pilling, effect of pilling, remedies ICI Pill Box Tester.

11. Fabric Stiffness, Handle & Drape –Handle, drape, measurement of drape, stiffness, Shirley stiffness tester (cantilever test), Heart loop test.

12. Crease resistance & crease recovery, measurement of crease recovery.

13. Air permeability, water fabric relations – air permeability, air resistance, air porosity, SHIRLEY air permeability tester, water proofing & water repellency, wetting time test, spray test. Drop penetration test, the bundesmann testers water head tester.

14. Flammability – Flame retardancy, flame proofing and flame propagation, mechanism of flammability, measurement of flammability – concept of LOI.

### **LIST OF EXPERIMENTS**

1. Single Thread Strength testing
2. Determination of lea strength & CSP
3. Ballastic Strength of Yarn & Fabric
4. Yarn Evenness testing by Visual Examination & on Evenness Tester
5. Fabric strip strength test.
6. Fabric tearing strength & Bursting strength.
7. Fabric abrasion
8. Fabric pilling
9. Fabric Stiffness.
10. Fabric drape
11. Crease recovery.
12. Crimp & fabric thickness measurement.

### **REFERENCE BOOKS**

1. Principles of Textile Testing by J.E. Booth.
2. Textile Testing Vol.I & II by Anagappan & Gopalkrishnan
3. Physical properties of Textile Fibre by J.W.S. Hearle & Morton.

### **THIRD YEAR B. TEXT - SEMESTER-II**

#### **6.5 HIGH PERFORMANCE FIBRES (MMTT)**

Lectures	:	4 Hrs / Week
Theory Paper	:	100 Marks
Subject Total	:	100 Marks

- 1) Introduction to High Performance Fibres.
- 2) Aramids: - Introduction, polymer preparation, spinning of fibres, structure and properties of fibres, applications.
- 3) Gel spun high performance polyethylene fibres:- Introduction, manufacture, fibre characteristics and properties and applications, solid state extrusion of high molecular weight polyethylene fibres.
- 4) Carbon Fibres: Introduction, PAN and pitch based carbon fibres, Vapour grown carbon fibre, physical properties and applications.
- 5) Glass Fibres: Introduction, fibre manufacture, properties and design of fibre glass composites.
- 6) Ceramic Fibres: Introduction, silicon carbide based fibres, Alumina based fibres. Single crystal oxide fibres.
- 7) Chemical resistant fibres: Chlorinated fibres: PVDC  
Fluorinated Fibres: PTFE, PVF, PVDF & FEP  
Poly (etheretherketones): PEEK  
Poly (phenylene sulphide): PPS  
Poly (ether imide) : PEI
- 8) Thermally resistant fibres: Introduction, Thermosets, Aromatic polyamides and polyarimids, semi-carbon fibres: oxidized acrylic, poly benzimidazole, PBI Polybenzoxazoles, PBO

#### **REFERENCE BOOKS**

1. High Performance Fibres by J. W. S. Hearle
2. Carbon Fibres by Donnet & Bansal

3. hand book of Fibres Science & Technology : High Technology Fibres  
edited by Manachem Lewin & Jack Preston
4. New Fibres by Hongu and Phillips.
5. Kevlar Aramid Fibres by yang.
6. The Textile Institute Advances in Fibre Science by S. K. Mukhopadhya
7. Textile Fibres: Developments & Innovations Vol. 2 by V. K. Kothari

### THIRD YEAR B. TEXT - SEMESTER-II

#### 6.6 TEXTURISING & SPECIALITY YARNS (MMTT)

Lectures	:	4 Hrs / Week
Practicals	:	3 Hrs / Week
Theory Paper	:	100 Marks
Term Work	:	50 Marks
Subject Total	:	150 Marks

#### **TEXTURISING:-**

Draw backs of flat filament yarn, scientific principle in twist texturising, Classification and characteristics of textured yarns.

**Falst Twist Process:-** Introduction, Methods of production of stretched and modified stretched yarns by conventional methods.

**Draw Texturising:** - Draw Texturising, sequential (False twist process) and simultaneous draw texturising, Study of simultaneous draw texturising process.

**Draw Texturising Machine:-** Machine profiles, Twisting devices – Various friction twisting units, Heaters, Cooling devices, Coning oil application, Process variables, machine types and variations – Double density machine and multiple input shaft machine, Defects in draw textured yarns. Quality of draw textured yarns. Technological developments in draw – texturising technology.

**Air Jet Texturising:-** Principle, Air-jet texturising machine, air jets, wetting systems, stabilizing devices, process variables in air texturising, Quality of air textured yarns, blending of filaments in air texturising.

**BCF Processes and Yarns:** - BCF draw texturising machines, process variables. Stuffer box crimping, Knit-de-knit, Gear Crimping, Chemical Texturising.

#### **Blends Spinning:-**

Fibre characteristics and spinnability, fibre properties and end uses, objectives of blending, measures of blending, migration, timing, selection of blend constituents, mechanics of blending, blending techniques, modification of cotton spinning machineries for processing man made fibres.

Common faults in blended and 100% man made spun yarn. Blending of man made fibres with wool. Processing of man made fibres and its blends on Rotor Spinning Machines. Spinning of dyed fibres.

### **Speciality Yarns:-**

Sewing threads – Thread Construction, Thread Production Methods, Characteristics of Sewing threads. Types of thread packages, thread storage and degradation.

### **Ropes, Cordage and Twines:-**

Requirements of fibres and yarns for these products, Manufacturing process, Structure of yarns, properties of these products.

### **Embroidery Yarns & Laces: -**

Process sequence, Manufacturing details, properties and applications.

### **Core / Cover Yarns:-**

Principles of formation of yarns, Constructional details of machine, process description, Production of different types of cover and core yarn, yarn properties and end uses.

### **LIST OF EXPERIMENTS**

- 1) Demonstration of draw texturising machine (Himson HDS-CX<sub>2</sub>).
- 2) Study the effect of various processing parameters of draw texturising (Himson HDS-CX<sub>2</sub>) on Structure properties of textured yarn.
- 3) Demonstration of Himson HJT-1000 Air texturising machine.
- 4) Study the effect of various processing parameters of Air texturising (HJT-1000) on structure properties of textured yarn.

- 5) Study the effect of various processing parameters of high speed Himson draw winder on characteristics of filament yarn.
- 6) Demonstration of Crepe-TFO machine.
- 7) Study the effect of Parameters of crepe-TFO machine on the properties of twisted filament yarns.
- 8) Demonstration of Air covering machine and manufacturing of Air covered yarn.
- 9) Comparison of properties of stretched yarn with modified stretched yarn.
- 10) Production of blended filament yarn using air texturising machine and study the properties of blended filament yarn.
- 11) Visit to the texturising plant.
- 12) Visit to filament yarn twisting unit.

#### **REFERENCE BOOKS**

- 1) Yarn Texturising Technology – J. W. S. Hearls, L. Hollick and D. K. Wilson, Woodhed publishing limited, England.
- 2) Textile Yarns by Goswami.
- 3) False – Twist texturising, Textile Progress.
- 4) Texturising Methods other than False – Twist, Textile process.
- 5) Texturising – IIT, New Delhi Publication.
- 6) Technical Manuals of Monsanto Heberlin.
- 7) Yarn Texturising Technology – Hess & Ursney.