

S.Y.B.TEXT. (FT) SEMESTER-I

SR. NO.	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
		L	T	DR	PR	TP	TW	OE	PE	SUB. TOTAL
3.1	TEXTILE ELECTRONICS-I	3	---	---	2	100	25	---	50	175
3.2	TEXTILE MATHEMATICS-III	3	---	---	---	100	---	---	---	100
3.3	FABRIC STRUCTURE & DESIGN	4	---	---	2	100	50	---	---	150
3.4	BASICS OF APPARAL PRODUCTION PROCESSES	4	---	---	---	100	---	---	---	100
3.5	YARN MANUFACTURE	4	---	---	2	100	25	---	---	125
3.6	FABRIC MANUFACTURE	4	---	---	2	100	50	---	---	150
		22	---	---	8	600	150	---	50	800
L =LECTURES T =TUTORIALS DR=DRAWING PR=PRACTICALS		TP=THEORY PAPER TW=TERM WORK OE=ORAL EXAMINATION PE=PRACTICAL XAMINATION								

SECOND YEAR B.TEXT. – SEMESTER - I

3.1 TEXTILE ELECTRONICS – I (FT)

Lecturers	:	3 hrs/week
Practical	:	2 hrs/week
Theory paper	:	100 marks
Term work	:	25 marks
Practical Exam.	:	50 marks
Subject Total	:	175 marks.

- 1) **Electronics Components** :- Introduction to Electronics, applications of electronics, electronics components, passive components, resistors, colour coding of resistors, variable resistors, capacitors, colour code used for capacitors, variable capacitors, inductors, active components.
- 2) **Semiconductors** :- Semiconductor materials, metals, insulators, semiconductors, intrinsic semiconductor, extrinsic semiconductors, p-n junction diode, junction theory, VI characteristics of p-n junction diode, use of diode in rectifiers, half wave rectifier, full wave rectifiers, performance of rectifiers, filters-shunt capacitor filter, series inductor filter, Π filter, LC filter, zener diode, zener regulator, diode specification.
- 3) **Transistor** :- Junction transistor structure, working of transistor, relation between different currents in a transistor, transistor amplifying action, transistor configurations, transistor characteristics (More emphasis CE configuration). Basic CE amplifier transistor data sheet, transistor testing.
- 4) **Feedback in Amplifier & Op-Amp.** :- Concept of feedback in amplifier, Types of feedback, voltage gain of a feedback amplifier advantages of negative feedback. Amplifier circuit with negative feedback.
Op-Amp :- Introduction, block diagram, symbol, ideal op-amp, open loop, op-amp configuration, op-amp with negative feedback, IC741-pinout & specifications. Applications.
- 5) **Power Semiconductor Devices and Applications** :- SCR construction, Principle of operation, two transistor analogy, turning ON & OFF of SCR, SCR characteristics.
Triac.-Construction, working & characteristics. Diac- construction, working & characteristics. UJT - Construction, working & characteristics. UJT as

Relaxation Oscillator. Application of SCR – SCR Converter, SCR in DC Motor speed control. Triac in AC power control.

6) Optoelectronic Devices :- Classification of optoelectronic devices, emitters, sensors, optocouplers, LED, photodiode, phototransistor, LDR, photo voltaic cell, application of optoelectronic devices in textile.

7) Transducers :- Transducer classification – Primary transducers, secondary transducers, electrical transducers active & passive transducers, analog & digital transducers, advantages of electrical transducer, Basic Requirements of a transducer.

Primary Transducers for pressure measurement – Diaphragm bourdon tube, Bellows.

Temperature Transducers – Resistance temperature Detector (RTD), Thermocouple thermisters.

Strain Measurement – Introduction, factor affecting strain measurement, types of strain gauge. Theory of operation of resistance strain gauge, types of electrical strain gauge, properties of strain gauge, materials for strain gauges, gauging techniques, applications. Variable inductance type transducers, linear variable differential transformers (LVDT), capacitive transducers, Piezo electric transducers.

Note : - Emphasis should be given on applications of above transducers in textile industry.

8. Electromechanical Devices:- Electromagnetic relay, Reed relay, Solenoid valve, Limit switches, Electromagnetic clutches.

LIST OF EXPERIMENTS

- 1) Forward & reverse bias characteristics of diode.
- 2) Full wave rectifier (with & without filter).
- 3) I/O characteristics of transistor in CE configuration.
- 4) Op-amp inverting & non-inverting amplifier.
- 5) UJT characteristics.
- 6) Study of AC power control using triac.
- 7) LDR characteristics.

- 8) Speed measurement using optical & magnetic pickups.
- 9) Study of RTD and thermister characteristics.
- 10) Study of strain gauge characteristics.
- 11) Study of LVDT characteristics.
- 12) Study of inductive & capacitive pickup.
- 13) Study of SCR characteristics.

REFERENCE BOOKS

1. Basic Electronics & Linear Circuits by N.N. Bhargava, D.C. Kulshreshtha TMH Pub.
2. Electronic Devices and Circuits by Allen Mottershade, PHI Pub.
3. Modern Industrial Electronics by T.J. Maloney. Fourth Edition, Prentice Hall Pub.
4. Electrical & Electronics Measurements & Instrumentation by A.K. Sawhey, Dhanpat Ria & Sons Pub.
5. Instrumentation Devices & Systems by C.S. Rangan, G.R. Sharma, TMH Pub.
6. Electronics Components & Materials by Madhuri Joshi
7. Op-amp & Linear Integrated Circuits by Ramakant Gaykwad.
8. Thyristor & their Applications by Ramamurthi.

SECOND YEAR B.TEXT. – SEMESTER - I

3.2 TEXTILE MATHEMATICS-III (FT)

Lectures : 3 hrs/week

Theory Paper: 100 marks.

Subject Total : 100 marks.

1) Differential equations of first order & first degree :

Method of Solution :-

Variable, separable, homogeneous, non homogeneous, exact, non exact, linear and non linear differential equations.

2) Linear differential equations of n^{th} order with constant coefficients :-

Solution $y = C.F. + P.I$

Methods to find C.F. and P.I.

Homogeneous linear differential equations with constant coefficients.

3) Analytical solid geometry :-

Introduction to three dimensional co-ordinate system & sphere.

4) Surfaces & Curves in the Space :-

Tangent plane, Normal line to the surfaces in the space, Normal plane, Osculating plane, Principal normal & binormal.

5) Testing of hypothesis :-

Introduction, Hypothesis, Statistic, Critical Region, Errors in testing, Level of Significance.

6) Large sample tests :-

Test for population mean, equality of population means population proportion & equality of population proportions.

7) Small sample tests :-

Test for population mean, equality of population means, population variance, equality of population variance. Test for goodness of fit and independence of attributes. Test for significance of population correlation co-efficient.

8) Estimation :-

Point Estimation, types, unbiased estimators of population mean and variance. Interval Estimation, Confidence Interval for population mean based on normal and 't' and χ^2 distributions,

9) Statistical quality Control :-

Process Control : Control charts, X-chart, R-chart, C-chart, np-chart, P-chart.

Lot Control : AQL, LTPD, AOQ, AOQL, O.C. Curve, Single and Double sampling plans.

REFERENCE BOOKS

1. A Text Book of Applied Mathematics : by J.N. & P.N. Watarikar.
2. Higher Engineering Mathematics by B.S. Grewal.
3. A Text Book on Engineering Mathematics by Bali, Saxena & Iyengar.
4. Mathematical Statistics by J.Fruend.
5. Applied Statistics & Probability of Engineers by Montgomeri & Runger
6. Probability & Statistics for Engineers by Johnson.

SECOND YEAR B.TEXT. – SEMESTER - I

3.3 FABRIC STRUCTURE & DESIGN (FT)

Lectures	-	4 hrs/week
Practicals	-	2hrs/week
Theory paper	-	100 marks
Term work	-	50 marks
Subject total	-	150 marks

- 1) Bedford cords: plain faced – twill faced. Wadded – modifications. Welt piques: wadded piques – Loose back and fast back welts and piques, waved pique. Simple spot designs, Spot figuring – arrangement of figuring for dobby and jacquard.
- 2) Color theory: light and pigment theory – modification of color – color combination – application of colors – color and weave effects. Stripe & check weave combination.
- 3) Extra warp and extra weft figuring. Extra warp and extra weft figuring with two colors.
- 4) Backed fabrics: Warp and weft back, wadded backed fabric.
- 5) Warp pile produced by – terry weaves, Face to face weaving, wire insertion methods, carpet structure. Weft pile: plain back – twill back velveteen, corduroy, Weft plush, Length, density and fastness of pile.
- 6) Double cloth: Object, Classification: - self stitched – face to back – back to face – Combination face to back and back to face stitched double cloth. Wadded double cloth – weft and warp Wadded double cloth – Center Warp & Weft Stitched double cloth. Interchanging double cloths, multilayer fabrics, open to double & triple width & tubular fabrics.
- 7) Gauze & Leno: Principles, basic sheds, leno with flat steel douts And slotted douts, point draft or counter leno, simultaneous top & bottom douting, application of slotted douts, easing and shaker motion concept, working and construction.
- 8) Fabric engineering: fabric classification as per structure pierces formula for yarn diameter, cloth cover, cloth geometry of plain & twill fabrics, practical application of cloth geometry and cover factor.

9) Construction and development of jacquard design.

Elements of jacquard shedding-double lift jacquard with single and double cylinder working, jacquard sizes, harness ties ,card cutting and card lacing, harness and design calculation ,casting out ,size of repeat ,count of design paper. Development of jacquard design –construction of square paper designs, process of drafting a sketch design, drafting designs from woven fabrics,

10) Application of CAD in developing fabric structure and design.

LIST OF EXPERIMENTS:

- 1) Fabric analysis: Bedford cords pique.
- 2) Fabric analysis: Extra warp and extra weft
- 3) Fabric analysis: color and weave effects. Stripe & check weave.
- 4) Fabric analysis: Warp and weft back
- 5) Fabric analysis: Pile fabrics
- 6) Fabric analysis: double cloth
- 7) Fabric analysis: Leno fabric.
- 8) Sample weaving of Bedford cloth
- 9) Sample weaving of extra weft
- 10) Sample weaving of double cloth
- 11) Sample weaving of terry pile fabric
- 12) Sample weaving of stripe & check fabric.

REFERENCE BOOKS

1. Grosicki Z., “Watson’s Textile Design & Color: Elementary weaves & Figure”, Blackwell Science, Commerce place.
2. Grosicki Z., “Advanced Textile Design & Colour:”, Blackwell Science, Commerce place.
3. H.Nisbet, “Grammar of textile Design”, Tarporevala sons & Co. Pvt. Ltd.,
4. W.S. Murphy, “Textile weaving & Design”, Abhishek Publications.
5. Marks & robinson, “ woven cloth construction”
6. J.E. Booth,” Textile mathematics- vol-I & II”

SECOND YEAR B.TEXT. – SEMESTER - I

3.4 BASICS OF APPAREL PRODUCTION PROCESSES (FT)

Lectures	-	4 hrs/week
Theory paper	-	100 marks
Subject total	-	100 marks

1) Apparel Production:

- a) Cutting room: Importance of cutting, production processes in cutting room, planning, spreading, cutting, preparation for sewing
- b) Fusing: purpose, fusing process, fusing machinery.
- c) Sewing room: stitches, seams, feed systems, sewing threads, sewing needles, machinery and equipments.
- d) Accessories in apparels: buttons, zips, underlining, waddings, labels and ornamental materials
- e) Pressing technology: object, classifications, means, components, machinery and equipments, handling systems and boiler room
- f) Garment finishing and inspection: attaching buttons, marking , cleaning, final touch , fitting quality, viewing of garments and quality standards.

2) Production technology: Manual systems, making through, section systems, progressive bundle systems, straight line systems, mechanical transport systems, selective conveyor belt systems, unit production systems, quick response sewing systems.

3) Ware housing: Handling equipments, storage equipments, packing equipments.

4) Introduction to cad/ cam in garment manufacturing.

REFERENCE BOOKS

- 1) Garment technology for fashion designers by Gerry Cooklin.
- 2) Introduction to clothing manufacturing by Gerry Cooklin.
- 3) Clothing construction and wardrobe planning by Dora S. Lewin, Mabel Goode Bowers, Manetta Knttunen- The Macmillan Co New York
- 4) Garment technology by Dr. V. Subramanian – winter school booklets1990
- 5) BIS publications 1989.

SECOND YEAR B.TEXT. – SEMESTER - I

3.5 YARN MANUFACTURE (FT)

Lectures	-	4 hrs/week
Practicals	-	2hrs/week
Theory paper	-	100 marks
Term work	-	25 marks
Subject total	-	125 marks

1. Cultivation, harvesting & ginning.
2. Blowroom : Types and composition of trash in cotton, their origin and their effect on processing performance & yarn quality. Objects of mixing and blowroom. Machines used for opening & cleaning. Chute feed system, calculation of production, waste.
3. Carding:- Objects, basic actions in carding, constructional details, calculation of production, draft and waste.
4. Drawing:- Objects, Concepts of drafting & doubling, principles of roller drafting systems. Calculations of drafts & production, roller setting.
5. Combing:- Objects, Characteristics of good lap, Machines sequences used for comber preparatory, Study of principles & operation. Calculation of drafts, production & noils. Type of combing.
6. Speed Frame:- Objects, principles of working of speed frame, drafting, twisting & winding, driving arrangement, calculation of draft, twist & production.
7. Ring Frame:- Objects, description of machine, drafting, twisting & winding, brief study of spindles, ring & travelers, driving arrangements, calculation of draft, twist & production.

LIST OF EXPERIMENTS

1. Study of passage of material through blow room machines, bale openers, mild opener, mixing machine, intensive opener, lap formation system, cute feed system.
2. Driving arrangement & calculation of Carding machine.
3. Driving arrangement & calculation of draw Frame
4. Driving arrangement & calculation of sliver lap machine.
5. Driving arrangement & calculation of ribbon lap machine.
6. Driving arrangement & calculation of comber machine.
7. Driving arrangement & calculation of speed frame.
8. Driving arrangement & calculation of ring frame.
9. Spinning of carded yarn.
10. Spinning of combed yarn.
11. Comparison Carded and Combed yarn properties.
12. Mill visit.

REFERENCE BOOKS

1. 'The Technology of Short Staple Spinning' by W.Klein. The Textile Institute Publication - Short Staple Spinning Series Vol.1.
2. 'A Practical Guide to Opening and Carding' by W. Klein. The Textile Institute Publication - Short Staple Spinning Series Vol.2.
3. 'The Characteristics of Raw Cotton' by E. Lord. The Textile Institute Publication Manual of Cotton Spinning Vol.II, Part-I.
4. 'Opening Cleaning and Picking' by Dr.Zoltan S. Szaloki, Institute of Textile Technology, Virginia.
5. 'Cotton Opening and Picking' by G.R. Merril.
6. 'Blowroom' by BTRA, Sliver Jubilee Monograph series.
7. 'Cotton Ginning' Textile Progress, The Textile Institute Publication.
8. CIRCOT Annual Issue on Cotton Varieties.
9. The technology of short staple spinning - The Textile Institute publication short staple spinning series Vol-I - W. Klein.
10. The practical guide to opening & Carding. The Textile Institute publication short staple spinning series Vol-II - W. Klein.

11. The Practical guide to combing & drafting The Textile Institute publication short staple spinning series Vol-III - W. Klein.
12. Carding by F. Charanlay. The Textile Institute publication Manual of cotton spinning series Vol-III.
13. Drawing, Combing and Roving by Zoltan. S. Szalola The Institute of Textile Technology Virginia.
14. Cotton Drawing & Roving by G.R. Merrill.
15. Elements of cotton spinning calculations by Dr. H.V.S. Murthy.
16. A Practical guide to Ring Spinning by Vol.-IV by W.Klein, The Textile Institute, Manual of Textile Technology – Short Staple Spinning Series.
17. Carding, draw frame by Prof. A. R. Khare.
18. Ring frame & doubling by Prof. A. R. Khare.

SECOND YEAR B.TEXT. – SEMESTER - I

3.6 FABRIC MANUFACTURE (FT)

Lectures	-	4 hrs/week
Practicals	-	2hrs/week
Theory paper	-	100 marks
Term work	-	50 marks
Subject total	-	150 marks

1) Winding:

Constructional details and features of modern winding machines (Autoconer 238,338, Savio, Espero and Orion, Murata 11c & 7V).

2) Warping:

Need, objectives, classification, machine construction and working, Creel, principles of operation of beam & sectional warping, Headstock, and calculations for production and efficiency.

Features of modern warping machine (Benninger, West point, Sucker-Muller, Tsdakoma and Karl Mayer)

3) Sizing-

Need, size ingredients, sizing process, size cooking, sizing machine- various zones and their functions, various drying systems, headstock, moisture and stretch importance. Calculations for production & efficiency.

Features of modern sizing machine (Benninger, West point, Sucker-Muller, Tsdakoma)

4) Basic concepts and working principles of Dobby looms, Drop box Looms, Jacquard looms – dobby pegging and Card cutting.

5) Automatic weaving

Limitations of ordinary looms, design features of automatic loom, weft feelers, cop changing and shuttle changing mechanism, automatic let off motion, Warp stop motion, centre weft fork motion, operator assisting motion, autoloom fabric defects, causes and remedies.

6) Non-Woven fabrics - Types – different methods of production of non woven – needle punched, chemical & thermal bonded - application of non woven fabrics.

LIST OF PRACTICALS

- 1) To study the working of modern automatic winding machine.
- 2) To study & operate the sectional warping machines to make the beam.
- 3) To study the working of T-lever dobby loom.
- 4) To study the working of cam dobby loom.
- 5) To study the working of jacquard loom.
- 6) To study the working of drop box loom
- 7) To study the working of cop changing automatic loom
- 8) To study the working of shuttle changing automatic loom
- 9) To study the warp stop motions, centre weft fork motion and operator assisting motion of a automatic loom.
- 10) Visit to modern winding unit.
- 11) Visit to modern warping and sizing unit.
- 12) Visit to auto loom and jacquard unit.

REFERENCE BOOKS

- 1) Principles of Weaving By Marks A.T.C. & Robinson.
- 2) Weaving machines, Materials & methods By Prof. M.K. Talukdar , Prof. D.B. Ajgaonkar and sriramlu.
- 3) Modern Preparation & weaving Machines by A. Ormerod.
- 4) Weaving mechanism by N.N. Bannerjee.
- 5) Sizing by Prof.D.B. Ajgaonkar, Dr. M.K. Talukdar & V.R. Wadekar
- 6) Warp Sizing by Paul V. Seydel.
- 7) Warping and Sizing – BTRA Silver Jubilee Monograph series.
- 8) Winding & Warping by Dr. M.K. Talukdar.
- 9) Non-wovens by N.N. Bannerjee.
- 10) Manual of non Wovens by Dr. Radko Krma.
- 11) Non Woven Bonded Fabric by Lunenscholoss

S.Y.B.TEXT. (FT) SEMESTER-II

SR. NO.	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
		L	T	DR	PR	TP	TW	OE	PE	SUB. TOTAL
4.1	THERMAL & AIR ENGINEERING	3	---	---	---	100	---	---	---	100
4.2	TEXTILE MATHEMATICS-IV	3	---	---	---	100	---	---	---	100
4.3	TEXTILE WET PROCESSING	4	---	---	2	100	25	---	---	125
4.4	PATTERN MAKING & GARMENT CONSTRUCTION	4	---	---	2	100	25	---	50	175
4.5	YARNS FOR FASHION APPLICATIONS	3	---	---	2	100	25	---	50	175
4.6	FABRICS FOR FASHION APPLICATIONS	3	---	---	2	100	25	---	50	175
4.7	TEXTILE DESIGN & COLOUR ORNAMENTATION	---	---	2	---	---	50	---	---	50
		20	---	2	8	600	150	---	150	900
L =LECTURES T =TUTORIALS DR=DRAWING PR=PRACTICALS		TP=THEORY PAPER TW=TERM WORK OE=ORAL EXAMINATION PE=PRACTICAL XAMINATION								

SECOND YEAR B.TEXT. – SEMESTER - II

4.1 THERMAL & AIR ENGINEERING (FT)

Lectures	:	3 hrs/week
Theory Paper	:	100 marks
Subject Total	:	100 marks

1. Introduction – Laws of Thermodynamics – Zeroth Law, First Law, Second law of Thermodynamics. Thermodynamic Process – constant volume, constant pressure, constant temperature, adiabatic, polytropic & throttling process with P-V & T- ϕ diagrams and numericals..
2. Air Standard Cycle – Introduction, Assumptions in thermodynamic cycles, Important terms used in thermodynamic cycles, efficiency of a cycle, Carnot cycle, Otto cycle, Diesel cycle, Dual combustion cycle on P-V and T- ϕ diagram and numericals.
3. Properties of Steam – Formation of steam at constant pressure – Enthalpy, Enthalpy of water, Enthalpy of evaporation, Enthalpy of dry saturated steam, Wet steam, Superheated steam, Specific volume of steam, Steam table, External work done during evaporation, Internal energy of steam, difference between Gas & Vapour. Measurement of dryness fraction – Throttling calorimeter, separating calorimeter, combined separating & throttling calorimeter, Use of steam in textiles – Sizing, Wet processing and numericals based on properties of steam & calorimeters.
4. Steam Boilers – Introduction, Classification of boilers, Study & construction of fire tube boilers such as Cochran boiler, Study & construction of water tube boiler such as Babcock & Wilcox boiler, equivalent evaporation, efficiency of boiler & numericals.
5. Study of boiler mountings & accessories – Safety valve – Dead weight safety valve, Lever safety valve, Spring loaded safety valve, Combined high pressure steam & low water safety valves, Water level indicator, Fusible plug, Steam pressure gauge, Feed check valve, Stop valve, Blow off cock, Accessories – Feed water pump, Injector, Economizer, Superheater.

6. Thermic Fluid Heating System – Introduction, Thermic heating system, Expansion & Deviation, Selection of Tanks, Requirements of Fluids, Deterioration of fluid, Consequences, Cleaning of the system.

7. Refrigeration – Units of refrigeration, C.O.P., Difference between heat engine, Refrigerator, heat pump. Air refrigerator working on reversed Carnot cycle on P-V & T- ϕ diagram, expression for C.O.P.

8. Air Conditioning – Introduction to air conditioning, psychrometric terms, Dalton's law of partial pressure, Psychrometric relations, Enthalpy of moist air, Thermodynamic wet bulb temperature, Psychrometric chart, Psychrometric processes, - Sensible heating & cooling, bypass factor of heating & cooling coil, Humidification & dehumidification, methods of humidification in textile industry, methods of dehumidification, sensible heat factor, cooling & dehumidification, cooling with adiabatic humidification by steam injection, Adiabatic chemical dehumidification, Adiabatic mixing of two air streams, Object of a/c & proper humidification in textile mills, Effect of moisture on textile fibres, Sling psychrometer, Humidistat.

9. Compressor – Classification, Reciprocating, Rotary vane compressor, Liquid ring compressor, Twin lobe compressor, Screw compressor, Centrifugal compressor, Axial flow compressor. Pumps – Reciprocating, Centrifugal & Radial (working and principle only).

10. Pneumatics –

(a) Pneumatic Circuits – Symbols of cylinder, control valves, check valves.

(b) Air treatment – Air filter and its symbol, Refrigerated dryer, Lubricators.

(c) Control valves – Poppet valve, Pilot operated check valve and spool valve.
Symbol of every valve,

(d) Loop system in piping lay out, Pressure drop in pneumatic line.

(e) Examples of pneumatic circuits.

REFERENCE BOOKS

1. Elements of Heat Engines (Vol. I & II) by Patel, Karamchandani.
2. Refrigeration & Air conditioning by Arora & Domkundwar
3. Pneumatic Systems by Majumdar
4. Hydraulics & Pneumatics by Andrew & Parr
5. Hydraulic machines by Banga, Sharma.
6. Heat Transfer by S.P. Sukhatame.

SECOND YEAR B.TEXT. – SEMESTER - II

4.2 TEXTILE MATHEMATICS-IV (FT)

Lectures	:	3 hrs/week
Theory Paper	:	100 marks.
Subject Total	:	100 marks.

1. Laplace Transforms :-

Definition, transforms of standard functions, transforms of derivatives, integrals and periodic functions. Inverse Laplace transforms by partial fraction and convolution method.

2. Vector differentiation :-

Differentiation of vector valued function of scalar 't', gradient, divergence, curl, directional derivative. Solenoidal and irrotational vector fields.

3. Vector Integration :

Line, surface & volume integrals, Stoke's and Green's and Guass divergence theorem (without proof) and examples.

4. Projectiles :-

Motion of a body thrown horizontally in the air. Motion of a projectile, equation of path of projectile, Time of flight of a projectile on a horizontal plane, Horizontal range of a projectile velocity and direction of motion of projectile, Time of flight of a projectile on a inclined plane.

5. Analysis of Multivariate Data :-

Multiple and Partial correlation coefficients. Plane of regressions.

6. Analysis of Variances :-

Introduction, One-way Classification, Two-way Classification with and without repetition.

7. Design of Experiments :-

Introduction, Basic principles, Basic Designs (CRD, RBD & LSD).

8. Factorial Experiments :-

Introduction & types, 2^n factorial experiments, 2^2 & 2^3 factorial experiments.

REFERENCE BOOKS

1. A Text Book of Applied Mathematics : by J.N. & P.N. Wattikar.
2. Higher Engineering Mathematics : by B.S. Grewal.
3. A Text Book on Engineering Mathematics :by Bali, Saxena & Iyengar.
4. Mathematical Statistics : by J.Fruend.
5. Applied Statistics & Probability of Engineers : by Montgomeri & Runger
6. Probability & Statistics for Engineers : by Johnson.
7. Design and Analysis of Experiments : by Montgomeri.
8. A Text Book of Engineering Mechanics : by R.S. Kurmi.

SECOND YEAR B.TEXT. – SEMESTER - II

4.3 TEXTILE WET PROCESSING (FT)

Lectures	-	4 hrs/week
Practicals	-	2hrs/week
Theory paper	-	100 marks
Term work	-	25 marks
Subject total	-	125 marks

- 1) Introduction to sizing, object of sizing, different sizes for different fibres, size paste ingredients.
- 2) Introduction of pretreatments in wet processing. Importance of grey inspection. Introduction to shearing & cropping machines.
- 3) Object of singeing. Gas singeing for woven and knitted fabrics.
- 4) Object of desizing, Hydrolytic and oxidative methods of desizing.
- 5) Object of scouring, scouring with alkali and solvents. Batch and continuous methods for scouring.
- 6) Bleaching with hypo-chlorites and hydrogen peroxide for cotton, polyester and their blends.
- 7) Batchwise and continuous machines for bleaching.
- 8) Bleaching of wool, silk nylon and acrylic.
- 9) Evaluation of bleaching efficiency.
- 10) Object of mercerization, Changes brought about by Mercerization. Mercerization machines used for yarn, woven and knit fabrics. Study to hot mercerization, liquid ammonia mercerization. Testing methods of evaluate the efficiency of mercerization.
- 11) 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.
- 12) Dyeing of cellulosic fibres with direct, vat, reactive and sulphur dyes.
- 13) Dyeing of Polyester & its blends like polyester-cotton, polyester-viscose, polyester-wool.
- 14) Dyeing of silk, wool, acrylic, & nylon.

- 15) Evaluation of fastness properties like Wash Fastness, Rubbing Fastness, Light Fastness and Perspiration fastness.
- 16) Introduction to package dyeing machine. Jigger dyeing machine, winch dyeing machine, padding mangle, jet dyeing & soft flow dyeing machine.
- 17) Various ingredients used in preparation of printing paste.
- 18) Various styles of printing such as direct, resist and discharge by using direct, reactive and disperse dyes.
- 19) Printing with pigments.
- 20) Introduction to various methods of printing such as Table, Flat bed printing for woven and Garments and Rotary printing machine.
- 21) Concept of inkjet / digital printing.

LIST OF EXPERIMENTS

- 1) Pretreatment of cotton fabric.
- 2) Pretreatment of polyester fabric.
- 3) Pretreatment of polyester / cotton blended fabric.
- 4) Pretreatment of 100% cotton knit fabrics.
- 5) Determination of mercerization efficiency by BAN method.
- 6) Determination of whiteness, Yellowness of bleached fabric by CCM.
- 7) Dyeing of cotton fabric with direct, vat, reactive, and sulphur dyes.
Dyeing of 100% polyester with disperse dyes.
- 8) Dyeing of polyester-cotton blended fabrics.
- 9) Printing of cotton with pigments.
- 10) Direct style of printing of cotton with reactive dyes.
- 11) Discharge style of printing of cotton with reactive dyes.
- 12) Printing of cotton with reactive dyes for direct and discharge style.
- 13) Identification of fibres.
- 14) Assessment of light, wash, rubbing, perspiration, sublimation and chlorine fastness.
- 15) Application of computer colour matching system in assessment of colour difference.
- 16) Visit to processing house.

REFERENCE BOOKS

1. Sizing by Prof.D.B. Ajgaonkar, M.K. Talukdar & V.R. Wadekar.
2. Chemical technology of fibrous materials by F. Sadov.
3. Chemical Processing of Polyester/Cellulosic blends by R.M.Mittal & S.S. Trivedi.
4. Chemical processing of synthetic & blends by K.V. Datye & A.A. Vaidya.
5. Mercerizing by J.T. Marsh.
6. Introduction to Textile bleaching by J.T. Marsh.
7. Bleaching, Dyeing & Chemical Technology of textile fibres by S.R. Trotman.
8. Technology of Bleaching by V.A. Shenai.
9. Dyeing Of Polyester & Its Blends by M.L. Gulrajani.
10. Dyeing Of Chemical Technology Of Textile Fibres by E.R. Trotman.
11. Technology Of Dyeing by V.A. Shenai.
12. Textile Printing by L.W.C. Miles.
13. Technology Of Printing by V.A. Shenai.
14. An Introduction To Textile Printing by W. Clarke.
15. Textile Finishing by A.J. Hall.
16. Introduction To Textile Finishing by J.T. Marsh
17. Technology of Finishing by V.A. Shenai.

SECOND YEAR B.TEXT. – SEMESTER - II

4.4 PATTERN MAKING AND GARMENT CONSTRUCTION (FT)

Lectures	-	4 hrs/week
Practicals	-	2hrs/week
Theory paper	-	100 marks
Term work	-	25 marks
Practical exam	-	50 marks
Subject total	-	175 marks

1) BASIC PATTERN MAKING:

Measurement Taking – Size chart and Measuring of Sizes. Definition of various garments parts & positions. Methods: Bespoke method & Industrial method (Using Blocks) – Basic block construction – Block preparation & correction.

2) DRAFTING:

Basic principles & methodologies used to draft standard size block patterns for men, women & kids wear viz, shirts, pants, skirts, blouses, jackets, dresses etc.

3) DRAFTING OF SLEEVE & COLLAR:

Construction of sleeve block – crown height and its relationship with the fit of garment. Introduction to silhouettes of sleeves. Sleeve variation – cap, regular shirt sleeve, Bishop, Leg's o mutton, Puff sleeve. Cuffs & sleeves opening sleeve plackets. Collars: Set-in collars and collar variations – band collars, peter Pan, sailor, gent's shirt collar – One piece and two piece collars, convertible collar.

4) DART MANIPULATION:

Pattern making by manipulation of dart – and advance dart manipulation. Manipulation as seen through existing suppressions points (Bust points), away from suppression points, as gathers or tucks, as multiple darts. Methods: Slash & Spread, Pivot, difference between permanent pattern (Draft) Working patterns & Production patterns. Importance of drill hole marks in the darts; seam allowances and its importance Importance of notches: Balances marks & grain lines.

5) Grading:

Principles of Grading – Master and Basic Grades – Basic Back Grades, Basic Front Grading, Basic Sleeve Grading, Basic Collar Grading, Basic Facing Grading. Trousers Grading, Jacket Grading, Shirt Grading, Grading Men's Waist Coat – Size

Chart. Displacement of Bust Dart to Waist line – Side seam, arm hole – Neck arc Front edge, Women's Sizing Chart, Selecting a Grading System, Multi Track Grading. A Simplified System.

6) Basic Sewing Techniques:

Seams: Definition, Types of seams, seam quality, seam performance, factors to be considered in the selection of seam, seam finishes, seam defects. Stitches: Definition, stitch classes, stitch parameters, factors to be considered in the selection of stitches. Stitching defects. Sewing Thread: Types, construction, sewing thread quality, selection of sewing thread.

7) Sleeves:

Types of sleeves, plain, puffs, gathered, bell, bishop, circular, leg-o-mutton, Magyar sleeves dolman, kimono. Method of application. Mounting of sleeve – one piece, two pieces. Collars: Classification – full, flat, roll, partial roll, puritan collar, sailor collar, square collar, rippled collar, scalloped collar, mandarin, convertible, tie, shawl reverse and notch collar.

8) Yokes:

Definition – Selection of yoke design, different styles of yoke. Simple yoke – yokes with or without fullness – midriff yokes, methods of attaching yokes. Fullness: Definition types, Darts – single, double, pointed darts, tucks, pin tucks, cross tucks, piped tucks, shell tucks, pleats, knife pleats, box pleats, invertible box pleats, kick pleats, flare, godets, gathers, shirring, single or double frills. Ruffles. Hemming Techniques: Definition, factors to be considered in the selection of hems, types of machine stitched hem, hand stitched hem.

9) Plackets:

Types, regular, top stitched with edge stitch, top stitched with one leg of pressure foot distance, concealed plackets, kurta plackets. Sleeve packet: faced placket, continuous bound placket and diamond placket. Pockets: Types – patch pocket, patch with lining / flap, front hip, set-in seam, slash pocket with flap-single lip, double lip. Waist Band: One piece, two piece and tailor waist band, elastic applied. Cuffs: Types, square shape, round shape.

10) Introduction and construction techniques of garment closures:

Application of zippers-fly, kissing lap, button & button holes, hooks, and eye snaps. Velcro, eyelets, cords. Basic standard of professional sewing. Relationship between pattern making and ultimate quality of finished sample, steps in the construction of sample, planning a logical garment construction sequence, planning a layout, analysis of component pieces and trimmings, economic use of fabric yardage, time effective sewing techniques.

LIST OF PRACTICALS

1. - Taking measurements directly from body
 - Locating land marks and taking anthropometrics measurements
 - Taking measurements from the garments
2. Practice on use of:
 - Squares and scales
 - French curve – for arm hole, necklines etc.
 - Practice on use of other equipment
3. Drafting of:
 - Child's panty
 - Bloomer
 - Child's bodice block and sleeve block
 - Child's skirt block
4. Developing pattern for Children's wear
 - i. Baba suit
 - ii. Rompers
 - iii. Round neck T-Shirt
 - iv. Baby frock
5. Developing pattern for Ladies wear
 - i. Salwar Kameez
 - ii. Blouses
 - iii. Skirt & Top
 - iv. Brassier & Panties
 - v. Nighty
6. Developing Pattern for Men's Wear
 - i. Men's Shorts

- ii. Men's Formal Shirt
- iii. Men's Formal Trousers
- iv. Jeans

7. Prepare samples for basic Hand stitches, seams, darts & pleats.
8. Preparing samples for plackets – continuous bound placket, 2 piece placket, tailors placket, Fly opening & Zipper.
9. Preparing samples for Necklines – Bias facing, Bias Binding & Fitted facing.
10. Preparing samples for collars – Peter Pan collar, Full shirt collar, Shawl collar.
11. Preparing samples for pockets – patch pocket, bound pocket & front hip pocket.
12. Preparing samples for Sleeves – Plain, Puff, Raglan, Kimono.

Note: The students may be taken to the nearby manufacturing organizations to demonstrate various pattern making and style interpretation processes

REFERENCE BOOKS

1. Gerry Cooklin "Introduction to Clothing Manufacture", Blackwell Scientific Publications SP
2. Gerry Cooklin "Master Patterns & Grading for Women's Outsize", Blackwell Scientific Publications (1995) ISBN: 0 – 632- 03915 – 9.
3. Gerry Cooklin "Master Patterns & Grading for Men's Outsize", Blackwell Scientific Publications 1992.
4. Gillian Holman - Pattern Cutting Made Easy, Blackwell Scientific Publications 1997. ISBN: 0- 7134 – 8093- 9.
5. Natalie Bray "More Dress Pattern Designing" Blackwell Scientific Publications 1986 ISBN: 0- 632-01883- 6.
6. Cooklin Gerry, "Garment Technology for Fashion Designers", Blackwell Science Ltd., 1997.
7. Claire Shaeffer, "Sewing for apparel Industry", Prentice Hall, 2000.
8. Leila Aitken, "Step by step dress making course", BBC Books, 1992.

SECOND YEAR B.TEXT. - SEMESTER - II

4.5 YARNS FOR FASHION APPLICATION (FT)

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

Classification of different types of yarns.

1) Rotor Yarns

Basic principles and working of Rotor Spinning, yarn production, Properties & end uses.

2) Yarns produced on unconventional spinning system

Manufacture, Properties & end uses of the special / fascinated yarns produced on unconventional spinning techniques, such as Air-jet, Friction, Cover, Siro, Bobtex, Selftwist, Twistless, etc. Concepts of composite yarns

3) Blended Yarns

Objects of blending of different fibres, concept of blend spinning. Properties & application of blended yarns.

4) Filament Yarns

Manufacture of man-made filament yarns, their properties, end uses. Manufacture of Textured yarns.

5) Hosiery Yarns

Requirement of hosiery yarn. Raw material for hosiery yarn, Process sequence & Process parameters to make hosiery yarn from Cotton, Polyester, viscose & their blends. Properties and end use applications of hosiery yarns.

6) Dyed, Mercerised & Melange Yarns

Requirement of dyed yarns, Types of dyed yarns, Necessity of mercerization of yarn, Concepts of producing mélange yarn, Process sequence & machine required for production of above yarns. Yarn properties & applications.

7) Fancy yarns

Various types of fancy yarns, Manufacturing techniques, end uses, yarn properties & structure of fancy yarns.

8) Elastane Yarns

End uses, spinning of lycra yarns on ring spinning & air covering machine, necessary modification on machine, process parameters, production, yarn properties.

9) Sewing Threads

Introduction of Thread construction, Characteristics of sewing threads, Thread productional methods, Types of thread package, Thread storage & degradation.

LIST OF EXPERIMENTS

- 1) General study & passage of yarn through hallow spindle doubler.
- 2) Study of passage of material through crepe TFO.
- 3) Study of passage of material through air covering machine.
- 4) Study of passage of material through air jet texturising , draw texturising & draw winder.
- 5) Manufacturing of fancy yarns on hallow spindle winder by changing machine parameters.
- 6) Manufacturing of elastic yarn by different techniques such as air covering etc...
- 7) Manufacturing slub yarn & special yarn for garment application through slub motion.
- 8) Producing crepe yarn by changing machine parameters of crepe TFO.
- 9) Fancy yarn manufacturing by air jet texturising by changing machine parameters.
- 10) Manufacturing special yarns through different texturising machines.
- 11) Mill visit.
- 12) Mill visit.

REFERENCE BOOKS :-

- 1) 'Sewing Threads' Textile progress vol.30 no.3/4, by J.O. Ukponmwan, The Textile Inst. Publisher.
- 2) 'Modern Yarns for Modern Fabrics Seminar' Conference proceedings. By TTI, The Textile Inst. Publisher.
- 3) 'Yarn Dyeing 98' Tech. For a Changing Industry' By AATCC, American Asst. of Textile Chem. Colorists Publisher.
- 4) 'Worsted Spinning' Textile Progress, Vol.11, No.2 by DE Henshw, The Textile Inst. Publisher.
- 5) The production of textured yarns by the false – twist technique' Textile progress vol.21 no.3, By D K. Wilson and T. Kollu, The Textile Inst. Publisher.
- 6) Woollen – Yarn manufacture' Textile progress, vol.15, no.1/2 by D.A. ROSS, The Textile Inst. Publisher.
- 7) 'The production of textured yarn by methods other than the false – twist technique, The Textile progress vol.16, No.3, By D.K. Wilson and T Kollu, The textile Inst. Publisher.
- 8) 'Progress in Air – Jet Spinning' Textile progress vol.29, No.3, By A Basu, The Textile Inst. Publisher.
- 9) The production of textured yarns by methods other than the false twist technique textile progress, vol.9, no.3 by D.K. Wilson, The Textile Inst. Publisher.
- 10) Yarns & Fabric Classification Main Items in wool and blends, Italtex Editor.
- 11) Textile guide synthesis to create yarns & fabrics, Italtex Editor.
- 12) Fancy yarns by Wood head publications.

SECOND YEAR B.TEXT. – SEMESTER - II

4.6 FABRICS FOR FASHION APPLICATIONS (FT)

Lectures	-	3 hrs/week
Practicals	-	2hrs/week
Theory paper	-	100 marks
Term work	-	25marks
Practical exam	-	50 Marks
Subject Total	-	175 Marks

SHUTTLELESS WEAVING:-

- 1) Limitations of shuttle loom, Classification of shuttleless weaving machines.
- 2) Projectile weaving machine –Projectile picking motion , picking phases, torsion rod details, Projectile preparation for picking, selvedge motion, Receiving unit , Selvedge weaves, Let-off motion (Mechanical & power), Take-up motion, their advantages in relation to shuttle loom motions, specifications of projectiles & grippers for various applications, Multi colour weft insertion, weft stop, warp stop, Fabric defects & remedies.
- 3) Principle of rapier weft insertion through various mechanisms such as single rapier, double rapier, rigid and flexible, biphasic & twin rapiers.
Constructional details of rapier weaving machines:-Rapier heads, weft transfer system rapier drive, Positive and negative rapiers, Sley Reed drive, selvedge formation, Multicolour feeding mechanism, Let off and take-up mechanisms & auxiliary mechanism, Field of application & commercial viability.
- 4) Principle of Air jet weft insertion.
Constructional details of single nozzle, confusor, multinozzle air jet weaving machines. Study of- Relay nozzle weaving machines, Profile reed, Reed beat up, Take up – let off motions, Auxiliary motions, Field of application & commercial viability.
- 5) Weft accumulator, types, constructional design, motors, sensors, controls.

- 6) Water jet weft insertion system, nozzle, picking, water consumption, water requirement, and field of application.
- 7) Principle of multiphase weaving, passage of yarn, ripple shed or wavy shed formation, Beatup, carrier drive, take up, field of application, study of sulzer M 8300 multiphase weaving machines.
- 8) Circular weaving principle, passage of yarn, fabric production, speeds, classification and field of application. Types of yarns used and their specifications.
- 9) Triaxial Weaving : Principles of weaving, shed formation, heddles, beat up, take up of fabric, properties and applications of triaxial fabrics, yarns used and their specifications, field of applications.
- 10) Techno economical rating of different shuttleless technologies, Quick style change (Q.S.C.)
- 11) Weaving of different material on shuttleless weaving like polyester, silk, Acrylic, polypropylene, Nylon and Blends. Sample weaving concept from handloom to Suzuki sample loom.
- 12) Positive cam shedding concept & need , constructional & working of Positive cam shedding motions , positive lever dobby, positive rotary cam concept, Rotary mechanical & electronic control dobby, concept of electronic Jacquard, constructional & working details of electronic Jacquard, adjustment for various weaves, Jacquard capacity, mounting, suitability for various end uses, data transfer & management, Networking with looms.

LIST OF PRACTICALS

1. General study of projectile machine.
2. General study of flexible & rigid Rapier machine
3. General study of air-jet machine.
4. Study of positive cam motions, Rotary mechanical & electronic doobby.
5. Study of electronic jacquard motion.
6. Develop a Dobby Design & prepare a 2D simulation
7. Develop a Jacquard Design & prepare a 2D simulation
8. Develop a Print Design & prepare a 2 D simulation
9. Develop a Dobby design with different weaves
10. Develop a Jacquard design & prepare a card punching for the same.
11. Visit to circular weaving unit
12. Visit to projectile, rapier and airjet weaving unit.

REFERENCE BOOKS

- 1) Modern Preparation & Weaving by A. Ormerod.
- 2) Principles of weaving by Marks & Robinson.
- 3) Weaving machines & methods by Dr. Talukdar, Prof. D.B. Ajgaonkar.
- 4) Shuttleless weaving by Svaty.
- 5) Modern Methods of Weaving by Duxbury
- 6) Shuttleless Weaving by J.J. Vincent.
- 7) Shuttleless weaving NCUTE programme by IIT Delhi.
- 8) Brochures and machine pamphlets of various machine manufacturers

SECOND YEAR B.TEXT. – SEMESTER - II

4.7 TEXTILE DESIGN & COLOUR ORNAMENTATION (FT)

Drawing Practical	-	2 hrs/week
Term work	-	50marks
Subject Total	-	50 Marks

1. Units developments for textile design
2. Colour Modification chart.
3. Light theory of colour chart.
4. Pigment theory of colour chart.
5. Development of colour wheel.
6. Textile design development with the help of designing principles.
7. Achromatic colour harmony.
8. Monochromatic colour harmony
9. Analogous colour harmony
10. Complementary colour harmony.
11. Polychromatic colour harmony.
12. Development of stripes / checks design.
13. Composition of all over textile design by different bases.
14. Computer aided textile design.