

UTTAR PRADESH TECHNICAL UNIVERSITY LUCKNOW



SYLLABUS

Bachelor of Carpet & Textile Technology

2nd Year (III & IV Semester)

Study and Evaluation Scheme:

Year: 2nd, Semester-III

Sr no.	Course code	Subject	Period			Evaluation scheme				Subject total	Credit
			L	T	P	Sessional Exam			ESE		
						CT	TA	Total			
THEORY SUBJECTS											
1	NAS 301/ NOE 031- 038	Engg Mathematics III / science based electives**	3	1	0	30	20	50	100	150	4
2	NCT-301	Fabric Structure	3	1	0	30	20	50	100	150	4
3	NCT-302	Yarn Manufacture I	3	1	0	30	20	50	100	150	4
4	NCT-303	Fabric Manufacture I	3	1	0	30	20	50	100	150	4
5	NHU 301/ NHU 302	Industrial Psychology/ Industrial Sociology	2	0	0	15	10	25	50	75	2
6	NCT- 304	Textile Fibre	2	1	0	15	10	25	50	75	3
	NHU-111	*Human Values & Professional Ethics/ Cyber security	2	0	0	15	10	25	50	75	-
PRACTICAL/ DESIGN/ DRAWING											
7	NCT-351	Fabric analysis lab	0	0	2	10	10	20	30	50	1
8	NCT-352	Yarn Manufacture lab I	0	0	3	10	10	20	30	50	1
9	NCT-353	Fabric Manufacture lab I	0	0	3	10	10	20	30	50	1
10	NCT-354	Fibre identification lab	0	0	2	10	10	20	30	50	1
11	GP 301	General proficiency						50		50	
		Total	18	05	10	-			-	1000	25

Paper Code ** Science based open electives

NOE 031/NOE 041 Introduction to Soft Computing (Neural Networks, Fuzzy Logic and Genetic Algorithm)

NOE 032/NOE 042 Nano Sciences

NOE 033/NOE 043 Laser Systems and Application

NOE 034/NOE 044 Space Sciences

NOE 035/NOE 045 Polymer Science & Technology

NOE 036/NOE 046 Nuclear Science

NOE 037/NOE 047 Material Science

NOE 038/NOE 048 Discrete Mathematics

Note: The Course (s) will be offered on the basis of available resources in the Institute.

NAS 301

Engineering Mathematics III

L:T:P::3:1:0

NCT 301

Fabric Structure

L:T:P::3:1:0

UNIT I

[8]

Introduction to Elements of woven designs, Classification of woven fabric, concept of design , draft, peg plan, denting order.

UNIT II

[8]

Plain weave, derivatives of plain weave and different methods of decorating of plain fabric

UNIT III

[8]

Classification of twill weaves. Elongated , Zig-zag,wavy, broken, herringbone,transposed & rearranged twill weaves. Satin /Sateen weave .

UNIT IV

[8]

Mockleno, diaper, diamond, Cork-Screw & crepe weaves . Different methods of producing crepe weaves

UNIT V

[8]

Other towelling weaves, bedford cord and pique weaves

References:

1. Watson's Textile Design and Colour by Z Grosicki; Universal Publishing Corporation, Bombay (India)
2. Grammer of Textile Design – Nisbet
3. Structural Fabric Design by – Kilby
4. Woven Structures and Design – Doris Goerner; British Textile Technology GroupWIRA House, Leeds (UK)
5. Fibre to Fabric by Ghosh
6. Watson's Advance Textile Design

UNIT-I**[8]**

Classification and introduction to various spinning systems.

Terms & definitions of various yarn parameters such as like Count, Twist, Strength etc.

Process flow chart and brief idea of process sequences of carded & combed yarn and object of each process.

UNIT-II**[8]**

Object of Ginning. Brief description of various ginning process. Bale preparation.

Mixing and blending.

UNIT-III**[8]**

Blow room : various sections of blow room line. Chute feed mech. Piano feel mech on scutcher.

Production calculation on scutcher and Process Performance of blow room (cleaning efficiency, defects analysis of lap & waste control etc.)

UNIT-IV**[8]**

Carding:

Objects, carding and stripping action on card. Draft in carding. web doffing & coiler mechanism.

maintenances and settings of carding m/c. production calculation

process control of carding (cleaning efficiency, wastes, nep formation, sliver evenness etc)

UNIT-V**[8]**

Draw frame:

Object. doubling and drafting process. Drafting system and fibre control in drafting zone,

Production calculation.

Process Performance assessment of draw frame- U% and CV % analysis and remedies.

concept of autolevellers

References-

1. Indra Doraiswamy, P Chellamani and A Pavendham, Cotton Ginning, Textile Progress, Volume 24, Number 2
 2. Eric Oxtoby, Spun Yarn Technology, Butterworths, London
 3. A.R. Khare, Elements of Carding and Drawing, Sai Book Centre, Bhandup, Mumbai
 4. Gilbert R. Merrill, Cotton Opening and Picking, Gilbert R. Merrill, 364 Varnum Ave, Lowell, Mass
 5. Gilbert R. Merrill, Cotton Drawing and Roving, Gilbert R. Merrill, 364 Varnum Ave, Lowell, Mass
 6. W. G. Byerley and J. T. Buckley, W. Miller, G. H. Jolly and G. Battersby, F. Charnley, Manual of Cotton Spinning, Vol.-III Carding, The Textile Institute, Butterworths, 1965
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UNIT I**[8]**

Introduction to weaving.

Basics of woven fabric structure – epi,ppi,design representation of woven fabric.

Brief introduction to weaving preparatory process.

Basic operations of loom . Warp and weft passage on loom.

Calculation of wt. of warp, weft and fabric GSM.

UNIT II**[8]****Winding:**

Warp winding: Object; classification of yarn faults, supply and delivery packages. Evaluation of machine performance: Clearing efficiency & knot factor,

Classification of winding machine. mechanism of cross wound packages. Random and precision winder..

Essential parts of Roto coner and auto coner winding machines, its production calculation.

PIRN Winding- object, shape of pirn, essential mechanism of high speed pirn winder- diameter control mechanism, layer locking device, Automatic pirn winding machine, production calculation.

UNIT III**[8]**

Warping: Object of warping, classification of warping machine.

Essential parts of High speed beam warping machine.

Principle of sectional warping machine. Essential parts of horizontal sectional warping machine.

Traverse mechanism and its calculation.Efficiency and production calculation.

UNIT IV**[8]**

Sizing: Purpose of Sizing: sizing ingredients. Starch and its derivatives. Properties of size paste. Other adhesives.

Essential parts of slasher sizing machine. Drying equipments, crawl speed drive mechanism.

Factors affecting size take up. Calculation of size concentration, take up and speed of machine.

UNIT V**[8]****Looming in :**

Drawing in : accessories and tools, manual drawing in process, heald and reed calculation, semi automatic and fully automatic drawing in machines. Beam gaiting process

Tying in: essential requirement, tying in stand, knotters, warp tying in process.

Warp welding, QSC

References :

1. Principles of weaving by Marks and Robinson
 2. Weaving mechanism vol 1 & 2 by N N Banerjee
 3. Weaving by Talukdar
 4. Textile mathematics vol 3 by J E Booth
 5. Fabric manufacture vol 1 & 2 by NCUTE
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NCT 304**Textile Fibres****L:T:P::2:1:0****UNIT – I****[8]****Textiles fibres:**

Definition and classification- natural & synthetic – their source and end uses.

Various terms related to dimension & structure of textile fibres;

New fibres their source and end uses.

UNIT II**[8]****Vegetable fibres:**

Cotton: varieties and grading. Microscopic and Morphological structure of cotton,

Physical Properties - length, strength and elongation, moisture regain etc;

Chemical Properties: a) Action of acids b) Action of alkalies c) Action of oxidising agents on cellulose – formation of oxycellulose d) Esterification of Cellulose

OTHER VEGETABLE FIBRES: Brief idea on structure, Retting, Physical & Chemical properties of Bast fibres such as Jute, Flax, Hemp, Ramie, coir, sisal etc.

UNIT III**[8]****Animal fibres:**

Silk: Classification & origin, Physical Properties & Chemical composition of silk- sericin and fibroin. Degumming and weighting of silk.

Wool : Grading of wool with respect to length and diameter, wool impurities and their causes and remedies.

Structure of wool - Medullation, length, strength and elongation, moisture regain .

Chemical composition of wool- Salt and Cystine linkages,

Chemical properties of wool fibre a) action of water, b) action of acid, c) action of alkalis, d) action of oxidising and reducing agent on wool. Felting of wool and anti-felt finish on wool.

Mohair, cashmere, camel hair and other hair fibres

Unit IV

[8]

Manmade fibres:

Regenerated Fibres : acetate, viscose & diverse forms of viscose, cu-prammonium,alginate, lyocell. - general properties, end uses, Flow chart of the production sequence of some important regenerated fibres- viz., viscose & cellulose-acetate.

Synthetic fibres: polyesters, polyamides and polyurethanes, Flow chart for the production of these synthetic fibres.

concept of micro denier fibre

REFERENCES:

1. Manmade Fibres by R.W. Moncrieff
- 2.W.E. Morton & J.W.S. Hearle, Physical properties of textile fibres, Textile Institute, U.K.
3. Progress in textiles: Science and technology Vol.-2, By Dr. V.K. Kothari,
4. Hand book of textile fibres by J.Gordon Cook
- 5.silk, mohair, cahemere and other luxury fibres , Robert R Franck, wood head publishing U.K.

NHU 111

***Human Values and Professional Ethics/ cyber security**

L:T:P::2:0:0

NCT-351

Fabric Analysis Lab

L:T:P::0:0:2

1. Identification wrap and weft innfabric
2. Count verification from fabric sample
3. analysis fabric for various weaves
4. evaluation crimp in the given fabric sample
5. calculation of warp and weft weight per sq. meter
6. fabric weight calculation theoretical and also by balance, GSM

NCT-352

Yarn Manufacture lab-I

L:T:P::0:0:3

BLOW ROOM

To study mechanism of various blow room line, gearing - production calculation. piano feed regulating motion

CARDING

To study the different parts of carding machine and calculate the speed , cleaning efficiency, total draft and draft distribution , settings ,various stop motions incorporated and their function of LC 300, its production per hour & process parameters from industry.

DRAWFRAME

To study the parts, stop motion, gearing diagram, settings and calculation of total draft and distribution of draw frame and calculate the speed and production for given hank. Collection of data on machine parameters & process parameters from industry.

NOTE:

Experiments shall be decided on factors like:

1. Facilities installed at Institute.
 2. Accessibility to Industry & nearby Institutes.
 3. Trend of Technological Developments in National & International perspective
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NCT-353**Fabric Manufacture lab-I****L:T:P::0:0:3**

1. supply and delivery pkgs for winding, passage of winding m/c, rotary traverse, thread stop motion, drive and production calculation,
2. shuttles and pirns, pirn winder- study of various mechanisms, drive and production calculation
3. warping m/c-passage, beaming mech. warping calculation
4. manual drawing in process, various types of reed, healds, and drop pins, beam gaiting process
5. passage of warp and weft on plain power loom,
6. drive to loom, speed and production calculation

NOTE:

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 2. Accessibility to Industry & nearby Institutes.
 3. Trend of Technological Developments in National & International perspective
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NCT-354**Fibre identification lab****L:T:P::0:0:2**

1. Microscopic appearance of various textile fibres such as Cotton, Wool, Silk, Jute, Banana, sisal, Viscose etc
2. Burning test various textile fibres Cotton, Wool, Polyester, Nylon, Viscose, Acrylic, Silk, Jute
3. Chemical dissolution test for Cotton, Wool, Polyester, Nylon, Viscose, Acrylic, Silk, Polypropylene, Polyethylene
4. Identification of fibres in various blends by chemical dissolution method and to find the blend composition
5. Determination of Moisture content & Moisture regain of various fibres.

NOTE:

Experiments shall be decided on factors like:

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Study and Evaluation Scheme:

Year: 2nd, Semester-IV

Sr no.	Course code	Subject	Period			Evaluation scheme				Subject total	Credit
			L	T	P	Sessional Exam			ESE		
						CT	TA	Total			
THEORY SUBJECTS											
1	NOE 041-048/ NAS 401	Science based electives**/ Engg Mathematics-III	3	1	0	30	20	50	100	150	4
2	NCT-401	Carpet Technology	3	1	0	30	20	50	100	150	4
3	NCT-402	Yarn manufacture II	3	1	0	30	20	50	100	150	4
4	NCT-403	Fabric manufacture II	3	1	0	30	20	50	100	150	4
5	NHU-402/ NHU 401	Industrial Sociology/ Industrial Psychology	2	0	0	15	10	25	50	75	2
6	NCT-404	Textile chemistry I	2	1	0	15	10	25	50	75	3
	NHU-111	*Human Values & Professional Ethics/cyber security	2	0	0	15	10	25	50	75	-
PRACTICAL/ DESIGN/ DRAWING											
7	NCT-451	Carpet Technology workshop	0	0	2	10	10	20	30	50	1
8	NCT-452	Yarn manufacture lab II	0	0	3	10	10	20	30	50	1
9	NCT-453	Fabric manufacture lab II	0	0	3	10	10	20	30	50	1
10	NCT-454	Textile chemistry lab I	0	0	2	10	10	20	30	50	1
11	GP 401	General proficiency						50		50	
		Total	18	05	10	-			-	1000	25

Paper Code ** Science based open electives

NOE 031/NOE 041 Introduction to Soft Computing (Neural Networks, Fuzzy Logic and Genetic Algorithm)

NOE 032/NOE 042 Nano Sciences

NOE 033/NOE 043 Laser Systems and Application

NOE 034/NOE 044 Space Sciences

NOE 035/NOE 045 Polymer Science & Technology

NOE 036/NOE 046 Nuclear Science

NOE 037/NOE 047 Material Science

NOE 038/NOE 048 Discrete Mathematics

Note: The Course (s) will be offered on the basis of available resources in the Institute.

NOE 045

POLYMER SCIENCE AND TECHNOLOGY

L:T:P::3:1:0

UNIT –I

[8]

POLYMERS:

Introduction, chemistry of polymer synthesis, polymer reaction kinetics, physical properties and characterization of polymers,

UNIT –II [8]

[8]

Effect of structure on properties of polymers, organic polymers. Introduction to high performance polymers and composites and their processing.

UNIT –III

[8]

POLYMERIZATION:

Introduction, step-growth polymerization, free radical chain growth polymerization,

UNIT –III

[8]

emulsion polymerization, ionic and cationic polymerization, chain statistics and rubber elasticity.

UNIT–V

[8]

PREPARATION AND APPLICATIONS:

Preparation, properties and technical applications of thermo-plastics (PVC, PVA), thermostats (PF, UF) and Preparation, properties and technical application of elastomers (SBR, GR-N), silicones. Application of polymers in space, ocean, electronics, medical, agriculture, automobile, sports and building construction.

NCT-401

Carpet Technology

L:T:P::3:1:0

UNIT I [8]

Introduction to carpet and its applications. Type of floor coverings. Classification of carpets. Indian carpet industry and carpet in global market.

UNIT II [8]

Carpet designing technology- brief idea of design methodology, classification carpet designs

UNIT III [8]

Carpet manufacturing- brief idea of various manufacturing techniques.

UNIT IV [8]

Finishing of carpet- brief introduction to various washing finishing processes. Other chemical finishes and its object.

UNIT V [8]

Process control in Carpet Manufacturing, Carpet merchandising and export. Packing and delivery methodology, business performance measurement,etc

References:

1. Advances in Carpet Manufacture by K. K. Goswami, Woodhead Publishing
 2. Journals & Magazines 3. Carpet-e-World
 3. Carpet Manufacture by Crawshaw
 4. Tufted Carpet by Von Moody
 5. Process control in carpet manufacturing by K K Goswami, Abhishek Publishing, Chandigarh , India.
 6. Performance Measurement of Handmade Carpet Industry by Goswami Propa, Banwet D K & Goswami,K K, Abhishkek Publications (in press) Chandigarh, 2014.
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UNIT-I [8]

Objectives of combing. Preparatory process for comber. Terms and definition of combing. Sequence of operations in a rectilinear comber. Comber machine elements and modern developments.

Production calculation.

UNIT-II [8]

Objective and operation of speed frame.

Drafting systems, Twisting arrangement, Winding and package building mechanism. Stop motions.

Production calculations.

Defects in speed frame and their remedies.

Modern developments in speed frame.

UNIT-III [8]

Objective of Ring & traveler.

Description of different parts of Ring Frame – ring and traveler, Drafting arrangement & Winding and package building

Unit IV [8]

Spinning geometry. End breaks during spinning and its control

Modern development in Ring Frame and its automations .

Waste control and efficiency calculations.

Unit V [8]**Doubling/twisting**

Principle of doubling and twisting of yarns. Methods of doubling: Ring doubler, Two-for-One twisting.

Quality aspects in doubling and twisting.

Reeling process and its parameters

References-

1. Eric Oxtoby, Spun Yarn Technology, Butterworths, London
2. E. De Barr, H. Catling, The principles and theory of ring spinning, The Textile Institute, Butterworths.
3. A.R. Khare, Elements of Combing, Sai Book Centre, Bhandup, Mumbai
4. W. Klein, Manual of Textile Technology, The Textile Institute, Manchester, Vol. 3,4,5
5. K.R.salhotra, Spinning of man Made Fibres and Blends on Cotton System – The Textile Association (India)
6. J.W.S. Hearle, P. Grosberg, S. Backer, Structural mechanics of fibres, yarn and fabrics, Wiley-Interscience
7. W. Klein, Man-Made Fibres and Their Processing, Manual of Textile Technology – Vol-6, by The Textile Institute, Manchester, UK.
8. Manufactured fibre technology by V.B. Gupta & V.K. Kothari
9. Regenerated Cellulosic fibres by C. Wooding, Woodhead publications.

UNIT I**[8]**

Classification of looms, brief idea of each type of loom

Classification of loom motions.

shedding:Types of sheds. Mechanism of tappet shedding and its settings. Positive tappet shedding. Timing and setting of tappets.

Picking motion:Mechanism of over pick and under pick motion;Shuttle checking device. Shuttle fly- causes and remedies.

Beat up mechanism:Sley beat up mechanism, sley eccentricity and its effect on fabric properties;Loom drive & timing diagram

Efficiency and production calculation

UNIT II**[8]****Dobby Shedding:**

Principle of operation of i) Climax Dobby, ii) cross border doobby iii) Cam Dobby iv) Knowles positive doobby

Dobby pattern card preparation of above doobby mechanism;

Unit III**[8]**

Warp let off mechanism: warp tension on loom, Negative warp let of mechanism, Semi positive warp let off mechanism and its timing, setting

Cloth take up mechanism:5 wheel and 7 wheel take up mechanism and it calculation.

Temples: purpose, types of temples.

Unit IV**[8]****Weft Selection Mechanism:**

Drop box mechanism - classification.

Eccle's drop box mechanism and preparation of pattern chain

Zang drop box motion and its pattern chain preparation.

Pick at will mechanism.

UNIT V**[8]****Various stop motions-**

Mechanical Warp stop motion, electrical warp stop motions, its setting and timing

Side weft fork motion , center weft stop motion, its setting and timing

Loose reed and fast reed warp protector motion

References

1. Principles of weaving by Marks and Robinson
2. Weaving mechanism vol 1 & 2 by N N Banerjee
3. Weaving by Talukdar
4. Textile mathematics vol 3 by J E Booth
5. Fabric manufacture vol 1 & 2 by NCUTE

NCT-404**Textile Chemistry I****L:T:P::2:1:0****UNIT – I****[8]****PREPARATORY PROCESS:**

Various Types of Impurities: present in Textile Materials e.g. cotton, silk, wool, jute etc. and their removal. Sequence of preparatory process prior to dyeing for natural & manmade fibres (including their blends) with special reference to cotton, wool, polyester and blends. e.g. (i) singeing, (ii) desizing, (iii) scouring, (iv) bleaching, (v) heat setting etc. Brief description of the principles and machineries involved and chemical reagent used in the above mentioned processes.

UNIT – II**[8]**

Role of various process parameter (e.g. temperature, pH, Concentration, Pressure etc.) and auxiliaries in various preparatory processes. Description of the key preparatory machines: a) J-Box, b) Kier, c) Jumbo Jigger, d) Drying machines. Defects and damages occurred in preparatory processes- their cause and remedies.

UNIT – III**[8]**

Natural Dyes: Importance of natural dyes in present scenario, comparison with synthetic dyes, source wise classification of natural dyes. Mordants used for natural dyes and their applicability for various fibres. Significance of natural dyes in Carpet perspective. Merits, demerits and practical applicability.

Dyeing Process: Preparation of dyeing material for dye extraction; extraction process of dyes and their standardization; Application procedure for natural dyes; process parameters for natural dyeing. Study on fastness properties of natural dyes.

UNIT – IV

[8]

SYNTHETIC DYES:

Direct Dyes: Generalised formula of Direct dyes; Classification of direct dyes; Mechanism of Direct dyes and procedure for application of direct dyes; dye-fibre bond; effect of different process parameters (e.g. temp, time, pH) & role of various additives in dyeing process; fastness properties of direct dyes; after treatments for direct dyes.

Basic Dyes: General formula, chemical classes of Basic dyes; Use of Mordants for dyeing of cellulosic fibres; Procedure of application of Basic dyes on acrylic fibres and mechanism of dyeing; Role of dye bath assistants & process parameters in dyeing with basic dyes, Fastness properties of basic dyes.

References:

1. Dyeing & Chemical technology of Textile fibres by E.R. Trotman.
 2. Chemical Technology of fibrous material by F..Sadov.
 3. Chemical Technology in the Pre-Treatment process of Textile by Dr.S. R. Karmakar.
 4. Technology of Bleaching Vol. IV, by Dr. V.A. Shenai.
 5. Technology of Bleaching by J.T Marsh
 6. Chemistry of Dyes and principles of Dyeing by Dr. V.A. Shenai.
 7. Technology of Dyeing by Dr. V.A. Shenai
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NHU 111

*Human Values and Professional Ethics/ cyber security

L:T:P::2:0:0

NCT-451 Carpet Technology workshop L:T:P::0:0:2

1. Identify various type of carpet
2. practice of carpet manufacturing of hand knotted and tufted carpets.
3. Objects of various carpet testing instruments in the lab.
4. study of carpet washing and finishing
5. visit of carpet industry for hand made and m/c made carpet
6. data collection of carpet export and report making.

NCT-452 Yarn manufacture lab II L:T:P::0:0:3

SPEED FRAME

Study different parts & stop motions of LF 1400A speed frame, their function, gearing diagram and speed calculation,

Calculation of draft constant, total draft & draft distribution in LF 1400A speed frame. study the builder motion, calculate the twist per inch of a roving from the gearing diagram, production in Kg/Shift for a given roving hank. machine parameters & process parameters from industry.

RING FRAME

Study different parts -drafting system Determination of shore hardness of cots, bottom roller eccentricity, top arm pressure of a Ring Frame and speed frame. Determination of twist constant of a Ring frame and to find twist per inch in yarn, draft constant, Break draft constant and distribution of draft. calculate the production in Kg/Shift for a given yarn count. bobbin building mechanism of a ring frame.

Collection of data on machine parameters & process parameters from industry including snap study on end down and doff quality.

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- Trend of Technological Developments in National & International perspective

NCT-453 Fabric manufacture lab II L:T:P::0:0:3

1. tappet shedding,
2. picking motion- over pick motion, under pick motion,
3. sley beat up mech, calculation of sley eccentricity
4. loose and fast reed warp protector motion
5. take up motion - 5 wheel and seven wheel take up motions,
6. negative warp let-off mech
7. climax dobbie, its card preparation
8. warp stop motion and setting, timing diagram

NOTE:

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3. Trend of Technological Developments in National & International perspective

1. Desizing of cotton fabric using various types of desizing agents.
2. Scouring of natural fibres viz. cotton in form of yarn or fabric and find the scouring loss.
3. Scouring of wool in fibre.
4. Degumming of silk and calculation of weight loss percentage.
5. Bleaching of cotton by sodium Hypochlorite.
6. Bleaching of cotton by sodium Chlorite.
7. Bleaching of cotton by hydrogen peroxide.
8. Bleaching of silk by sodium hydrosulphite.
9. Dyeing of Cotton Yarn with Direct Dyes.
10. Dyeing of Cotton Yarn with Basic Dyes.

NOTE:

Experiments shall be decided on factors like:

- Facilities installed at Institute.
- Accessibility to Industry & nearby Institutes.
- Trend of Technological Developments in National & International perspective.
