

UTTAR PRADESH TECHNICAL UNIVERSITY, NOIDA



Syllabus

For

B. TECH. TEXTILE

- 1. Textile Technology**
- 2. Textile Engineering**
- 3. Man Made Fibre Technology**
- 4. Textile Chemistry**

(Effective from the Session: 2014-15)

Study and Evaluation scheme
B. Tech. Textile Technology
[Effective from the Session 2014-15]

YEAR 2nd, SEMESTER- III

S. No	Subject Code	Name of Subject	Periods			Evaluation Scheme			Subject Total	Credits	
			L	T	P	Sessional Assessment		ESE			
						CT	TA				Total
THEORY SUBJECT											
1	NAS-301/ NOE-031-039	Engg. Mathematics-III/ Science based open elective	3	1	0	30	20	50	100	150	4
2	NTT-301	Yarn Manufacture-I	3	1	0	30	20	50	100	150	4
3	NTT-302	Fabric Manufacture-I	3	1	0	30	20	50	100	150	4
4	NTT-303	Wet Processing of Textiles-I	3	1	0	30	20	50	100	150	4
5	NHU 301/ NHU302	Industrial Psychology/ Industrial Sociology	2	0	0	15	10	25	50	75	2
6	NTT-304	Textile Fibre-I	2	1	0	15	10	25	50	75	3
7	AUC-001/ AUC-002	Human Values & Professional Ethics/ Cyber Security	2	0	0	15	10	25	50	75*	
PRACTICAL/ DESIGN/DRAWING											
8	NTT-351	Yarn Manufacture-I Lab	0	0	3	10	10	20	30	50	1
9	NTT-352	Fabric Manufacture-I Lab	0	0	3	10	10	20	30	50	1
10	NTT-353	Wet Processing of Textiles-I Lab	0	0	2	10	10	20	30	50	1
11	NTT-354	Textile Fibre-I Lab	0	0	2	10	10	20	30	50	1
11	NGP-301	General Proficiency								50	
		Total	18	5	10					1000	25

Science Based Open Elective:

- NOE031 Introduction to Soft Computing (Neural Network, Fuzzy Logic and Genetic Algorithm)
- NOE032 Nano Sciences
- NOE033 Laser Systems and Applications
- NOE034 Space Sciences
- NOE035 Polymer Science & Technology
- NOE036 Nuclear Science
- NOE037 Material Science
- NOE038 Discrete Mathematics
- NOE039 Applied Linear Algebra

*Human values & Professional Ethics /Cyber Security will be offered as a compulsory audit course for which passing marks are 30% in End Semester Examination and 40% in aggregate.

Study and Evaluation scheme
B. Tech. Textile Technology
[Effective from the Session 2014-15]

YEAR 2nd, SEMESTER- IV

S. No.	Subject Code	Name of Subject	Periods			Evaluation Scheme				Subject Total	Credits
			L	T	P	Sessional Assessment			ESE		
						CT	TA	Total			
THEORY SUBJECT											
1	NOE-041 - NOE-049/ NAS-401	Science based Open Elective /Engg. Mathematics-III/	3	1	0	30	20	50	100	150	4
2	NTT-401	Yarn Manufacture-II	3	1	0	30	20	50	100	150	4
3	NTT-402	Fabric Manufacture-II	2	1	0	15	10	25	50	75	3
4	NHU-401/ NHU-402	Industrial Psychology/ Industrial Sociology	2	0	0	15	10	25	50	75	2
5	NTT-403	Wet Processing of Textiles-II	3	1	0	30	20	50	100	150	4
6	NTT-404	Textile Fibre-II	2	1	0	15	10	25	50	75	3
7	AUC-002/ AUC-001	Cyber Security/ Human Value & Professional Ethics	2	0	0	15	10	25	50	75*	
PRACTICAL/ DESIGN/DRAWING											
8	NTT-451	Yarn Manufacture-II Lab	0	0	3	10	10	20	30	50	1
9	NTT-452	Fabric Manufacture-II Lab	0	0	3	10	10	20	30	50	1
10	NTT-453	Wet Processing of Textiles-II Lab	0	0	2	10	10	20	30	50	1
11	NTT-454	Textile Fibre-II Lab	0	0	2	10	10	20	30	50	1
11	NGP-401	General Proficiency	-	-	-	-	-	50	-	50	1
		Total	18	5	10					1000	25

Science Based Open Elective:

- NOE-041 Introduction to Soft Computing (Neural Network, Fuzzy Logic and Genetic Algorithm)
- NOE-042 Nano Sciences
- NOE-043 Laser Systems and Applications
- NoE-044 Space Sciences
- NOE-045 Polymer Science & Technology
- NOE-046 Nuclear Science
- NOE-047 Material Science
- NOE-048 Discrete Mathematics
- NOE-049 Applied Linear Algebra

*Human values & Professional Ethics /Cyber Security will be offered as a compulsory audit course for which passing marks are 30% in End Semester Examination and 40% in aggregate.

U.P TECHNICAL UNIVERSITY, LUCKNOW

Study and Evaluation scheme

B. Tech. Textile Technology

[Effective from the Session 2015-16]

YEAR 3rd , SEMESTER- V

S. No.	Subject Code	Name of Subject	Periods			Evaluation Scheme			Subject Total	Credits	
			L	T	P	Sessional Assessment					
						CT	TA	Total			
THEORY SUBJECT											
1	NTT-501	Textile Testing-I	3	1	0	30	20	50	100	150	4
2	NTT-502	Yarn Manufacture-III	3	1	0	30	20	50	100	150	4
3	NTT-503	Fabric Manufacture-III	3	1	0	30	20	50	100	150	4
4	NTT-504	Colour & Design	3	1	0	30	20	50	100	150	4
5	NTT-505	Fabric Structure	2	1	0	15	10	25	50	75	3
6		HS	2	0	0	15	10	25	50	75	2
PRACTICAL/ DESIGN/DRAWING											
7	NTT-551	Textile Testing-I Lab	0	0	3	10	10	20	30	50	1
8	NTT-552	Yarn Manufacture-III Lab	0	0	3	10	10	20	30	50	1
9	NTT-553	Fabric Manufacture - III Lab	0	0	2	10	10	20	30	50	1
10	NTT-555	Fabric Analysis Lab	0	0	2	10	10	20	30	50	1
11	NGP-501	General Proficiency								50	
		Total	16	5	10					1000	25

***HS: To be decided by UPTU**

U.P TECHNICAL UNIVERSITY, LUCKNOW

Study and Evaluation scheme

B. Tech. Textile Technology

[Effective from the Session 2015-16]

YEAR 3rd, SEMESTER- VI

S. No.	Subject Code	Name of Subject	Periods			Evaluation Scheme			Subject Total	Credits	
			L	T	P	Sessional Assessment		ESE			
						CT	TA				Total
THEORY SUBJECT											
1	NTT-601	Textile Testing-II	3	1	0	30	20	50	100	150	4
2	NTT-602	Yarn Manufacture-IV	3	1	0	30	20	50	100	150	4
3	NTT-603	Fabric Manufacture-IV	3	1	0	30	20	50	100	150	4
4	NTT-011 / NTT-012	Structure & Properties of Fibre/ Garment Manufacture Technology	3	1	0	30	20	50	100	150	4
5	NTT-021/ NTT-022	Advance Fabric Structure/ Multi & Long Fibre Spinning	2	1	0	15	10	25	50	75	3
6		HS/ Industrial Management	2	0	0	15	10	25	50	75	2
PRACTICAL/ DESIGN/DRAWING											
7	NET-651	Textile Testing-II Lab	0	0	3	10	10	20	30	50	1
8	NET-652	Yarn Manufacture-IV Lab	0	0	3	10	10	20	30	50	1
9	NTT-653	Fabric Manufacturer-IV Lab	0	0	2	10	10	20	30	50	1
10	NTT-654	SEMINAR			2		50	50		50	1
11	NGP-601	General Proficiency								50	
		Total	16	5	10					1000	25

***HS: To be decided by UPTU**

Departmental Elective I

1. NTT-011 Structure & Properties of fibres
2. NTT-012 Garment Manufacturing Technology

Departmental Elective II

1. NTT-021 Advance Fabric Structure
2. NTT-022 Multi & Long Fibre Spinning

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Study and Evaluation scheme

B. Tech. Textile Technology

[Effective from the Session 2016-17]

YEAR 4th , SEMESTER- VII

S. No.	Subject Code	Name of Subject	Periods			Evaluation Scheme			Subject Total	Credits	
			L	T	P	Sessional Assessment					ESE
						CT	TA	Total			
THEORY SUBJECT											
1	NTT-701/ NTT-702	Process Control in Spinning/ Process Control in Weaving	2	0	0	15	10	25	50	75	2
2	NOE-071 NOE-072 /NOE-073	Entrepreneurship Development Quality Management/ Operation Research/	3	1	0	30	20	50	100	150	4
3	NTT-704	Advance Spinning Technology	3	1	0	30	20	50	100	150	4
4	NTT-705	Knitting Technology	3	1	0	30	20	50	100	150	4
5	NTT-031/ NTT-032	Non Woven/ Fibre Reinforced Composite	3	1	0	30	20	50	100	150	4
PRACTICAL/ DESIGN/DRAWING											
6	NTT-751	PROJECT	0	0	8	-	50	50	100	150	4
7	NTT-752	Industrial Training	0	0	2	-	75	75		75	2
8	NTT-755	Knitting Technology Lab	0	0	2	10	10	20	30	50	1
	NGP701	General Proficiency								50	
		Total	14	4	13					1000	25

Open Elective-II from other departments

Open Elective-1

1. NTT-701 Process Control in Spinning
2. NTT-702 Process Control in Weaving

Open Elective-II from Other Departments

1. NOE-072 Quality Management
2. NOE-073 Operation Research

Departmental Elective III

1. NTT-031 Nom- woven
2. NTT-032 Fibre Reinforced Composite

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Study and Evaluation scheme

B. Tech. Textile Technology

[Effective from the Session 2016-17]

YEAR 4th , SEMESTER- VIII

S. No.	Subject Code	Name of Subject	Periods			Evaluation Scheme			Subject Total	Credits	
			L	T	P	Sessional Assessment					
						CT	T A	Tot al			
THEORY SUBJECT											
1	NTT-801/ NOE-082	Technical Textiles /Product Development	3	1	0	30	20	50	100	150	4
2	NTT-802	Mill Planning & Organization	3	1	0	30	20	50	100	150	4
3	NTT-041/ NTT-042	Theory of Textile Structure / Mechanical Machine Design	3	1	0	30	20	50	100	150	4
4	NTT-051/ NTT-052/	Electronics in Textiles/ Advance Weaving Technology	3	1	0	30	20	50	100	150	4
PRACTICAL/ DESIGN/DRAWING											
5	NTT-851	PROJECT	0	0	12		100	100	150	250	7
6	NTT-852	SEMINAR	0	0	3		100	100		100	2
	NGP-801	General proficiency								50	
		Total	12	4	15					1000	25

Open Elective from Other Departments

1. NTT-801: Technical Textile
2. NTT-082 Product Development

Departmental Elective IV

1. NTT-041 Theory of Textile Structure
2. NTT-042 Mechanical Machine Design

Departmental Elective V

1. NTT-051 Electronics in Textiles
2. NTT-052 Advance Weaving Technology

3rd Semester B. Tech. Textile Technology

1. (Engineering Core: Interdisciplinary):

Engineering Mathematics-III/Science based electives (NAS-301/NOE-031-038)

(L T P 3 1 0 = 4): Common Syllabus provided by UPTU

2. Yarn Manufacture –I (NTT-301) (L T P 3 1 0)

Unit (1): Introduction to passage of material through spinning process by flow charts and brief description of each process, Picking and pre-cleaning of cotton, objective of ginning, description and working of roller and saw gins. Picking and cleaning of jute, wool and linen/

Total Lectures required =9

Unit (2): Objective of mixing, different types of mixing & blending, difference between mixing & blending, Objective of tinting, use of anti-static agents, Mixing different cotton varieties, Different mixing methods and their advantages and disadvantages

Total Lectures required = 08

Unit (3): Objective of blow room, Principles of opening and cleaning, various types of openers, their construction and working, selection of beating/ cleaning points according to type of cotton and their suitable combinations, Grid bars and their setting, Blow room line for synthetic fibres, Blending of man-made fibres with cotton, modern blow room line.

Total Lectures required =8

Unit (4): Unit (4): Lap forming mechanism, Chute/flock feed systems and their comparison, Lap rejection, Causes of lap defects and their remedies, Transport control and regulation of material in blow room, performance assessment of blow room,

Total Lectures required =8

Unit (5): Problems of contamination and their remedies, working of contamination separators, Waste extraction mechanism at various openers and beaters, cleaning efficiency of different machines, lint-trash ratio, nep generation, fibre breakage and their control, Calculations pertaining to production of blow room and cleaning efficiency, Maintenance practices in Blow-room. **Total Lectures required =9**

Grand total of lectures required = 42

Text Books and Reference material:

1. Cotton ginning: Textile Progress, Vol 24, No 2, I. Doraiswamy, P. Chellamani
2. Spun Yarn Technology, Vol.-I- A Venkatsubramaniam

3. Elements of raw cotton & blow room- Dr. A. R. Khare
4. A practical guide to opening & carding- W. Klein
5. Cotton Spinning- Taggart
6. Spun Yarn Technology- Eric Oxtoby
7. Spinning blow room & carding by Prof. K.R. Salhotra & Prof. R. Chattopadhyaya

Laboratory work: As per the lab Syllabus

3. Fabric Manufacture-I (NTT-302) (L T P 3 1 0)

Unit (1): Introduction to weaving process and its sequence, Objective of conventional cone winding, classification of winding, (manual & automatic), Study of slow, high and super high speed warp winding machines, difference between precision winding and drum winding, Features of slow, high & super high speed winding machines. **Total Lectures required =9**

Unit (2): Type of package winding (parallel & cross winding), thread stop motion, tensioning device, Mechanical & electrical sub-catchers, clearing efficiency of winding machine, knot factor, types of knot, **Total Lectures required =7**

Unit (3): Ways of yarn traversing, Ribbon formation and s of elimination, Machine traverse ratio, angle of wind, conicity of cone, packages, ribbon formation and method of its elimination, package density, winding parameters, package defects during winding and their remedies. **Total Lectures required =8**

Unit (4): Auto-coner: Objective of auto-coner, important parts of auto-coner and their functions, concept of yarn clearing, concept of splicing, Brief idea of classimat test report, Cheese winding, Important parts of cheese winding & their functions.

Total Lectures required =9

Unit (5): High speed weft winding machines, detailed study of mechanism and setting of speed on weft winders, Automatic and non-automatic pirn winding machines, Bunch motion and its importance, Maintenance practices in winding machines, **Total Lectures required =9**

Grand total lectures required =42

Text Books & Reference Books:

1. R. Sengupta, yarn preparation, the popular book depot Mumbai.
2. Cotton yarn weaving (ATIRA), 1980
3. M.K. Talukdar- An introduction to winding and warping.
4. P.K. Bannerjee- Yarn winding NCUTE, IIT Delhi.
5. A. Ormerdd weaving technology and operation, Textile Institute U.K.
6. Industrial practices in weaving preparatory

Laboratory Work: As per the lab syllabus

4. Wet Processing of Textiles -I (NTT-303) (L T P 3 1 0)

Unit (1): Role of water & its quality for wet processing, Principle and application of surfactant in textile processing, Sequence of chemical processing, of textiles, natural and added impurities in textiles, Various preparatory processes for cotton, wool, silk, nylon, polyester, acrylic and blends including optical whitening. **Total Lectures required =9**

Unit (2): Objectives of desizing, scouring, bleaching and mercerization of textile materials, Different types of desizing and bleaching agents, methods of desizing, singeing, scouring and bleaching of textile material, various faults in bleaching and their remedies and removal. **Total Lectures required =9**

Unit (3): Objective of heat setting, Objective of mercerization, physical and chemical aspects of mercerization, method and types of heat setting and mercerizing, yarn and fabric mercerizing, Optical brightening agents, and their application

Total Lectures required =8

Unit (4): Brief introduction to processing machinery and new processes development in machinery for preparatory and dyeing. **Total Lectures required =8**

Unit (5): Introduction to colours and their mixing, Measurement of colour, Application of Computer Colour Matching system as a quality control tools to evaluate strength/ Purity of dye, shade matching, whiteness/ yellowness index **Total Lectures required =8**

Grand Total Lectures Required =42

Books:

1. Chemical processing of cotton and p/c blends – ATIRA
2. A glimps on the chemical technology and textile fibres by R.R. Chackrawartty
3. Technology of bleaching and mercerization by V.A. Shenai
4. Technology of finishing by V.A. Shenai

Laboratory work: As per the lab Syllabus

5. Industrial Psychology/ Industrial Sociology (NHU301/NHU302) Syllabus to be decided by UPTU (L T P 2 0 0=2)

6. Textile Fibre-I: (NTT-304) (L T P 2 1 0)

Unit (1): Fibre, textile fibre (1). Classification of natural textile fibres (1), Essential and desirable properties of textile fibres (2), National and international production and consumption of various natural fibres (cotton, wool, silk linen, ramie, jute etc) Advantages and disadvantages of natural and man-made fibres.

Total Lectures required = 08

Unit (2): Geographical distribution and cultivation of cotton fibre, varieties of cotton fibre, Morphological structure of cotton fibre, Physical properties of cotton fibre, Effect of acid and alkalis on cotton fibre, Grading of cotton, Fibre Quality Index.

Total Lectures required = 09

Unit (3): Cultivation, extraction, morphological structure, properties and uses of bast fibres such as flax, jute, hemp, and ramie, Production of raw silk, Morphological structure of silk, Production of waste silk yarn, Chemical composition and physical properties of silk, effect of acid and alkalies, varieties of silk with brief description etc.

Total Lectures required = 08

Unit (4): Morphological structure of wool, Composition of wool fibre, Wool scouring, and combing, Properties of wool fibres, Varieties of wool fibre with brief description. **Total Lectures required =8**

Grand total of Lectures = 33

Books:

1. W.E. Morton & J.W.S. Hearle, Physical properties of textile fibres, Textile Institute, U.K.
2. Progress in textiles: Science and technology Vol.-2 By Dr. V.K. Kothari, I.I.T. Delhi.
3. Hand book of textile fibres by J.Gordon Cook
4. Fibre Science and Technology, S P Mishra

Laboratory work: As per the lab Syllabus

7. Human Value & Professional Ethics/ Cyber Security: Audit Course

Common Syllabus as Decided by UPTU BOS

3RD SEMESTER LAB SYLLABUS

TT-351: Yarn Manufacturing-I:

Practice in handling and operation of blow room, study of constructional details of machinery in blow room, calculating speed of different machine parts, Blows per inch of Krishna beater, Production calculation of blow room, various controls points and change places, Practice in checking the quality of laps

TT-352: Fabric Manufacturing-I

Study of cone winding, cheese winding and auto coner, constructional details of machine, types of packages produced by them and package faults, Calculations pertaining to cone winding, cheese winding, ring doubler, reeling & TFO.

TT-353 Wet Processing of Textiles-I:

Sizing, scouring, bleaching and mercerization of cotton fabric and to evaluate the effectiveness of each process using various test such as Tewega test, drop absorption test, whiteness index, barium activity number test, measure wax content, ash content and scouring loss of cotton fabric, find out available chlorine in a given sample of sodium hypo chloride, determine strength of H₂O₂ (Hydrogen peroxide) by titration method, to finish fabric with water repellent and flame retardant finishes and test water repellency and flame retardant property using appropriate test method.

TT-354: Textile Fibres-I

Principle of microscopy, microscopic identification of natural fibres, preparation and mounting of specimen for longitudinal view, standard scheme of analysis of homogeneous fibre and blend by physical and chemical methods, preparation of reagents used for chemical analysis

4th Semester B. Tech. Textile Technology

1. **Engg. Mathematics-III (NAS-401)/ Science based open elective (NOE-041-048):** Common Syllabus as decided by UPTU BOS (L T P 3 1 0)

2. **Yarn Manufacture-II (NTT-401) (L T P 3 1 0= 4)**

Unit (1): Objective of carding, constructional features and working details of licker-in, cylinder, doffer and flats for processing different materials, Principles of carding.

Total Lectures required =8

Unit (2): Flexible and metallic card clothing, requirement of wire grinding, Process parameters, settings and gauges for different materials, Carding defects and their remedies, mechanism of neps and hooks formation, assessment and their control.

Total Lectures required =9

Unit (3): Tandom carding, Modern development in carding, Auto leveler used in carding, Basic idea woolen, jute and flax carding, carding calculations pertaining to draft and production. **Total Lectures required =8**

Unit (4): Objective of draw frame, working principles of draw frame including constructional details, drafting systems, weighting in draw frame, draft distribution, doubling and blending, drafting force, coiling system and stop motion.

Total Lectures required =8

Unit (5): Concept of ideal draft and formation of drafting waves, drafting irregularities , and their causes, Hooks removal at draw frame, Principles of roller setting, Modern developments in draw frame, Auto leveling, Calculation pertaining to draft and production. **Total Lectures required =9**

Grand total of lectures required = 42

Text Books and Reference material:

1. Mechanics of spinning machines, by R. rengaswami
 2. New Spinning by R.V.M Gowda
 3. Elements of carding & draw frame- Dr. A. R. Khare
 4. Short staple spinning, Vol-III- W. Klein
 5. Cotton Spinning- Taggart
 6. Spinning drawing, combing, roving, by Dr. R. Chattopadhyay & Dr. R. Rengaswamy
 7. Spinning blow room & carding by Prof. K.R. Salhotra & Prof. R. Chattopadhyaya
- Laboratory work:As per the lab Syllabus

3. **Fabric Manufacture-II (NTT-402) (L T P 3 1 0)**

Unit (1): Objective of warping, Classification of warping machines, slow, high and super high speed warping machines, Salient features of high and super high speed direct warping machines, different types of warping creels, Tension devices and their setin, Various stop motions used in warping machines, Quality of good warping beam, Common faults in warper's beam, their causes and remedies

Total Lectures required =8

Unit (2): Sectional warping machines, Waxing attachment, computerized warping machines, pattern beam preparation for loom and sizing, Quality of good weaver's beam, Common faults in beam, their causes and remedies, Estimation of efficiency and productivity of various types of warping machines. **Total Lectures required =8**

Unit (3): Objectives of sizing and sizing terminology, Details of slasher sizing, multi-cylinder sizing, Hot air sizing and high pressure sizing, sizing ingredients used for cotton and synthetic warp, properties of size paste, Factors affecting size pick-up

Total Lectures required =9

Unit (4): Common faults occurring in sizing beam, their causes and remedies, Various types of drying systems and their advantages & disadvantages, importance of moisture content and stretch % in sized yarn. **Total Lectures required =8**

Unit (5): Causes and remedies of lapper and migration, shore hardness of squeeze roll, Numerical problems about sizing, Various controls used on a modern sizing m/c, Drawing-in: Objectives, process description, reed count system, manual drawing-in, semi-automatic drawing-in process, Knotting process and its limitations

Total Lectures required =8

Grand total of lectures required = 42

Text Books and Reference material:

1. Yarn preparation by R. Sengupta
2. An introduction to winding & warping by M.K. Talukdar
3. Yarn winding by P.K. Bannerjee, IIT Delhi
4. Modern preparation & weaving machinery by A Ormerod, Textile Institute, U.K.

Laboratory work: As per the lab Syllabus

4. Industrial Psychology/ Industrial Sociology: Syllabus provided by UPTU BOS

5. Wet Processing of Textiles II (NTT-403) (L T P 3 1 0)

Unit (1): Classification of dyes according to their mode of application, Dyeing of cellulosic material with direct, reactive, vat and sulphur dyes. Dyeing of polyester with disperse dyes, exhaust and continuous dyeing. **Total Lectures required =9**

Unit (2): Dyeing of nylon, wool, and silk with acid, metal complex dyes, dyeing of acrylic with basic dyes, cross dyeing of polyester and cellulosic blends, Dyeing of nylon and wool and wool and acrylic blends. **Total Lectures required =8**

Unit (3): Styles and methods of printing outline of various methods and their limitations. Application and type of printing thickeners, Properties of thickener, printing auxiliaries, Technology of printing. **Total Lectures required =8**

Unit (4): Finishing: Introduction to finishing, Classification of finishing (mechanical and chemical), Various types of mechanical finishing such as singeing, calendaring, Milling, raising, napping, brushing, and shrinking, Heat setting. **Total Lectures required =8**

Unit (5): Various types of chemical finishing such as softner, flame retardant, antistatic, anti piling, oil & soil resistance, bactericidal & fungicidal, water repellent, easy care. Application of finishes, Thickeners and their application .Various style of printing –direct style resist style and discharge style of printing. **Total Lectures required =9**

Text Books and Reference material:

1. Chemical processing of cotton & p/c blends- ATIRA
2. A glimpse on the chemical technology of textile fibres, by R.R. Chakraborty
3. Technology of dyeing, by V.A. Shenai
4. Technology of finishing, by V.A. Shenai
5. Technology of Printing, by V.A. Shenai
6. Dyeing and chemical technology of textile fibres by E.R. Trotman
7. An introduction to Textile finishing by J.T. Marsh.

Laboratory work: As per the lab Syllabus

6. Textile Fibre-II (NTT-404) (L T P 2 1 0)

Unit (1): General definition of man-made or manufactured fibres, classification of man-made fibre, and introduction to manufacturing processes of man-made fibres, Study of various systems of spinning: melt, wet & dry spinning- basic principles, brief idea about spinning head, spinneret, quench chamber, & coagulation bath, spin finish application

Total Lectures required =9

Unit (2): Introduction to synthetic fibres, Polyethylene Terephthalate fibre- polymer production by DMT & PTA route, chip drying, spinning of filament yarns and staple fibre manufacturing, effect of process variable on properties of polyester fibre, some dope additives for specialty polyester fibre, Properties of polyester fibre,

Total Lectures required =8

Unit (3): Polyamide fibre- Different types of polyamide fibres, Nylon polymer production by continuous polymerization in VK tube, Manufacturing of Nylon 6 and

Nylon 6,6 by melt spinning, Properties of Nylon 6 and Nylon 66 fibre, Polyacrylonitrile (PAN) fibre, Acrylic fibre- formation by dry spinning, dry-jet-wet spinning process,

Total Lectures required =9

Unit (4): Introduction to regenerated fibre, concepts of regeneration of fibre, Raw material for viscose rayon, manufacturing sequence of viscose fibre, wet spinning of viscose rayon, formation of serrated edge cross-section of viscose rayon, viscose fibre properties, Introduction to cuprammonium rayon in brief, introduction of cellulose acetate rayon in brief. **Total Lectures required =9**

Grand total of lectures required = 35

Reference Books:

1. Manufactured fibre Technology, by V.B. Gupta & V.K. Kothari
2. Essential fibre chemistry, by M.E. Miller
3. Production of Synthetic Fibres, by A.A. Vaidhya
4. Fibre Chemistry by M. Lewin, E.M. Pearce, Marcel & Dekkan Inc
5. Regenerated Cellulose fibre, by C. Wooding, Woodhead Publishing Ltd.
6. Handbook of Textile fibre, by Gordon Cook
7. Man Made Fibres, by R.W. Moncrief

Laboratory work: As per the lab Syllabus

7. Human Value & Professional Ethics/ Cyber Security: Audit Course

Common Syllabus as Decided by UPTU BOS

4TH SEMESTER LAB SYLLABUS

TT-451: Yarn Manufacturing-I:

Familiarity with carding machine, constructional details, change places and speed calculation of a carding machine, effect of various machine parameters in production and quality of sliver, checking the quality of sliver, finding out individual draft and total draft in carding machine, flat speed and its impact, study of coiling mechanism, find out coils/layer, setting according to type of material.

Practice in handling, operation, setting and gauging draw frame, study of construction details of draw frame, various control and change places etc, practice in checking the quality of sliver and waste analysis, common fault and remedies, calculation pertaining to gearing, speeds, constant, draft and production etc

TT-452: Fabric Manufacturing-I

Study of warping, drawing-in, and sizing, constructional details of machines, types of packages produced by them and package faults, calculation pertaining to warping, sizing, weft winding and drawing-in

TT-453: Wet Processing of Textiles-I:

Dye cotton with direct, reactive, vat and sulphur dye, dyeing polyester, wool, silk, acrylic and nylon using, appropriate disperse, acid and basic dyes, Print cotton fabric using various styles of printing, namely, direct, resist and discharge, Evaluate colour fastness to washing, light, perspiration and rubbing properties

TT-454: Textile Fibres-II

Principle of microscopy, microscopic identification of man-made fibres, preparation and mounting of specimen for longitudinal view, standard scheme of analysis of homogeneous fibre and blend by physical and chemical methods, preparation of reagents used for chemical analysis

5th Semester B. Tech. Textile Technology

1. Textile Testing-I (NTT-501) (L T P 3 1 0)

Unit (1): Introduction to fiber, yarn and fabric testing, sampling, random sampling, biased sampling, sampling techniques, square and cut-square technique, selection of sample for testing. **Total Lectures required =8**

Unit (2): Atmospheric conditions for testing, absolute and relative humidity, moisture regain & moisture content and their measurement, dry and wet bulb hygrometer, importance of moisture in textiles, effect of moisture on properties (physical, & mechanical) of textile material, factors affecting the regain, Shirley moisture meter, control of atmospheric conditions during testing. **Total Lectures required =9**

Unit (3): Measurement of physical characteristics of cotton viz. length, fineness, maturity, bundle strength, colour and foreign matter including principle, construction, operation, and calibration of the equipment in common use. **Total Lectures required =8**

Unit (4): Mechanical properties of fibres, relation between structure and mechanical properties of fibres, Measurement of physical properties of man-made fibres i.e. length, denier, strength, elongation, modulus, work of rupture, crimp, spin finish, fibre quality index etc. **Total Lectures required =8**

Unit (5): determination of yarn count, diameter, average & resultant count of folded yarn, relation between Ne, D, T, Nm, Instruments used for determination of count, quadrant balance, Knowles balance, Beesley balance and physical balance, Twist, classification of twist, twist measurement, direct counting method, continuous twist tester, twist-untwist method, Twist tester, R.B. twist tester, level of twist. **Total Lectures required =9**

Grand total of lectures required = 42

Text Books and Reference material:

1. Quality control and testing management, by V.K. Kothari
2. Principles of textile testing, by J.E. Booth
3. Physical testing of textiles, by B.P. Savile
4. Physical properties of fibres, by W.E. Morton and J.W.S. Hearle

Laboratory work: As per lab syllabus

2. Yarn Manufacture-III (NTT-502) (L T P 3 1 0)

Unit (1): Objectives of combing, system of lap preparation, sliver lap, ribbon lap and super lap machines, configuration of fibre feed and its effect on the quality of product and efficiency of comber, combing cycle.

Total Lectures required =8

Unit (2): Important parts of comber and their functioning, timing and setting of comber for different classes of cotton, concept of forward and backward feed, concept of comber waste, calculation pertaining to production and noil percentage, recent developments in combers. **Total Lectures required =9**

Unit (3): Objectives of speed frame, important parts of speed frame and their functioning, Mechanism involved in drafting, twisting, and winding, different types of roler drafting systems, setting and gauges in drafting zone. **Total Lectures required =8**

Unit (4): Mechanism of bobbin building, process parameters for different materials, basic principle of designing of cone drum, differential motions and their working principles. Recent developments in speed frame. **Total Lectures required =8**

Unit (5): Common defects in roving package, their causes and remedies, calculations pertaining to gearing, draft, t.p.i. and production, twist multiplier and roving twist

Total Lectures required =9

Grand total of lectures required = 42

Text Books and Reference material:

1. A practical guide to combing and drawing- W. Klein
2. Spun Yarn technology- Eric Oxtoby
3. Spun Yarn technology, Vol-I- A. Venkatsubramani
4. Elements of Combing- Dr. A.R. Khare
5. Cotton Spinning- Taggart

Laboratory work: As per the lab Syllabus

3. Fabric Manufacture-III (NTT-503) (L T P 3 1 0)

Unit (1): Introduction to weaving process, general description of power looms, their mechanical details, settings and adjustments, primary, secondary and auxiliary motions.

Total Lectures required =8

Unit (2): Various ways of shedding, various types of sheds, tappet shedding, and idea of construction of tappet, under pick and over pick mechanism, beating up motion, early and late shedding, healds, reed & temples and their utility in loom.

Total Lectures required =9

Unit (3): Negative and positive take up motion, negative and positive let-off motions, merits and demerits of negative and positive take-up and let-off motion, causes of shuttle flying and shuttle trapping. **Total Lectures required =9**

Unit (4): Warp protecting motion, side and centre weft fork motion, description of various types of dobby's, negative and positive dobby, preparation of chain/ lattice, scope and limitation of dobby, settings and adjustments. **Total Lectures required =8**

Unit (5): Various timings and settings used on loom for filament weaving, Grey inspection and mending, folding process and machines, Numerical problems on loom speed, production & efficiency and cover factor. **Total Lectures required =8**

Grand total of lectures required = 42

Text Books and Reference material:

1. Weaving Mechanism by Fox
2. Weaving Mechanism by N.N. Bennerjee
3. Weaving Calculation, by R. Sengupta
4. Weaving machine and mechanism by M.K. Talukdar

Laboratory work: As per the lab Syllabus

4. Colour & Design (NTT-504) (L T P 3 1 0=4)

Unit (1): Light and colour phenomena, physical basis of colour, Emission & absorption theory of light, Colour vision and light theory of colours, Complementary colours, Chromatic circle, Pigment theory of colours, Brewster circle, Attributes of the primary & secondary colours,

Total Lectures required = 11

Unit (2): Colour measurement, Primary, Secondary, Tertiary & compound colours, Biren's triangle, Modification of colours, Coloured greys, Colours in combination, Colour contrast, contrast in hue, contrast of tone, colour harmony, Relative spaces occupied by colours, divisional colours, Application of colours, Mixed colour effect,.

Total Lectures required =11

Unit (3): Composition of designs, Condition to be observed during ornamentation of fabrics, Mode shade, Harmony of succession, gradation of hue, Different stages of colouring of textile materials, Colour and weave effect and its classification. Bases of Textile design, One third and one fourth drop design, Half drop and drop reverse design,

Total Lecture required = 10

Unit (4): Unit repeating design, Geometric ornamentation, Construction of symmetrical designs, Stripe and check effect designs, Sari border / vertical border design, Factor affecting the woven designs, reversing inclined figure, Diamond, Ogee, & diagonal waved line base, applications of colours.

Total Lecture required = 10

Unit (5): Art sheet based question covering all above units

Grand total Lectures required = 34

Reference Books:

1. W. Watson- Textile design and colour
2. Traditional Textile designs B K Behera

5. **Fabric Structure (NTT-505) (L T P 2 1 0=3)**

Unit (1): Classification of various fabrics, construction of plain weave and its derivatives (rib and mat weave), ordinary twill, right hand twill, warp faced, weft faced & balanced twills,

Total Lectures required = 8

Unit (2): Satin regular, irregular and their extension. Combined twills, end to end and pick-to-pick combination, elongated twills, steep twills, broken twill, curved twill, Fancy twills-large diagonal shaded twills, Wave/ zig-zag, herringbone twill.

Total Lectures Required = 8

Unit (3): Regular and irregular satin, sateen base diagonals and brained twills, Diamond, mock leno, ordinary honeycomb, brighten honeycomb , Huck-a-back and crepe weave.

Total Lectures Required = 9

Unit (4): derivatives of hopsack, barley corn stitched hopsack and twilled hopsack, Ripstop weave, Simple and wadded bed ford cords (1), weft and piques (1), principle of figuring with extra material extra warp figuring, extra weft, limitation of extra thread.

Total Lectures Required = 9

Grand Total Lectures Required = 34

Reference Book: -

1. W. Watson Textile Design & colour Longmans Greens Co. London.
2. Z.J Grosicki Watson's Textile design and colour Newnes Butter Worth, London.
3. Z.J. Grosicki, Advance Textile Design Newnes Butter Worth, London.
4. "Nishant" A Grammar of textile.

Laboratory work: As per the lab Syllabus

6. **HS: Common Syllabus as decided by UPTU) (L T P 2 0 =2)**

5th SEMESTER LAB SYLLBUS

TT-551, Textile testing-I

Measurement of fibre length and its distribution, fineness, moisture content and strength etc using different methods and instruments, Fibre diameter and its variability, cleanliness of cotton, testing of neps in card web, sliver, roving and yarns, Analysis and interpretation of test results.

Measurement of hank of sliver, roving and count of yarn and their variability, Single yarn strength and elongation, Lea strength measurement, Use of statistical techniques for evaluation of experimental results

TT-552, Yarn Manufacturing-III

Practice in handling operation, setting and gauging of lap former, comber and speed-frame, Study of constructional details of machines: various controls and change places etc., Practice in checking the quality of sliver, roving, comber lap and waste analysis, common fault and remedies, Calculation pertaining to gearing, speeds, constant, draft and production etc.

TT-553, Fabric Manufacturing-III

Introduction to loom, its different parts and passage of material on it, Names of parts, setting and fitting of tappet shedding, dobby shedding, jacquard shedding, over pick, under pick, beat up, five wheel take up, seven wheel take up, negative let-off and semi-positive let-off motions

TT-555: Fabric Analysis:

Analysis of various types of fabric structures like plain, twill, satin, hopsack, barleycorn etc , measurement of cover factor and crimp of fabrics.

6th Semester B. Tech. Textile Technology

1. Textile Testing-II (NTT-601) (L T P 3 1 0)

Unit (1): Tensile properties of yarn and fabric, stress-strain curve, various methods for finding of yield point, methods for finding of various modulus, destination of tenacity, and stiffness of fabric. **Total Lectures Required = 7**

Unit (2): Procedure of determination of strength and elongation in the spun yarns, knowledge about the equipment used, yarn tensile strength testing machines, single yarn strength tester, lea strength tester, fabric strength tester- impact tester, Grab test, fabric B.S. Test, Scott serigraph, Instron tensile tester. . **Total Lectures Required = 9**

Unit(3): Measurement of evenness testing of yarns, nature and causes of irregularities, principles and methods of evenness testing, evaluation and interpretation of evenness diagram & spectrogram and their associated equipment, Classimat faults .

Total Lectures required =9

Unit (4): Measurement of physical properties of fabric and the knowledge of the equipment used, tensile strength, bursting strength, tearing strength, pilling, air permeability, crimp, thickness, EPI, PPI, weight and cover factor.

Total Lectures required =10

Unit (5): Measurement of water repellency, shrinkage, measurement of fastness to light and rubbing, thermal transmission, Brief introduction to FAST and KAWABATA.

Total Lectures required =7

Grand total of lectures required = 42

Reference Books: -

1. Physical testing of textiles by B.P. Saville.
2. Quality control and testing management by Dr. V.K. Kothari.
3. Principles of textile testing by J.E. Booth.
4. Quality control by V.K. Kothari.

2. Yarn Manufacture-IV (NTT-602) (L T P 3 1 0)

Unit (1): Introduction and objective of ring frame, important parts of ring frame and their functions, principle and mechanism involved in drafting, twisting and winding, yarn twist: terminology, concept of twist multiplier, propagation of twist, yarn contraction due to twisting. **Total Lectures required =9**

Unit (2): Types of rings and travelers, spinning triangle, forces acting on yarn and traveler during spinning, theory of spinning balloons, yarn tension in ring spinning,

mechanism of cop formation, common package size, limitations of large package spinning, effect of ring rail lift and ring diameter on cop size.

Total Lectures required =8

Unit (3): System of waste collection at ring frame and types of spinning wastes, control of pneumafil waste, factors responsible for loss in efficiency,, control in yarn faults, ring frame calculations pertaining to TPI, production and draft, concept of average mill count at 4o's conversion. **Total Lectures required =8**

Unit (4): Recent developments in ring spinning, Limitations of ring spinning, Compact spinning- Principle and mechanism of yarn formation, yarn quality, basic yarn structure, end-use of compact spun yarns, merits and limitations of compact spinning, yarn characteristics and comparison of yarn properties with ring yarn.

Total Lectures required =8

Unit (5): Doubling: - Objects and terminology, study of ring doublers, fancy yarns, sewing thread and tyre Cord, Reeling: Objects and terminology, types of reeling construction and working of a reel yarn bundling, calculation of draft, TPI and production of ring frame & doubling frame. Routine & preventive maintenance practices in ring spinning. **Total Lectures required =9**

Grand total of lectures required = 42

Text Books and Reference material:

1. NCUTE Series
2. The technology of short staple spinning- W. Klein
3. Spun Yarn technology- Eric Oxtoby
4. Spun Yarn technology, Vol-I- A. Venkatsubramani
5. Elements of Ring frame & Doubling- Dr. A.R. Khare

Laboratory work: As per the lab Syllabus

3. Fabric Manufacture-IV (NTT-603) (L T P 3 1 0)

Unit (1): Jacquards shedding, types of jacquards and their principle of working, cross border jacquards, System of harness mounting and tying, Card cutting, limitations of jacquards, electronic jacquard, recent development in jacquards.

Total Lectures required =9

Unit (2): Automatic Looms- pirn and shuttle changing, various motions of automatic looms, warp stop motion- mechanical, electro-mechanical and electronic.

Total Lectures required =9

Unit (3): Types of multiple box motion, working principle of multiple box motion, two colour and four colour drop box motion, brief description of pick-at-will, pick and pick motion, Online process and quality control, estimation of productivity, snap study

Total Lectures required =9

Unit (4): Terry weaving: essential feature of terry weaving loom, various principle of terry pile formation, Terry let-off-heading, fringing-motion, modern development in terry structure. **Total Lectures required =8**

Unit (5): Introduction of narrow fabric manufacturing, brief description of braiding machines and needle looms, Introduction of non-woven fabrics, brief description of various manufacturing processes of non-woven fabrics.

Total Lectures required =8

Grand total of lectures required = 42

Text Books and Reference material:

1. Weaving Mechanism by Fox
2. Weaving Mechanism by N.N. Bennerjee
3. Weaving Calculation, by R. Sengupta
4. Weaving machine and mechanism by M.K. Talukdar

Laboratory work: As per the lab Syllabus

4. Departmental Elective I

4.1 Structure & properties of Fibres (NTT-011) (L T P 3 1 0)

Unit (1): Basic structural features of fibre, Structure of Cotton, wool, silk, and other textile fibres, relation between fibre structure and fibre, Methods of estimating molecular weight, orientation, crystallinity & crystalline orientation of fibre forming polymer, Overall orientation by “sonic modulus tester,

Total Lectures Required = 87

Unit (2): Concept of scanning electron microscope (SEM), Concept of transmission electron microscope (TEM) Fourier Transform Infrared Spectroscopy (FTIR), Atomic force microscopy, fibre fracture.

Total Lectures Required = 8

Unit (3): Thermal behavior of textile fibres by Differential Scanning Calorimeter (DSC) (2), TGA, thermal mechanical analysis (TGA) (2), Thermomechanical Analyser (TMA) Density gradient column (2), Preparation of density gradient column (2) Crystallinity by density gradient column.

Total Lectures Required = 8

Unit (4): Optical properties of fibres (2), Birefringence behavior, dielectric properties, fibre friction, fibre friction measurement, fibre to fibre, yarn to yarn friction measurement

Total Lectures Required = 87

Unit (5): Creep behavior (2), concept of moisture absorption by fibres (2), (2). Moisture absorption, heat of absorption, differential heat of absorption, integral heat of absorption, Quantitative theory of heat moisture absorption , Rate of moisture absorption

Total Lectures Required = 10

Grand Total of lectures required = 38

Reference Book: -

1. Manufactured fibre technology by V.B. Gupta, V.K. Kothari
2. Physical properties of fibre by J.W.S. Hearle
3. Thermal behavior of material by Turi
4. Modern yarn production by Ray
5. Textile fibres by ATIRA
6. ASTM Standard books
7. Polymers by fibre & textiles encyclopedia
8. Advances in fibre source by S.K. Mukhopadhyaya

4.2 Garment Manufacturing Technology (NTT-012)) (L T P 3 1 0)

Unit (1): Introduction to garment manufacturing technology, Sample cutting, ZFusing, Sewing, Pressing, Finishing and inspection, Line balancing concept.

Total Lectures required =8

Unit (2): Introduction to measurement of fabric dimensional properties, fabric comfort, thermal comfort, objective evaluation of fabric, low stress fabric properties, Kawabata system, fabric assurance by sample testing, fabric defects, Fabric inspection and feedback to back process.

Total Lectures required =9

Unit (3) Introduction to garment cutting, Marker planning, Efficiency of Marker planning, methods of marker planning and marker use, spreading of the fabric, to form a lay, spreading requirements, methods of spreading, fabric packages, objective of cuttings, methods of cuttings

Total Lectures required =9

Unit (4): Introduction to seam, stitch, stitch classification, stitch structure, seam formation, joining material, surface characteristics, seam appearance, damages (thermal and mechanical), seam performance, seam degradation, seam failure, seam puckering and seam testing.

Total Lectures required =9

Unit (5): Importance of garment processing and finishes, types of garment, processing of garments and special garment finishes.

Total Lectures required =7

Grand total of lectures required = 42

Text Books and Reference material:

1. Introduction to Garment Manufacturing Technology By T Ramchandran
2. 2. Garment Manufacturing Technology by By T Ramchandran
3. 3. Practical Clothing Construction Part I & II by Mary Methews

Laboratory work: NA

Departmental Elective II

5.1 Advance Fabric structure (NTT-021) (L T P 2 1 0)

Unit (1): Backed cloths, weft backed cloths, warp backed cloths with weeding threads, double cloths, center stitched, self stitched, inter changing double cloth, cut effect in interchanging double cloths. **Total Lectures required =9**

Unit (2) Turkish towel, Ornamentation of terry weave, triple cloth, Types of carpets and classification of carpets. **Total Lectures required =8**

Unit (3) Damask weaves, Brocade, Tapestry, Velvet, Velveteen, Colour and weave effect, **Total Lectures required =8**

Unit (4): Gauge and leno weave with their mechanism; Lappet and Swivel weave, Ondule fabric, figured pique, draft & peg plan for above weaves.

Total Lectures required =9

Grand total of lectures required = 34

Reference Book: -

1. W. Watson Textile Design & colour Longmans Greens Co. London.
2. Z.J Grosicki Watson's Textile design and colour Newnes Buter Worth, London.
3. Z.J. Grosicki, Advance Textile Design Newnes Butter Worth, London.
4. "Nishant" A Grammar of textile.

5.2 Multi & Long Fibre Spinning (NTT-022) (L T P 2 1 0=3)

Unit 1: Characteristics of manmade fibres, spinnability, blending, and its objectives, Spinnability, blending & its objectives, processing of Man made fibres & blends on short, medium and long staple spinning systems.

Total Lectures Required = 10

Unit 2: Spinning of dyed fibres, estimation of blends intimacy, factors affecting the blend irregularity, structural properties of blended yarns.

Total Lectures Required = 8

Unit 3: Production of bulked yarn, characteristic difference in the physical & mechanical properties of various long staple fibres & their influence in the choice of preparatory & spinning machinery.

Total Lectures Required = 8

Unit 4: Woolen, semi-worsted & worsted systems of spinning, retting of flax, & jute, Jute & flax spinning, manufacturing of spun silk.

Total Lectures Required = 8

Grand total lectures required =34

Reference book:-

1. Spun Yarn technology: Eric Oxtoby
2. Spun yarn technology: Eric Oxtoby.
3. Wool Spinning by Vickerman, Abhishek Publication
4. Principle of woolen spinning by Priestman
5. Woolen & Worsted yarn manufacture by J. W Redcliff
6. Jute Spinning Calculation by Andrew Smith
7. Worsted Drawing & Spinning by Miles

6. HS: Syllabus as decided by UPTU) (L T P 2 0)

6^h SEMESTER LAB SYLLBUS

TT-551, Textile Testing-II

Use of microscope for testing of yarns for appearance, twist and diameter, measurement of evenness, measurement of yarn strength, tenacity, elongation at break, modulus, crimp rigidity, fabric testing for dimension, weight, thickness, shrinkage and air permeability,

Fabric testing for elongation, tensile, bursting, and tearing strength, abrasion resistance, flexural rigidity, crease recovery and draping qualities of fabric

TT-552, Yarn Manufacturing-IV

Operating, setting and gauging of ring frame and doubling frame, study of constructional details of machinery, various controls, change places etc., Practice in checking the quality of single and double yarn, common yarn faults and their remedies, calculations pertaining to gearing, speeds, constant, draft, TPI and production in ring frame and doubling frame.

TT-553, Fabric Manufacturing-IV

Construction, names of parts, setting of automatic pirn change, drop box motions, and shuttle box, Names of parts, setting and fitting of warp protecting, warp and weft stop motions.

7th Semester B. Tech. Textile Technology

1. Open Elective from Other Department

1.1 Process Control in Spinning (NTT-701) (L T P 2 0 0)

Unit (1): Importance of evolving a system for process control, control of mixing quality through fibre characteristics, simultaneous control of mixing cost and quality, concept of bale management. **Total Lectures required =7**

Unit (2): Control of waste in blow room and carding, norms for waste and cleaning efficiency in blow room & card, control of neps, assessment of performance of blow room & card, control of comber waste, concept of yarn realization, calculation pertaining to waste & yarn realization

Total Lectures required =8

Unit (3) Measurement and analysis of productivity, means to improve productivity, maximizing machine efficiency in ring spinning, controlling end breakage rate in ring spinning, control of soft waste and hard waste, control of yarn faults and package defects- slubs, crackers, spinner's doubles, bad piecing & slough off. **Total Lectures required =9**

Unit (4): Control of yarn quality- count, strength and their variability, study of CV% (within bobbin and between bobbin), control of variability of lea strength, single yarn strength and elongation %, Control of yarn unevenness, imperfections and hairiness.

Total Lectures required =9

Grant Total of lectures Required =35

Reference Books:

1. Process Control in Spinning by ATIRA
2. Process Control in Spinning by K.R. Salhotra

1.2 Process Control in Weaving (NTT-702) (L T P 2 0 0)

Unit (1): Scope of process control, systems of process control in weaving, setting norms and schedule of checks, machinery audit, process control in weaving, optimizing quality of preparation, control of quality of knot, producing good package, selection of healds, selection of reeds, dressing of the beams for reducing incidence of cross ends.

Total Lectures required =9

Unit (2): Process control in warping, minimizing end breakage in warping, quality of warping beam, control of productivity, factors responsible for loss in efficiency, control of productivity.

Total Lectures required =7

Unit (3): Process control in sizing, choice recipe and size pick-up, control of size pick-up, control of yarn stretch, quality of sized beams, control of productivity.

Total Lectures required =8

Unit (4): Process control in loom shed, snap study and time and motion study, control of warp and weft breakage, causes and remedies of fabric defects, factors responsible for loss in efficiency, control of productivity, process control in grey inspection, and folding sections.

Total Lectures required =8

Grand total of lectures required = 32

Reference Books

1. Weaving tablets by ATIRA
2. Machine catalogues of various machines manufacture
3. Process control in weaving by ATIRA

2. Open elective from other department

2.1 Quality Management (NOE-072) (L T P 3 1 0)

UNIT-I : Quality Concepts: Evolution of Quality Control, concept change, TQM Modern concept, Quality concept in design, Review of design, Evolution of proto type.

Control on Purchased Product: Procurement of various products, evaluation of supplies, capacity verification, Development of sources, procurement procedure.

Manufacturing Quality: Methods and techniques for manufacture, inspection and control of product, quality in sales and services, guarantee, analysis of claims.

UNIT-II: Quality Management

Organization structure and design, quality function, decentralization, designing and fitting, organization for different type products and company, economics of quality value and contribution, quality cost, optimizing quality cost, seduction program.

Human Factor in quality (11)

Attitude of top management, cooperation of groups, operators attitude, responsibility, causes of apparatus error and corrective methods.

UNIT-III: Control Charts, Theory of control charts, measurement range, construction and analysis of R charts, process capability study, use of control charts.

Attributes of Control Chart , Defects, construction and analysis of charts, improvement by control chart, variable sample size, construction and analysis of C charts.

UNIT -IV : Defects diagnosis and prevention defect study, identification and analysis of defects, correcting measure, factors affecting reliability, MTTF, calculation of reliability, building reliability in the product, evaluation of reliability, interpretation of test results, reliability control, maintainability, zero defects, quality circle.

UNIT –V: ISO-9000 and its concept of Quality Management, ISO 9000 series, Taguchi method, JIT in some details.

Text / Reference Books:

1. Lt. Gen. H. Lal, “Total Quality Management”, Eastern Limited, 1990.
2. Greg Bounds, “Beyond Total Quality Management”, McGraw Hill, 1994.
3. Menon, H.G, “TQM in New Product manufacturing”, McGraw Hill 1992.

2.2 OPERATION RESEARCH (NOE-073) (L T P 3 1 0)

UNIT-I: Introduction:

Definition and scope of operations research (OR), OR model, solving the OR model, art of modelling, phases of OR study.

Linear Programming: Two variable Linear Programming model and Graphical method of solution, Simplex method, Dual Simplex method, special cases of Linear Programming, duality, sensitivity analysis.

UNIT-II : Transportation Problems:

Types of transportation problems, mathematical models , transportation algorithms,

Assignment: Allocation and assignment problems and models, processing of job through machines.

UNIT-III : Network Techniques:

Shortest path model, minimum spanning Tree Problem, Max-Flow problem and Min-cost problem.

Project Management: Phases of project management, guidelines for network construction, CPM and PERT.

UNIT-IV: Theory of Games:

Rectangular games, Minimax theorem, graphical solution of $2 \times n$ or $m \times 2$ games, game with mixed strategies, reduction to linear programming model.

Quality Systems: Elements of Queuing model, generalized poisson queuing model, single server models. (12)

UNIT-V:

Inventory Control, Models of inventory, operation of inventory system, quantity discount., Replacement, Replacement models: Equipments that deteriorate with time, equipments that fail with time.

Text / Reference Books:

1. Wayne L. Winston, “Operations Research” Thomson Learning, 2003.
2. Hamdy H. Taha, “Operations Research-An Introduction” Pearson Education, 2003.
3. R. Panneer Seevam, “Operations Research” PHI Learning, 2008.
4. V.K.Khanna, “Total Quality Management” New Age International, 2008.

3. **Advance Spinning Technology (NTT-704) (L T P 3 1 0)**

Unit-1: Limitation of ring spinning, Principles of unconventional method of yarn manufacturing open-end spinning process, Advantages and Limitations of open-end spinning process, Classification of new spinning yarn technology.

Total Lectures Required = 10

Unit-2: Rotor spinning- Objects of rotor spinning, Principle of operation, Raw material requirements(1), opening unit, yarn formation, Design of rotor, Navel and yarn withdrawal tube, Automation, yarn characteristics comparison of yarn properties with ring yarn and rotor yarn. **Total Lectures Required = 8**

Unit-3: Friction spinning- Principle, DREF-2 and DREF-3, yarn formation , yarn quality, yarn structure(1) fibre specifications for optimum results, merits & limitations, Twist less spinning-TNO process and TWILLO process(1), Traveller-less NOVA Spinning.

Total Lectures Required = 8

Unit-4: Air jet Spinning-Principle, concept of false twist, Fasciated yarn, Murata jet spinning, operation principle(1) Raw material requirement, Effect of process variables on yarn twist & tenacity, yarn quality, limitation of air jet yarns, self twist process.

Total Lectures Required = 8

Unit-5: Bobtex ICS process, Wrap spinning, plyfil spinning, SIRO spinning, Electrostatic spinning, Core spinning compact spinning. **Total Lectures Required = 8**

Grant Total of Lectures Required =42

Reference Book-

1. NCUTE Series
2. The technology of short staple spinning- W. Klein
3. Spun Yarn technology- Eric Oxtoby
4. Spun Yarn technology, A. Venkatsubramani

4. **Knitting Technology (NTT-705) (L T P 3 1 0)**

Unit 1: Difference between knits and wovens, knitting terms and definitions (Course,, wale, stitch density) different type of knitting needles: bearded needle, latch needle, sinker, jack, cam arrangement, overlap, under lap, closed lap, open lap. **Total Lectures required =8**

Unit 2: Comparison of warp and weft knitting, Classification of weft knitting machine, elements of knitting machine like type of needles, sinkers, etc Needle numbering system, technology of loop formation, geometry of loop structure, Elements of loop structure: needle loop, sinker loop, relation between yarn count, machine gauge and stitch density. **Total Lectures required =9**

Unit 3: Classification of knit-structures, loop formation on: single jersey, Rib machines and inters look machines, socks knitting technology, Loop formation on flat bed machine

Total Lectures required =9

Unit 4: Four primary base knitting structures: Plain knitted fabric, Rib fabric, Interlock and Purl fabric, Special knitting machines: Fabric machine, garment length machine, flat machine, circular machine fabrics and Spacer fabrics. **Total Lectures required =7**

Unit 5: Basic warp knitting machines, classification of warp knitting, Modern developments in weft knitting technique, calculations regarding production, gsm, stitch density etc, Causes and remedies of faults of knitted fabrics. **Total Lectures required =9**

Grand total of lectures required = 42

Reference and Text Book-

1. Knitting Technology – Chamberlin
2. Knitting Technology – W.J. Spencer
3. International Textile Journal – Knitting
4. Knitting Calculation – Chamberlin
5. Wet Knitting Vol. 1&2 –Published by IIT New Delhi.
6. Knitting – NCUTE

Laboratory work: S per Lab Syllabus

5. Departmental Elective III

5.1 Nonwoven (NTT-031) (L T P 3 1 0=4)

Unit 1: National and international scenario on non-woven fabric production, Concept about felts and non woven, Classification of non-woven fabrics, fibres for non-woven fabrics, .. Felt Manufacturing process

Total Lectures Required =9

Unit 2: Various method of web formation, web chrematistic and their influence on properties of non-woven fabrics, (3) Non woven fabric by Needle punch, Description of needle punching machine, effect of process variables on properties of needle punch fabric

Total Lectures Required =9

Unit 3: Non-woven fabric by hydroentanglement, Description of hydroentanglement machine, effect of process variables on properties of hydroentanglement non woven fabric, Non-woven fabric by adhesive bonding, mechanical bonding, Melt blown process of non-woven fabric manufacturing

Total Lectures Required =8

Unit 4: Non-woven fabric by Stitch bonding, Non-woven fabric by chemical bonding, Non-woven fabric by bonding with thermoplastic adhesives, Non-woven fabric by Spun laced, Effect of process variables on properties of stitch bonding, chemical bonding spun laced non-woven fabrics

Total Lectures Required =8

Unit 5: Flocked fabric, Laminates, latest development in non-woven industry: ultrasonic bonding, Infra-red bonding, bonding by bi-component fibres,. Application of various non woven fabrics

Total Lectures Required =8

Grand total of Lectures Required= 42

Reference & Text Books

1. Non Woven – N.N. Banarjee
2. Non woven – NCUTE

3. Knitting technology : Spencer

5.2 Fibre Reinforced Composites (NTT-032) (L T P 3 1 0=4)

Unit 1: Definition of composites, Types of composites - fibre particulate and laminar composites, Fibre composites: Constituents - functions of fibre and matrix

Total Lectures Required =9

Unit 2: Types of high performance fibres - properties - types of matrix materials - Thermoset and Thermo plastics properties: short fibre composites, fibre matrix interface, coupling agents, coupling of interfaces and interfacial reaction in fibre composites, fracture mode in fibre composites. **Total Lectures Required =9**

Unit 3: Introduction to fibre reinforced composite material manufacturing techniques, Textile performs for composites: weaving, knitting, braiding. **Total Lectures Required =8**

Unit 4: Vacuum bagging, compression molding, injection molding, pultrusion, thermoforming, filament winding, resin transfer molding. **Total Lectures Required =8**

Unit 5: Testing of composites- Fibre volume fraction -Laminar tensile - shear - compression - and flexural properties, applications of fibre reinforced composites

Total Lectures Required =8

Grand Total of Lectures Required =42

Reference Books:

1. D hull An Introduction to composite materials, Cambridge university press, 1998
2. L Gupta “Advanced Composite Materials”, Himalayan Book, New Delhi, 1998
3. Mathews F.L and Rawlings R.D “Composite Materials Engineering science” Chapman and Hall London, 1994
4. Hearle. J.W.S “High performance fibres composites and engineering textile structures” JTI (special issue) 1990
5. Textile Progress monogram on “Hybrid yarns and textile performing for thermoplastic composites” by R. Alagirusamy, R Fanguero, V. Ogale and N. Padaki Textile Progress 2006 Vol 38 No. 4 (Wood Head Publishing Limited)
6. De.S.K. and White J.R. Short fibre polymer composites, Wood head, 2001

7th SEMESTER LAB SYLLABUS

TT-705: Knitting Technology

To study the path of yarn through circular and flat knitting machine, different knitting elements including the cam system, driving mechanism of plain knitting machine, cloth take-up mechanism of plain knitting m/c, rib knitting m/c including arrangement of dial and cylinder needles, cam, system and driving mechanism, Interlock knitting m/c including arrangement of dial and cylinder needle, cam system and driving mechanism, Warp knitting machine constructional details and mechanism of operation.

8TH SEMESTER TEXTILE TECHNOLOGY

1. Open Elective from Other Departments

1.1 Technical Textiles (NTT-801) (L T P 3 1 0=4)

Unit (1): Introduction to technical textile, types of technical textiles, textiles used in industry such as filtration, filter fabric construction- woven, needle felt & knitted filter fabric, finishing treatment of filter fabric, thermal and chemical properties of filter fabric, essential requirements of good filter fabric. **Total Lectures required =8**

Unit (2): Manufacture and properties of protective textiles- water proof/coated and water repellent, antimicrobial, flame retardant, chemical resistance, Nuclear and biological resistance, mechanical resistance such as bullet proof, cut proof, stab proof

Total Lectures required =9

Unit (3): Medical textiles, fibres used, classification of medical textiles- non-implantable material wound dressings, bandages, plasters, etc, Extra-corporal devices – Artificial kidney, liver lung, implantable material- suture, soft tissue implant, Orthopedic implants, Cardiovascular implants, Healthcare/ hygiene products, medical cost, surgical gown, face mast etc. **Total Lectures required =8**

Unit (4): Smart textiles, brief introduction of smart textiles, classification of smart textiles, passive smart textiles, active smart textiles, brief discussion of smart shirt, smart suit, musical jacket, space suit etc. automotive textiles: type cord, seat belt, air bag, seat upholstery, carpets, headliners, helmets etc, Agro textile: Shade net, green house film, Mulch net, crop cover, anti hail and bird protection net, finishing net etc. **Total Lectures required =9**

Unit (5): Introduction of geo textile, classification of geo textiles, functions of geo textile- soil reinforcement, drainage (fluid transmission), filtration, separation, erosion control/ absorption, objective of geo textiles, manufacturing of geo textile, essential properties of geo textiles- Mechanical determinants, Hydraulic determinants, durability determinants

Total Lectures required =8

Grand total of lectures required = 42

Text Books and Reference material:

1. Hand book of technical textiles- A.R. Horrocks & S.C. Anand
2. Smart fibre, fabrics and clothing Tao X
3. Shears handbook of industrial Textiles.

1.2 PRODUCT DEVELOPMENT (NOE-083) (L T P 3 1 0=4)

UNIT-I: Concept of Product, definition and scope. Design definitions, old and new design methods, design by evolution, examples such as evolution of sewing M/C, bicycle, safety razor etc., need based developments, technology based developments physical reliability & economic feasibility of design concepts.

UNIT –II: Morphology of design, divergent, transformation and convergent phases of product design, identification of need, Analysis of need. Design criteria; functional, aesthetics,

ergonomics, form, shape, size, colour. Mental blocks, Removal blocs, Ideation techniques, Creativity, Check list.

UNIT –III: Transformations, Brainstorming& Syntetics, Morephological techniques. Utility Concept, Utility Valaue, Utility Index, Decision making under Multiple Criteria. Economic aspects, Fixed and variable costs, Break-even analysis.

UNIT-IV: Reliability considerations, Bath tub curve, Reliability of systems in series and parallel, Failure rate, MTTF and MTBF, Optimum spares from Reliability considerations. Design of display and controls, Man-machine interface, Compatibility of displays and controls. Ergonomic aspects, Anthropometric data and its importance in design. Application of Computers in Product development & design.

UNIT-V: Existing techniques, such as work-study, SQC etc. for improving method & quality of product. Innovation versus Invention. Technological Forecasting. Use of Standards for Design.

Text/Reference Books:

1. A.K. Chitab& R.C. Gupta “Product design & Manufacturing” – Prentice Hall (EE)
2. R.P. Crewford, “The Technology of creation Thinking” Prentice Hall.
3. C.D. Cain, “Product Design & Decision” Bussiness Books.
4. C.D. Cain, “Engg. Product Design” Bussiness Books.

2. Mill Planning & Organization (NTT-803) (L T P 3 1 0=4)

Unit-1: Selection of site for a textile mill. Preparation of project report), Construction of building of a textile mill, Types of buildings, single and multistoried buildings. Fire hazards and their control Safety rules for textile industry, Prevention tours accidents,

Total of lectures required=9

Unit-2: Humidification of a textile mill, Humidifiers and dehumidifiers. Ventilation in textile mill,. Air conditioning and refrigeration System, lighting used in textile mill.

Total of lectures required=8

Unit-3: Balancing of machines for spinning and weaving mills Layout of different machines of spinning and weaving. **Total of lectures required=7**

Unit-4: Costing,, introduction to cost terms and purposes,. Cost volume, profit analysis, Master budget, flexible budget, cost allocation, process costing, waste cost in textile mill, labour and material cost, wage system in textile mill, Predetermining spinning and weaving cost, Viability evaluation of a project. **Total of lectures required = 10**

Unit (5) Calculation regarding payback period and Break-even point, Types of staff organization, Staff organization system in textile mills, **Total of lectures required = 8**

Grant total of Lectures Required = 42

Text Books & Reference Material

1. Industrial Engineering, Organization & management by Tarachand
2. Industrial Economics & Principle of Management by T.M. Chabra
3. Industrial Economics & Principle of Management by S. K Sharma

3. Departmental Elective IV

3.1 Theory of Textile Structure (NTT-041) (L T P 3 1 0)

Unit (1): Classification of yarns, Yarn geometry- idealized yarn geometry, relationship of yarn number and twist factor, packing of fibres in a yarn, ideal packing, hexagonal close packing and radial packing, packing factor and its measurement, yarn diameter, method of measurement of twist contraction. **Total Lectures required =10**

Unit (2): Fibre migration: mean fibre position, amplitude of migration and frequency of migration, mechanism of migration, spinning-in coefficient and fibre extent. estimation of strength of blended yarn **Total Lectures required =6**

Unit 3: Mechanism of staple fibre yarns, translation of fibre properties into yarn properties, twist and strength relationship, limit of twist, spinability of textile fibres, relation with end-breakage rate. **Total Lectures required =9**

Unit (4): Elements of fabric geometry, cloth setting theories, flexible and rigid thread model, Pierce's equation and later modifications. **Total Lectures required =7**

Unit (5): Relation of fabric properties to simple geometry, crimp interchange in woven fabric, crimp balance equation, Fabric cover, cover factor and their significance, relation between cover and weight per unit area of fabric, Theoretical treatment of fabric deformation in tension

Total Lectures required =10

Grand total of lectures required = 42

Text Books and Reference material:

1. Textile Yarn- B.C. Goswami, J.G. Martindale, F.L. Scardine
2. Textile structure- J.W.S. Hearle, S. Backer, Grossberg.
3. Pierce's geometry- Textile institute

3.2 Mechanical Machine Design (NTT-042) (L T P 3 1 0)

Unit 1: Design Philosophy: Problem identification- problem statement, specifications, constraints, Feasibility study technical feasibility, economic & financial feasibility, societal & environmental feasibility, Generation of solution field (solution variants), Brain storming, Preliminary design, Selection of best possible solution, Detailed design, Selection of Fits and tolerances and analysis of dimensional chains. Selection of Materials: Classification of Engg. Materials, Mechanical properties of the commonly used engg. Materials, hardness, strength parameters with reference to stress-strain diagram, Factor of safety.

Total Lectures Required =11

Unit 2: Mechanical Joints: ISO Metric Screw Threads, Bolted joints in tension, Eccentrically loaded bolted joints in shear and under combined stresses, Design of power screws, Design of various types of welding joints under different static load conditions. Riveted Joints, Cotter & Knuckle Joints: Design of various types of riveted joints under different static loading conditions, eccentrically loaded riveted joints, design of cotter and knuckle joints.

Total Lectures Required =11

Unit 3: Belt rope and chain drives: Design of belt drives, Flat & V-belt drives, Condition for Transmission of max. Power, Selection of belt, design of rope drives, design of chain drives with sprockets. Keys, Couplings & Flywheel: Design of Keys – Flat, Kennedy Keys, Splines, Couplings design – Rigid & Flexible coupling, turning Moment diagram, coefficient of fluctuation of energy and speed, design of flywheel –solid disk & rimmed flywheels.

Total Lectures Required =10

Unit 4: Clutches: Various types of clutches in use, Design of friction clutches – Disc. Multidisc, Cone & Centrifugal, Torque transmitting capacity. Brakes: Various types of Brakes, Self energizing condition of brakes, Design of shoe brakes – Internal & external expanding, band brakes, Thermal Considerations in brake designing.

Total Lectures Required =10

Grant Total of Lectures Required = 42

Text Books & Reference Material :

1. Engineering design – George Dieter, MGH, New York.
2. Product Design and Manufacturing , A.K.Chitale and R.C.Gupta, PHI.
3. Machine Design An Integrated Approach: Robert L.Norton, Addison Wesley.
4. Machine Design : S.G. Kulkarni - Tata MacGraw Hill.
5. Design of machine elements-C S Sharma, Kamlesh Purohit, PHI.
6. Mechanical Engg. Design - First Metric Editions: Joseph Edward Shigley-MGH, New York.
7. Design of Machine Elements – V.B. Bhandari – Tata McGraw Hill, New Delhi.

4. Departmental Elective V

4.1 Electronics in Textiles (NTT-051)

Unit 1: Overview of applications of electronic and controls in textile equipments and machines, Overview of basic analog electronics (R L C, V, I), **Total lectures required =9**

Unit 2: Basic circuits used for controllers, Overview of basic digital electronic: Gates and ICs, **Total lectures required =9**

Unit 3: Various types of sensors and transducers used in textile industry (displacement, position, force, temperature, pressure, flow), **Total lectures required =8**

Unit 4: Signal conditioning, control elements, system and examples, Data acquisition analysis, Control and automation by microprocessors, and microcontrollers, **Total lectures required =8**

Unit 5: Motor and power drives, some applications of data acquisition and control systems in textiles, **Total lectures required =8**

Grand Total of Lectures required = 42

Reference books:

1. Semiconductor Devices and Circuits,: Alope K Dutta
2. Solid state electronic devices: D K Bhattacharya
3. Principle of semiconductor devices: Sima Dimitrejev

4.2 ADVANCE Weaving Technology (NTT-052) (L T P 3 1 0)

Unit (1): Principle of operation of shuttle-less loom, classification of shuttle-less looms, various systems of weft insertion, advantage of shuttle less looms over shuttle looms

Total Lectures required =8

Unit (2): Basic principle of sulzer projectile weaving, sequence of weft insertion i.e. weft supply system, feeding of yarn to projectile, Toggle-torsion bar picking mechanism, Cam driven shedding (dobby, card cutting, card reading, card wielding and card pasting), double cam beat-up, weaving machine *timing advantages and limitations of sulzer looms, shuttle less weaving with more than one weft.* **Total Lectures required =9**

Unit 3: The rapier system of weft insertion, classification of rapier looms and its description, flexible and rigid rapier, tip transfer and loop transfer, weft control mechanism, loom timing

Total Lectures required =8

Unit (4): Working principle of air-jet weaving, essential requirements of shedding, sequence of weft insertion, weft measuring, weft tensioning, beating-up, weft gripping, weft cutting, weft stop motion and selvedge formation ,Problems in air-jet weaving machine, its remedies, design of nozzle, nozzle parameters affecting characteristics of air-jet, quality of air required, weaving machine timings, air drag force & factors affecting air drag force, blowing sequence of relay nozzles and timing control. **Total Lectures required =9**

Unit (5): Water-jet weaving machine: principle of weft insertion, path of yarn on weaving machine, sequence of weft insertion i.e. weft supply system, feeding of yarn to main nozzle, picking mechanism, nozzle pump design, problems encountered, drying of fabric on weaving machine, quality of water required. **Total Lectures required =9**

Grand total of lectures required = 42

Text Books & Reference Materila

1. Text Books and Reference material:

1. Modern development in weaving machine, by Duxburg
2. Weaving mechanism, machine and management, by Talukdar.
3. Weaving mechanism, by Robinson
4. Modern weaving preparation and machinery, by A. Ormerod

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Study and Evaluation scheme

B. Tech. TEXTILE ENGINEERING

[Effective from the Session 2014-15]

YEAR 2nd, SEMESTER- III

S. No.	Subject Code	Name of Subject	Periods			Evaluation Scheme			Subject Total	Credits	
			L	T	P	Sessional Assessment					
						CT	TA	Total			
THEORY SUBJECT											
1	NAS-301/ NOE-031-039	Engg. Mathematics-III/ Science based Open Elective	3	1	0	30	20	50	100	150	4
2	NTT-301	Yarn Manufacture-I	3	1	0	30	20	50	100	150	4
3	NTT-302	Fabric Manufacture-I	3	1	0	30	20	50	100	150	4
4	NTT-303	Wet Processing of Textiles-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	NTT-304	Textile Fibre-I	2	1	0	15	10	25	50	75	3
	AUC-001/ AUC-002	Human Value & Professional Ethics/ Cyber Security	2	0	0	15	10	25	50	75*	
PRACTICAL/ DESIGN/DRAWING											
7	NTT-351	Yarn Manufacture-I Lab	0	0	3	10	10	20	30	50	1
8	NTT-352	Fabric Manufacture-I Lab	0	0	3	10	10	20	30	50	1
9	NTT-353	Wet Processing of Textiles-I Lab	0	0	2	10	10	20	30	50	1
10	NTT-354	Textile Fibre-I Lab	0	0	2	10	10	20	30	50	1
11	NGP-301	General Proficiency								50	
		Total	18	5	10					1000	25

Paper Code Science Based Open Electives:

NOE-031	Introduction to Soft Computing (Neural Network, Fuzzy Logic and Genetic Algorithm)
NOE-032	Nano Sciences
NOE-033	Laser Systems and Applications
NOE-034	Space Sciences
NOE-035	Polymer Science & Technology
NOE-036	Nuclear Science
NOE-037	Material Science
NOE-038	Discrete Mathematics
NOE-039	Applied Linear Algebra

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YEAR 2nd, SEMESTER- IV

S. No.	Subject Code	Name of Subject	Periods			Evaluation Scheme			Subject Total	Credits	
			L	T	P	Sessional Assessment					
						CT	TA	Total			
THEORY SUBJECT											
1	NOE-041 - NOE-049/ NAS-401	Science based Open Elective /Engg. Mathematics-III	3	1	0	30	20	50	100	150	4
2	NTT- 401	Yarn Manufacture-II	3	1	0	30	20	50	100	150	4
3	NTT-402	Fabric Manufacture-II	3	1	0	30	20	50	100	150	4
4	NTT-403	Wet Processing of Textiles-II	3	1	0	30	20	50	100	150	4
5	NHU401/ NHU402	Industrial Psychology/ Industrial Sociology	2	0	0	15	10	25	50	75	2
6	NTT-404	Textile Fibre-II	2	1	0	15	10	25	50	75	3
	AUC-002/ AUC-001	Cyber Security/ Human Value & Professional Ethics	2	0	0	15	10	25	50	75*	
PRACTICAL/ DESIGN/DRAWING											
7	NTT-451	Yarn Manufacture-II Lab	0	0	3	10	10	20	30	50	1
8	NTT-452	Fabric Manufacture-II Lab	0	0	3	10	10	20	30	50	1
9	NTT-453	Wet Processing of Textiles-II	0	0	2	10	10	20	30	50	1
10	NTT-454	Textile Fibre-II	0	0	2	10	10	20	30	50	1
11	NGP-401	General proficiency								50	
		Total	18	5	10					1000	25

Science Based Open Elective:

- NOE-041 Introduction to Soft Computing (Neural Network, Fuzzy Logic and Genetic Algorithm)
- NOE-042 Nano Sciences
- NOE-043 Laser Systems and Applications
- NOE-044 Space Sciences
- NOE-045 Polymer Science & Technology
- NOE-046 Nuclear Science
- NOE-047 Material Science
- NOE-048 Discrete Mathematics
- NOE-049 Applied Linear Algebra

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B. Tech. TEXTILE ENGINEERING
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YEAR 3rd , SEMESTER- V

S. No	Subject Code	Name of Subject	Periods			Evaluation Scheme			Subject Total	Credits	
			L	T	P	Sessional Assessment					
						CT	TA	Total			
THEORY SUBJECT											
1	NTT 501	Textile Testing-I	3	1	0	30	20	50	100	150	4
2	NTT-502	Yarn Manufacture-III	3	1	0	30	20	50	100	150	4
3	NTT-503	Fabric Manufacture-III	3	1	0	30	20	50	100	150	4
4	NTT-504	Colour & Design	3	1	0	30	20	50	100	150	4
5	NTT-505	Fabric Structure	2	1	0	15	10	25	50	75	3
6		HS	2	0	0	15	10	25	50	75	2
PRACTICAL/ DESIGN/DRAWING											
7	NTT- 551	Textile Testing-I Lab	0	0	3	10	10	20	30	50	1
8	NTT-552	Yarn Manufacture-III Lab	0	0	3	10	10	20	30	50	1
9	NTT-553	Fabric Manufacture-III Lab	0	0	2	10	10	20	30	50	1
10	NTT-555	Fabric Analysis Lab	0	0	2	10	10	20	30	50	1
11	NGP-501	General proficiency								50	
		Total	16	5	10					1000	25

***HS: To be decides by UPTU**

U.P TECHNICAL UNIVERSITY, LUCKNOW
Study and Evaluation scheme
B. Tech. TEXTILE ENGINEERING
[Effective from the Session 2015-16]

YEAR 3rd, SEMESTER- VI

S. No	Subject Code	Name of Subject	Periods			Evaluation Scheme			Subject Total	Credits	
			L	T	P	Sessional Assessment		ESE			
						CT	TA				Total
THEORY SUBJECT											
1	NTT-601	Textile Testing-II	3	1	0	30	20	50	100	150	4
2	NTT-602	Yarn Manufacture-IV	3	1	0	30	20	50	100	150	4
3	NTT-603	Fabric Manufacture-IV	3	1	0	30	20	50	100	150	4
4	NTT-011/ NTT-012	Structure & Properties of Fibre/ Garment Manufacture Technology	3	1	0	30	20	50	100	150	4
5	NTT-021/ NTT-022	Advance Fabric Structure/ Multi & Long Fibre Spinning	2	1	0	15	10	25	50	75	3
6		HS	2	0	0	15	10	25	50	75	2
PRACTICAL/ DESIGN/DRAWING											
7	NTT-651	Textile Testing-II Lab	0	0	3	10	10	20	30	50	1
8	NTT-652	Yarn Production Lab	0	0	3	10	10	20	30	50	1
9	NTT-653	Fabric Production Lab	0	0	2	10	10	20	30	50	1
10	NTT-654	SEMINAR			2		50	50		50	1
11	NGP-601	General proficiency								50	
		Total	16	5	10					1000	25

***HS: To be decided by UPTU**

Departmental Elective I

1. NTT-011 Structure & Properties of fibres
2. NTT-012 Garment Manufacturing Technology

Departmental Elective II

1. NTT-021 Advance Fabric Structure/
2. NTT-022 Multi & Long Fibre Spinning

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B. Tech. TEXTILE ENGINEERING

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YEAR 4th , SEMESTER- VII

S. No.	Subject Code	Name of Subject	Periods			Evaluation Scheme			Subject Total	Credits	
			L	T	P	Sessional Assessment					
						C T	T A	Tot al			
THEORY SUBJECT											
1	NTT-701/ NTT-703	Process Control in Spinning/ Dynamics of Textile Machines	2	0	0	15	10	25	50	75	2
2	NOE-071/ NOE-072/ NOE-073	Entrepreneurship Development / Quality Management/ Operation Research	3	1	0	30	20	50	100	150	4
3	NTT-706	Principles & Design of Spinning Machines	3	1	0	30	20	50	100	150	4
4	NTT-705	Knitting Technology	3	1	0	30	20	50	100	150	4
5	NTT-031/ NTT-032	Non Woven/ Fibre Reinforced Composite	3	1	0	30	20	50	100	150	4
PRACTICAL/ DESIGN/DRAWING											
6	NTT-751	PROJECT	0	0	8	-	50	50	100	150	4
7	NTT-752	Industrial Training	0	0	2	-	75	75		75	2
8	NTT-755	Knitting Technology	0	0	2	10	10	20	30	50	1
	NGP-701	General Proficiency								50	
		Total	14	4	13					1000	25

Open Elective from other departments -I

3. NTT-703 Dynamics of Textile Machines
4. NTT-701 Process Control in Spinning

Open Elective from other departments -II

1. NOE-071 Entrepreneurship Development
2. NOE-072 Quality Management
3. NOE-073 Operation Research

Departmental Elective

1. NTT-031 Mill Planning & Organization
2. NTT-032 Fibre Reinforced Composite

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B. Tech. TEXTILE ENGINEERING

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YEAR 4th , SEMESTER- VIII

S. No	Subject Code	Name of Subject	Periods			Evaluation Scheme			Subject Total	Credits	
			L	T	P	Sessional Assessment					
						CT	T A	Tot al			
THEORY SUBJECT											
1	NTT-801/ NTT- 082	Technical Textiles/ Product Development	3	1	0	30	20	50	100	150	4
2	NTT-802	Mill Planning & Organization	3	1	0	30	20	50	100	150	4
3	NTT-041/ NTT-042	Theory of Textile structure / Mechanical Machine Design	3	1	0	30	20	50	100	150	4
4	NTT-051/ NTT-053	Electronics in Textiles/ Principles & Design of Weaving Machines	3	1	0	30	20	50	100	150	4
PRACTICAL/ DESIGN/DRAWING											
5	NTT-851	PROJECT	0	0	12		100	100	150	250	7
6	NTT-852	SEMINAR	0	0	3		100	100		100	2
	NGP-801	General Proficiency								50	
		Total	12	4	15					1000	25

Open Elective from Other Deptt

1. NTT-801 Technical Textiles
2. NOE-082 Product Development

Departmental Elective IV

1. NTT-041 Theory of Textile Structure
2. NTT-042 Mechanical Machine Design

Departmental Elective IV

1. NTT-051 Electronics in Textiles
2. NTT-053 Principles & Design of Weaving Machines

3rd Semester B. Tech. Textile Engineering

1. (Engineering Core: Interdisciplinary):

Engineering Mathematics-III/Science based electives (NAS-301/NOE-031-038)
(L T P 3 1 0 = 4): Common Syllabus provided by UPTU

2. Yarn Manufacture –I (NTT-301) (L T P 3 1 0)

Unit (1): Introduction to passage of material through spinning process by flow charts and brief description of each process, Picking and pre-cleaning of cotton, objective of ginning, description and working of roller and saw gins. Picking and cleaning of jute, wool and linen/
Total Lectures required =9

Unit (2): Objective of mixing, different types of mixing & blending, difference between mixing & blending, Objective of tinting, use of anti-static agents, Mixing different cotton varieties, Different mixing methods and their advantages and disadvantages
Total Lectures required = 08

Unit (3): Objective of blow room, Principles of opening and cleaning, various types of openers, their construction and working, selection of beating/ cleaning points according to type of cotton and their suitable combinations, Grid bars and their setting, Blow room line for synthetic fibres, Blending of man-made fibres with cotton, modern blow room line.
Total Lectures required =8

Unit (4): Unit (4): Lap forming mechanism, Chute/flock feed systems and their comparison, Lap rejection, Causes of lap defects and their remedies, Transport control and regulation of material in blow room, performance assessment of blow room,
Total Lectures required =8

Unit (5): Problems of contamination and their remedies, working of contamination separators, Waste extraction mechanism at various openers and beaters, cleaning efficiency of different machines, lint-trash ratio, nep generation, fibre breakage and their control, Calculations pertaining to production of blow room and cleaning efficiency, Maintenance practices in Blow-room
Total Lectures required =9

Grand total of lectures required = 42

Text Books and Reference material:

8. Cotton ginning: Textile Progress, Vol 24, No 2, I. Doraiswamy, P. Chellamani
9. Spun Yarn Technology, Vol.-I- A Venkatsubramaniam
10. Elements of raw cotton & blow room- Dr. A. R. Khare

11. A practical guide to opening & carding- W. Klein
 12. Cotton Spinning- Taggart
 13. Spun Yarn Technology- Eric Oxtoby
 14. Spinning blow room & carding by Prof. K.R. Salhotra & Prof. R. Chattopadhyaya
- Laboratory work: As per the lab Syllabus

4. Fabric Manufacture-I (NTT-302) (L T P 3 1 0)

Unit (1): Introduction to weaving process and its sequence, Objective of conventional cone winding, classification of winding, (manual & automatic), Study of slow, high and super high speed warp winding machines, difference between precision winding and drum winding (2), Features of slow, high & super high speed winding machines,.

Total Lectures required =9

Unit (2): Type of package winding (parallel & cross winding), thread stop motion, tensioning device, Mechanical & electrical sub-catchers, clearing efficiency of winding machine, knot factor, types of knot,

Total Lectures required =7

Unit (3): Ways of yarn traversing, Ribbon formation and s of elimination, Machine traverse ratio, angle of wind, conicity of cone, packages, ribbon formation and method of its elimination, package density, winding parameters, package defects during winding and their remedies.

Total Lectures required =8

Unit (4): Auto-coner: Objective of auto-coner, important parts of auto-coner and their functions, concept of yarn clearing, concept of splicing, Brief idea of classimat test report, Cheese winding, Important parts of cheese winding & their functions

Total Lectures required =9

Unit (5): High speed weft winding machines, detailed study of mechanism and setting of speed on weft winders, Automatic and non-automatic pirn winding machines, Bunch motion and its importance, Maintenance practices in winding machines

Total Lectures required =9

Grand total lectures required =42

Text Books & Reference Books:

1. R. Sengupta, yarn preparation, the popular book depot Mumbai.
2. Cotton yarn weaving (ATIRA), 1980
3. M.K. Talukdar- An introduction to winding and warping.
4. P.K. Bannerjee- Yarn winding NCUTE, IIT Delhi.
5. A. Ormerdd weaving technology and operation, Textile Institute U.K.
6. Industrial practices in weaving preparatory

Laboratory Work: As per the lab syllabus

4. Wet Processing of Textiles -I (NTT-303) (L T P 3 1 0)

Unit (1): Role of water & its quality for wet processing, Principle and application of surfactant in textile processing, Sequence of chemical processing, of textiles, natural and added impurities in textiles, Various preparatory processes for cotton, wool, silk, nylon, polyester, acrylic and blends including optical whitening

Total Lectures required =9

Unit (2): Objectives of desizing, scouring, bleaching and mercerization of textile materials, Different types of desizing and bleaching agents, methods of desizing, singeing, scouring and bleaching of textile material, various faults in bleaching and their remedies and removal.

Total Lectures required =9

Unit (3): Objective of heat setting, Objective of mercerization, physical and chemical aspects of mercerization, method and types of heat setting and mercerizing, yarn and fabric mercerizing, Optical brightening agents, and their application

Total Lectures required =8

Unit (4): Brief introduction to processing machinery and new processes development in machinery for preparatory and dyeing.

Total Lectures required =8

Unit (5): Introduction to colours and their mixing, Measurement of colour, Application of Computer Colour Matching system as a quality control tools to evaluate strength/ Purity of dye, shade matching, whiteness/ yellowness index

Total Lectures required =8

Grand Total Lectures Required =42

Books:

1. Chemical processing of cotton and p/c blends – ATIRA
2. A glimps on the chemical technology and textile fibres by R.R. Chackrawartty
3. Technology of bleaching and mercerization by V.A. Shenai
4. Technology of finishing by V.A. Shenai

Laboratory work: As per the lab Syllabus

5. Industrial Psychology/ Industrial Sociology (NHU301/NHU302) Syllabus to be decided by UPTU (L T P 2 0 0=2)

6. Textile Fibre-I: (NTT-304) (L T P 2 1 0)

Unit (1): Fibre, textile fibre (1). Classification of natural textile fibres (1), Essential and desirable properties of textile fibres (2), National and international production and consumption of various natural fibres (cotton, wool, silk linen, ramie, jute etc) Advantages and disadvantages of natural and man-made fibres.

Total Lectures required = 08

Unit (2): Geographical distribution and cultivation of cotton fibre, varieties of cotton fibre, Morphological structure of cotton fibre, Physical properties of cotton fibre, Effect of acid and alkalis on cotton fibre, Grading of cotton, Fibre Quality Index.

Total Lectures required = 09

Unit (3): Cultivation, extraction, morphological structure, properties and uses of bast fibres such as flax, jute, hemp, and ramie, Production of raw silk, Morphological structure of silk, Production of waste silk yarn, Chemical composition and physical properties of silk, effect of acid and alkalies, varieties of silk with brief description etc.

Total Lectures required = 08

Unit (4): Morphological structure of wool, Composition of wool fibre, Wool scouring, and combing, Properties of wool fibres, Varieties of wool fibre with brief description. **Total Lectures required =8**

Grand total of Lectures = 33

Books:

1. W.E. Morton & J.W.S. Hearle, Physical properties of textile fibres, Textile Institute, U.K.
2. Progress in textiles: Science and technology Vol.-2 By Dr. V.K. Kothari, I.I.T. Delhi.
3. Hand book of textile fibres by J.Gordon Cook
4. Fibre Science and Technology, S P Mishra

Laboratory work: As per the lab Syllabus

7. Human Value & Professional Ethics/ Cyber Security: Audit Course
Common Syllabus as Decided by UPTU BOS

3RD SEMESTER TEXTILE ENGINEERING LAB SYLLABUS

TT-351: Yarn Manufacturing-I:

Practice in handling and operation of blow room, study of constructional details of machinery in blow room, calculating speed of different machine parts, Blows per inch of Krishna beater, Production calculation of blow room, various controls points and change places, Practice in checking the quality of laps

TT-352: Fabric Manufacturing-I

Study of cone winding, cheese winding and auto coner, constructional details of machine, types of packages produced by them and package faults, Calculations pertaining to cone winding, cheese winding, ring doubler, reeling & TFO.

TT-353 Wet Processing of Textiles-I:

Sizing, scouring, bleaching and mercerization of cotton fabric and to evaluate the effectiveness of each process using various test such as Tewega test, drop absorption test, whiteness index, barium activity number test, measure wax content, ash content and scouring loss of cotton fabric, find out available chlorine in a given sample of sodium hypo chloride, determine strength of H₂O₂ (Hydrogen peroxide) by titration method, to finish fabric with water repellent and flame retardant finishes and test water repellency and flame retardant property using appropriate test method.

TT-354: Textile Fibres-I

Principle of microscopy, microscopic identification of natural fibres, preparation and mounting of specimen for longitudinal view, standard scheme of analysis of homogeneous fibre and blend by physical and chemical methods, preparation of reagents used for chemical analysis

4th Semester B. Tech. Textile Engineering

1. **Engg. Mathematics-III (NAS-401)/ Science based open elective (NOE-041-048):** Common Syllabus as decided by UPTU BOS (L T P 3 1 0 =4)

2. **Yarn Manufacture-II (NTT-401) (L T P 3 1 0= 4)**

Unit (1): Objective of carding, constructional features and working details of licker-in, cylinder, doffer and flats for processing different materials, Principles of carding.

Total Lectures required =8

Unit (2): Flexible and metallic card clothing, requirement of wire grinding, Process parameters, settings and gauges for different materials, Carding defects and their remedies, mechanism of neps and hooks formation, assessment and their control.

Total Lectures required =9

Unit (3): Tandom carding, Modern development in carding, Auto leveler used in carding, Basic idea woolen, jute and flax carding, carding calculations pertaining to draft and production

Total Lectures required =8

Unit (4): Objective of draw frame, working principles of draw frame including constructional details, drafting systems, weighting in draw frame, draft distribution, doubling and blending, drafting force, coiling system and stop motion.

Total Lectures required =8

Unit (5): Concept of ideal draft and formation of drafting waves, drafting irregularities , and their causes, Hooks removal at draw frame, Principles of roller setting, Modern developments in draw frame, Auto leveling, Calculation pertaining to draft and production

Total Lectures required =9

Grand total of lectures required = 42

Text Books and Reference material:

8. Mechanics of spinning machines, by R. rengaswami

9. New Spinning by R.V.M Gowda

10. Elements of carding & draw frame- Dr. A. R. Khare

11. Short staple spinning, Vol-III- W. Klein

12. Cotton Spinning- Taggart

13. Spinning drawing, combing, roving, by Dr. R. Chattopadhyay & Dr. R. Rengaswamy

14. Spinning blow room & carding by Prof. K.R. Salhotra & Prof. R. Chattopadhyaya

Laboratory work:

As per the lab Syllabus

3. Fabric Manufacture-II (NTT-402) (L T P 3 1 0= 4)

Unit (1): Objective of warping, Classification of warping machines, slow, high and super high speed warping machines, Salient features of high and super high speed direct warping machines, different types of warping creels, Tension devices and their setin, Various stop motions used in warping machines, Quality of good warping beam, Common faults in warper's beam, their causes and remedies

Total Lectures required =10

Unit (2): Sectional warping machines, Waxing attachment, computerized warping machines, pattern beam preparation for loom and sizing, Quality of good weaver's beam, Common faults in beam, their causes and remedies, Estimation of efficiency and productivity of various types of warping machines

Total Lectures required =7

Unit (3): Objectives of sizing and sizing terminology, Details of slasher sizing, multi-cylinder sizing, Hot air sizing and high pressure sizing, sizing ingredients used for cotton and synthetic warp, properties of size paste, Factors affecting size pick-up

Total Lectures required =9

Unit (4): Common faults occurring in sizing beam, their causes and remedies, Various types of drying systems and their advantages & disadvantages, importance of moisture content and stretch % in sized yarn,.

Total Lectures required =8

Unit (5): Causes and remedies of lapper and migration, shore hardness of squeeze roll, Numerical problems about sizing, Various controls used on a modern sizing m/c, Drawing-in: Objectives, process description, reed count system, manual drawing-in, semi-automatic drawing-in process, Knotting process and its limitations

Total Lectures required =8

Grand total of lectures required = 42

Text Books and Reference material:

5. Yarn preparation by R. Sengupta
6. An introduction to winding & warping by M.K. Talukdar
7. Yarn winding by P.K. Bannerjee, IIT Delhi
8. Modern preparation & weaving machinery by A Ormerod, Textile Institute, U.K.

Laboratory work: As per the lab Syllabus

4. Industrial Psychology/ Industrial Sociology: Syllabus provided by UPTU BOS

5. Wet Processing of Textiles II (NTT-403) (L T P 3 1 0)

Unit (1): Classification of dyes according to their mode of application, Dyeing of cellulosic material with direct, reactive, vat and sulphur dyes. Dyeing of polyester with disperse dyes, exhaust and continuous dyeing

Total Lectures required =9

Unit (2): Dyeing of nylon, wool, and silk with acid, metal complex dyes, dyeing of acrylic with basic dyes, cross dyeing of polyester and cellulosic blends, Dyeing of nylon and wool and wool and acrylic blends.

Total Lectures required =8

Unit (3): Styles and methods of printing outline of various methods and their limitations. Application and type of printing thickeners, Properties of thickener, printing auxiliaries, Technology of printing

Total Lectures required =8

Unit (4): Finishing: Introduction to finishing, Classification of finishing (mechanical and chemical), Various types of mechanical finishing such as singeing, calendaring, Milling, raising, napping, brushing, and shrinking, Heat setting,

Total Lectures required =8

Unit (5): Various types of chemical finishing such as softener, flame retardant, antistatic, anti piling, oil & soil resistance, bactericidal & fungicidal, water repellent, easy care. Application of finishes, Thickeners and their application .Various style of printing –direct style resist style and discharge style of printing.

Total Lectures required =9

Text Books and Reference material:

8. Chemical processing of cotton & p/c blends- ATIRA
9. A glimpse on the chemical technology of textile fibres, by R.R. Chakraborty
10. Technology of dyeing, by V.A. Shenai
11. Technology of finishing, by V.A. Shenai
12. Technology of Printing, by V.A. Shenai
13. Dyeing and chemical technology of textile fibres by E.R. Trotman
14. An introduction to Textile finishing by J.T. Marsh.

Laboratory work: As per the lab Syllabus

6. **Textile Fibre-II (NTT-404) (L T P 2 1 0)**

Unit (1): General definition of man-made or manufactured fibres, classification of man-made fibre, and introduction to manufacturing processes of man-made fibres, Study of various systems of spinning: melt, wet & dry spinning- basic principles, brief idea about spinning head, spinneret, quench chamber, & coagulation bath, spin finish application

Total Lectures required =9

Unit (2): Introduction to synthetic fibres, Polyethylene Terephthalate fibre- polymer production by DMT & PTA route, chip drying, spinning of filament yarns and staple fibre manufacturing, effect of process variable on properties of polyester fibre, some dope additives for specialty polyester fibre, Properties of polyester fibre,

Total Lectures required =8

Unit (3): Polyamide fibre- Different types of polyamide fibres, Nylon polymer production by continuous polymerization in VK tube, Manufacturing of Nylon 6 and Nylon 6,6 by melt spinning, Properties of Nylon 6 and Nylon 66 fibre, Polyacrylonitrile (PAN) fibre, Acrylic fibre- formation by dry spinning, dry-jet-wet spinning process, Total Lectures required =9

Unit (4): Introduction to regenerated fibre, concepts of regeneration of fibre, Raw material for viscose rayon, manufacturing sequence of viscose fibre, wet spinning of viscose rayon, formation of serrated edge cross-section of viscose rayon, viscose fibre properties, Introduction to cuprammonium rayon in brief, introduction of cellulose acetate rayon in brief.

Total Lectures required =9

Grand total of lectures required = 35

Reference Books:

8. Manufactured fibre Technology, by V.B. Gupta & V.K. Kothari
9. Essential fibre chemistry, by M.E. Miller
10. Production of Synthetic Fibres, by A.A. Vaidhya
11. Fibre Chemistry by M. Lewin, E.M. Pearce, Marcel & Dekkan Inc
12. Regenerated Cellulose fibre, by C. WEoding, Woodhead Publishing Ltd.
13. Handbook of Textile fibre, by Gordon Cook
14. Man Made Fibres, by R.W. Moncrief

Laboratory work: As per the lab Syllabus

7. Human Value & Professional Ethics/ Cyber Security: Audit Course
Common Syllabus as Decided by UPTU BOS

4TH SEMESTER TEXTILE ENGINEERING LAB SYLLABUS

TT-451: Yarn Manufacturing-II

Familiarity with carding machine, constructional details, change places, speed calculation of carding m/c, effect of m/c parameters on production and quality of sliver, finding out individual and total draft in carding m/c, Flat speed & its impact, study of coiling mechanism and coils per layer, setting of carding to type of material

Practice in handling, operation, setting and gauging draw frame, study of constructional details of machines, various controls and change places etc, practical in checking the quality of sliver, and waste analysis, common faults and analysis, Calculation pertaining to gearing, speed, constant, draft and production etc.

TT-452: Fabric Manufacturing-II

Study of warping, drawing-in, and sizing, constructional details of machines, types of packages produced by them and package faults, calculation pertaining to warping, sizing, weft winding and drawing-in

TT-453: Wet Processing of Textiles-II

Dye cotton with direct, reactive, vat and sulphur dye, dyeing polyester, wool, silk, acrylic and nylon using, appropriate disperse, acid and basic dyes, Print cotton fabric using various styles of printing, namely, direct, resist and discharge, Evaluate colour fastness to washing, light, perspiration and rubbing properties

TT-454: Textile Fibres-II

Principle of microscopy, microscopic identification of man-made fibres, preparation and mounting of specimen for longitudinal view, standard scheme of analysis of homogeneous fibre and blend by physical and chemical methods, preparation of reagents used for chemical analysis

5th Semester B. Tech. Textile Engineering

1. Textile Testing-I (NTT-501) (L T P 3 1 0)

Unit (1): Introduction to fiber, yarn and fabric testing, sampling, random sampling, biased sampling, sampling techniques, square and cut-square technique, selection of sample for testing.

Total Lectures required =8

Unit (2): Atmospheric conditions for testing, absolute and relative humidity, moisture regain & moisture content and their measurement, dry and wet bulb hygrometer, importance of moisture in textiles, effect of moisture on properties (physical, & mechanical) of textile material, factors affecting the regain, Shirley moisture meter, control of atmospheric conditions during testing..

Total Lectures required =9

Unit (3): Measurement of physical characteristics of cotton viz. length, fineness, maturity, bundle strength, colour and foreign matter including principle, construction, operation, and calibration of the equipment in common use.

Total Lectures required =8

Unit (4): Mechanical properties of fibres, relation between structure and mechanical properties of fibres, Measurement of physical properties of man-made fibres i.e. length, denier, strength, elongation, modulus, work of rupture, crimp, spin finish, fibre quality index etc.

Total Lectures required =8

Unit (5): **Unit (5):** determination of yarn count, diameter, average & resultant count of folded yarn, relation between Ne, D, T, Nm, Instruments used for determination of count, quadrant balance, Knowles balance, Beeslay balance and physical balance, Twist, classification of twist, twist measurement, direct counting method, continuous twist tester, twist-untwist method, Twist tester, R.B. twist tester, level of twist .

Total Lectures required =9

Grand total of lectures required = 42

Text Books and Reference material:

5. Quality control and testing management, by V.K. Kothari
6. Principles of textile testing, by J.E. Booth
7. Physical testing of textiles, by B.P. Savile
8. Physical properties of fibres, by W.E. Morton and J.W.S. Hearle

Laboratory work: As per lab syllabus

2. Yarn Manufacture-III (NTT-502) (L T P 3 1 0)

Unit (1): Objectives of combing, system of lap preparation, sliver lap, ribbon lap and super lap machines, configuration of fibre feed and its effect on the quality of product and efficiency of comber, combing cycle.

Total Lectures required =8

Unit (2): Important parts of comber and their functioning, timing and setting of comber for different classes of cotton, concept of forward and backward feed, concept of comber waste, calculation pertaining to production and noil percentage, recent developments in combers

Total Lectures required =9

Unit (3): Objectives of speed frame, important parts of speed frame and their functioning, Mechanism involved in drafting, twisting, and winding, different types of roler drafting systems, setting and gauges in drafting zone

Total Lectures required =8

Unit (4): Mechanism of bobbin building, process parameters for different materials, basic principle of designing of cone drum, differential motions and their working principles. Recent developments in speed frame.

Total Lectures required =8

Unit (5): Common defects in roving package, their causes and remedies, calculations pertaining to gearing, draft, t.p.i. and production, twist multiplier and roving twist

Total Lectures required =9

Grand total of lectures required = 42

Text Books and Reference material:

6. A practical guide to combing and drawing- W. Klein
7. Spun Yarn technology- Eric Oxtoby
8. Spun Yarn technology, Vol-I- A. Venkatsubramani
9. Elements of Combing- Dr. A.R. Khare
10. Cotton Spinning- Taggart

Laboratory work: As per the lab Syllabus

3. Fabric Manufacture-III (NTT-503) (L T P 3 1 0)

Unit (1): Introduction to weaving process, general description of power looms, their mechanical details, settings and adjustments, primary, secondary and auxiliary motions.

Total Lectures required =8

Unit (2): Various ways of shedding, various types of sheds, tappet shedding, and idea of construction of tappet, under pick and over pick mechanism, beating up motion, early and late shedding, healds, reed & temples and their utility in loom.

Total Lectures required =9

Unit (3): Negative and positive take up motion, negative and positive let-off motions, merits and demerits of negative and positive take-up and let-off motion, causes of shuttle flying and shuttle trapping.

Total Lectures required =9

Unit (4): Warp protecting motion, side and centre weft fork motion, description of various types of dobby's, negative and positive dobby, preparation of chain/ lattice, scope and limitation of dobby, settings and adjustments.

Total Lectures required =8

Unit (5): Various timings and settings used on loom for filament weaving, Grey inspection and mending, folding process and machines, Numerical problems on loom speed, production & efficiency and cover factor.

Total Lectures required =8

Grand total of lectures required = 42

Text Books and Reference material:

5. Weaving Mechanism by Fox
6. Weaving Mechanism by N.N. Bennerjee
7. Weaving Calculation, by R. Sengupta
8. Weaving machine and mechanism by M.K. Talukdar

Laboratory work: As per the lab Syllabus

4. Colour & Design (NTT-504) (L T P 3 1 0)

Unit (1): Light and colour phenomena, physical basis of colour, Emission & absorption theory of light, Colour vision and light theory of colours, Complementary colours, Chromatic circle, Pigment theory of colours, Brewster circle, Attributes of the primary & secondary colours,

Total Lectures required = 11

Unit (2): Colour measurement, Primary, Secondary, Tertiary & compound colours, Biren's triangle, Modification of colours, Coloured greys, Colours in combination, Colour contrast, contrast in hue, contrast of tone, colour harmony, Relative spaces occupied by colours, divisional colours, Application of colours, Mixed colour effect,.

Total Lectures required =11

Unit (3): Composition of designs, Condition to be observed during ornamentation of fabrics, Mode shade, Harmony of succession, gradation of hue, Different stages of colouring of

textile materials, Colour and weave effect and its classification. Bases of Textile design, One third and one fourth drop design, Half drop and drop reverse design,

Total Lecture required = 10

Unit (4): Unit repeating design, Geometric ornamentation, Construction of symmetrical designs, Stripe and check effect designs, Sari border / vertical border design, Factor affecting the woven designs, reversing inclined figure, Diamond, Ogee, & diagonal waved line base, applications of colours.

Total Lecture required = 10

Unit (5): Art sheet based question covering all above units

Grand total Lectures required = 34

Reference Books:

3. W. Watson- Textile design and colour
4. Traditional Textile designs B K Behera

5. Fabric Structure (NTT-505) (L T P 2 1 0=3)

Unit (1): Classification of various fabrics, construction of plain weave and its derivatives (rib and mat weave), ordinary twill, right hand twill, warp faced, weft faced & balanced twills,

Total Lectures required = 8

Unit (2): Satin regular, irregular and their extension. Combined twills, end to end and pick-to-pick combination, elongated twills, steep twills, broken twill, curved twill, Fancy twills-large diagonal shaded twills, Wave/ zig-zag, herringbone twill.

Total Lectures Required = 8

Unit (3): Regular and irregular satin, sateen base diagonals and brained twills, Diamond, mock leno, ordinary honeycomb, brighten honeycomb , Huck-a-back and crepe weave.

Total Lectures Required = 9

Unit (4): derivatives of hopsack, barley corn stitched hopsack and twilled hopsack, Ripstop weave, Simple and wadded bed ford cords (1), weft and piques (1), principle of figuring with extra material extra warp figuring, extra weft, limitation of extra thread.

Total Lectures Required = 9

Grand Total Lectures Required = 34

Reference Book: -

1. W. Watson Textile Design & colour Longmans Greens Co. London.
2. Z.J Grosicki Watson's Textile design and colour, Newnes Butter Worth, London.
3. Z.J. Grosicki, Advance Textile Design Newnes Butter Worth, London.
4. "Nishant" A Grammar of textile.

Laboratory work: As per the lab Syllabus

6. HS: Common Syllabus as decided by UPTU) (L T P 2 0 =2)

5th SEMESTER LAB SYLLBUS

TT-551, Textile testing-I

Measurement of fibre length and its distribution, fineness, moisture content and strength etc using different methods and instruments, Fibre diameter and its variability, cleanliness of cotton, testing of neps in card web, sliver, roving and yarns, Analysis and interpretation of test results.

Measurement of hank of sliver, roving and count of yarn and their variability, Single yarn strength and elongation, Lea strength measurement, Use of statistical techniques for evaluation of experimental results

TT-552, Yarn Manufacturing-III

Practice in handling operation, setting and gauging of lap former, comber and speed-frame, Study of constructional details of machines: various controls and change places etc., Practice in checking the quality of sliver, roving, comber lap and waste analysis, common fault and remedies, Calculation pertaining to gearing, speeds, constant, draft and production etc.

TT-553, Fabric Manufacturing-III

Introduction to loom, its different parts and passage of material on it, Names of parts, setting and fitting of tappet shedding, dobby shedding, jacquard shedding, over pick, under pick, beat up, five wheel take up, seven wheel take up, negative let-off and semi-positive let-off motions

TT-555: Fabric Analysis:

Analysis of various types of fabric structures like plain, twill, satin, hopsack, barleycorn etc , measurement of cover factor and crimp of fabrics.

6th Semester B. Tech. Textile Engineering

1. Textile Testing-II (NTT-601) (L T P 3 1 0)

Unit (1): Tensile properties of yarn and fabric, stress-strain curve, various methods for finding of yield point, methods for finding of various modulus, destination of tenacity, and stiffness of fabric. **Total Lectures Required = 7**

Unit (2): Procedure of determination of strength and elongation in the spun yarns, knowledge about the equipment used, yarn tensile strength testing machines, single yarn strength tester, lea strength tester, fabric strength tester- impact tester, Grab test, fabric B.S. Test, Scott serigraph, Instron tensile tester. . **Total Lectures Required = 9**

Unit(3): Measurement of evenness testing of yarns, nature and causes of irregularities, principles and methods of evenness testing, evaluation and interpretation of evenness diagram & spectrogram and their associated equipment, Classimat faults .

Total Lectures required =9

Unit (4): Measurement of physical properties of fabric and the knowledge of the equipment used, tensile strength, bursting strength, tearing strength, pilling, air permeability, crimp, thickness, EPI, PPI, weight and cover factor.

Total Lectures required =10

Unit (5): Measurement of water repellency, shrinkage, measurement of fastness to light and rubbing, thermal transmission, Brief introduction to FAST and KAWABATA.

Total Lectures required =7

Grand total of lectures required = 42

Reference Books: -

1. Physical testing of textiles by B.P. Saville.
2. Quality control and testing management by Dr. V.K. Kothari.
3. Principles of textile testing by J.E. Booth.
4. Quality control by V.K. Kothari.

2. Yarn Manufacture-IV (NTT-602) (L T P 3 1 0)

Unit (1): Introduction and objective of ring frame, important parts of ring frame and their functions, principle and mechanism involved in drafting, twisting and winding, yarn twist: terminology, concept of twist multiplier, propagation of twist, yarn contraction due to twisting. **Total Lectures required =9**

Unit (2): Types of rings and travelers, spinning triangle, forces acting on yarn and traveler during spinning, theory of spinning balloons, yarn tension in ring spinning,

mechanism of cop formation, common package size, limitations of large package spinning, effect of ring rail lift and ring diameter on cop size.

Total Lectures required =8

Unit (3): System of waste collection at ring frame and types of spinning wastes, control of pneumafil waste, factors responsible for loss in efficiency,, control in yarn faults, ring frame calculations pertaining to TPI, production and draft, concept of average mill count at 40's conversion. **Total Lectures required =8**

Unit (4): Recent developments in ring spinning, Limitations of ring spinning, Compact spinning- Principle and mechanism of yarn formation, yarn quality, basic yarn structure, end-use of compact spun yarns, merits and limitations of compact spinning, yarn characteristics and comparison of yarn properties with ring yarn.

Total Lectures required =8

Unit (5): Doubling: - Objects and terminology, study of ring doublers, fancy yarns, sewing thread and tyre Cord, Reeling: Objects and terminology, types of reeling construction and working of a reel yarn bundling, calculation of draft, TPI and production of ring frame & doubling frame. Routine & preventive maintenance practices in ring spinning. **Total Lectures required =9**

Grand total of lectures required = 42

Text Books and Reference material:

6. NCUTE Series
7. The technology of short staple spinning- W. Klein
8. Spun Yarn technology- Eric Oxtoby
9. Spun Yarn technology, Vol-I- A. Venkatsubramani
10. Elements of Ring frame & Doubling- Dr. A.R. Khare

Laboratory work: As per the lab Syllabus

3. Fabric Manufacture-IV (NTT-603) (L T P 3 1 0)

Unit (1): Jacquards shedding, types of jacquards and their principle of working, cross border jacquards, System of harness mounting and tying, Card cutting, limitations of jacquards, electronic jacquard, recent development in jacquards.

Total Lectures required =9

Unit (2): Automatic Looms- pirn and shuttle changing, various motions of automatic looms, warp stop motion- mechanical, electro-mechanical and electronic.

Total Lectures required =9

Unit (3): Types of multiple box motion, working principle of multiple box motion, two colour and four colour drop box motion, brief description of pick-at-will, pick and pick motion, Online process and quality control, estimation of productivity, snap study

Total Lectures required =9

Unit (4): Terry weaving: essential feature of terry weaving loom, various principle of terry pile formation, Terry let-off-heading, fringing-motion, modern development in terry structure. **Total Lectures required =8**

Unit (5): Introduction of narrow fabric manufacturing, brief description of braiding machines and needle looms, Introduction of non-woven fabrics, brief description of various manufacturing processes of non-woven fabrics. **Total Lectures required =8**

Grand total of lectures required = 42

Text Books and Reference material:

5. Weaving Mechanism by Fox
6. Weaving Mechanism by N.N. Bennerjee
7. Weaving Calculation, by R. Sengupta
8. Weaving machine and mechanism by M.K. Talukdar

Laboratory work: As per the lab Syllabus

4. Departmental Elective I

4.1 Structure & properties of Fibres (NTT-011) (L T P 3 1 0)

Unit (1): Basic structural features of fibre, Structure of Cotton, wool, silk, and other textile fibres, relation between fibre structure and fibre, Methods of estimating molecular weight, orientation, crystallinity & crystalline orientation of fibre forming polymer, Overall orientation by “sonic modulus tester, **Total Lectures Required = 8**

Unit (2): Concept of scanning electron microscope (SEM), Concept of transmission electron microscope (TEM) Fourier Transform Infrared Spectroscopy (FTIR), Atomic force microscopy, fibre fracture. **Total Lectures Required = 8**

Unit (3): Thermal behavior of textile fibres by Differential Scanning Calorimeter (DSC) (2), TGA, thermal mechanical analysis (TGA) (2), Thermomechanical Analyser (TMA) Density gradient column (2), Preparation of density gradient column (2) Crystallinity by density gradient column. **Total Lectures Required = 8**

Unit (4): Optical properties of fibres (2), Birefringence behavior, dielectric properties, fibre friction, fibre friction measurement, fibre to fibre, yarn to yarn friction measurement **Total Lectures Required = 8**

Unit (5): Creep behavior (2), concept of moisture absorption by fibres (2), (2). Moisture absorption, heat of absorption, differential heat of absorption, integral heat of absorption, Quantitative theory of heat moisture absorption, Rate of moisture absorption

Total Lectures Required = 10

Grand Total of lectures required = 38

Reference Book: -

1. Manufactured fibre technology by V.B. Gupta, V.K. Kothari
2. Physical properties of fibre by J.W.S. Hearle
3. Thermal behavior of material by Turi
4. Modern yarn production by Ray
5. Textile fibres by ATIRA
6. ASTM Standard books
7. Polymers by fibre & textiles encyclopedia
8. Advances in fibre source by S.K. Mukhopadhyaya

4.2 Garment Manufacturing Technology (NTT-012)) (L T P 3 1 0)

Unit (1): Introduction to garment manufacturing technology, Sample cutting, ZFusing, Sewing, Pressing, Finishing and inspection, Line balancing concept.

Total Lectures required =8

Unit (2): Introduction to measurement of fabric dimensional properties, fabric comfort, thermal comfort, objective evaluation of fabric, low stress fabric properties, Kawabata system, fabric assurance by sample testing, fabric defects, Fabric inspection and feedback to back process. **Total Lectures required =9**

Unit (3) Introduction to garment cutting, Marker planning, Efficiency of Marker planning, methods of marker planning and marker use, spreading of the fabric, to form a lay, spreading requirements, methods of spreading, fabric packages, objective of cuttings, methods of cuttings. **Total Lectures required =9**

Unit (4): Introduction to seam, stitch, stitch classification, stitch structure, seam formation, joining material, surface characteristics, seam appearance, damages (thermal and mechanical), seam performance, seam degradation, seam failure, seam puckering and seam testing. **otal Lectures required =9**

Unit (5): Importance of garment processing and finishes, types of garment, processing of garments and special garment finishes. **Total Lectures required =7**

Grand total of lectures required = 42

Text Books and Reference material:

4. Introduction to Garment Manufacturing Technology By T Ramchandran
 5. 2. Garment Manufacturing Technology by By T Ramchandran
 6. 3. Practical Clothing Construction Part I & II by Mary Methews
- Laboratory work: NA

Departmental Elective II

5.1 Advance Fabric structure (NTT-021) (L T P 2 1 0)

Unit (1): Backed cloths, weft backed cloths, warp backed cloths with weeding threads, double cloths, center stitched, self stitched, inter changing double cloth, cut effect in interchanging double cloths **Total Lectures required =9**

Unit (2) Turkish towel, Ornamentation of terry weave, triple cloth, Types of carpets and classification of carpets **Total Lectures required =8**

Unit (3) Damask weaves, Brocade, Tapestry, Velvet, Velveteen, Colour and weave effect, **Total Lectures required =8**

Unit (4): Gauge and leno weave with their mechanism; Lappet and Swivel weave, Ondule fabric, figured pique, draft & peg plan for above weaves. **Total Lectures required =9**

Grand total of lectures required = 34

Reference Book: -

1. W. Watson Textile Design & colour Longmans Greens Co. London.
2. Z.J Grosicki Watson's Textile design and colour Newnes Buter Worth, London.
3. Z.J. Grosicki, Advance Textile Design Newnes Butter Worth, London.
4. "Nishant" A Grammar of textile.

5.2 Multi & Long Fibre Spinning (NTT-022) (L T P 2 1 0=3)

Unit 1: Characteristics of manmade fibres, spinnability, blending, and its objectives, Spinnability, blending & its objectives, processing of Man made fibres & blends on short, medium and long staple spinning systems. **Total Lectures Required = 10**

Unit 2: Spinning of dyed fibres, estimation of blends intimacy, factors affecting the blend irregularity, structural properties of blended yarns. **Total Lectures Required = 8**

Unit 3: Production of bulked yarn, characteristic difference in the physical & mechanical properties of various long staple fibres & their influence in the choice of preparatory & spinning machinery. **Total Lectures Required = 8**

Unit 4: Woolen, semi-worsted & worsted systems of spinning, retting of flax, & jute, Jute & flax spinning, manufacturing of spun silk. **Total Lectures Required = 8**

Grand total lectures required =34

Reference book:-

8. Spun Yarn technology: Etic Oxtoby
9. Spun yarn technology: Eric Oxtoby.
10. Wool Spinning by Vickerman, Abhishek Publication
11. Principle of woolen spinning by Priestman
12. Woolen & Worsted yarn manufacture by J. W Redcliff
13. Jute Spinning Calculation by Andrew Smith
14. Worsted Drawing & Spinning by Miles

6. HS: Syllabus as decided by UPTU) (L T P 2 0)

6^h SEMESTER LAB SYLLBUS

TT-651, Textile testing-II

Use of microscope for testing of yarns for appearance, twist and diameter, measurement of evenness, measurement of yarn strength, tenacity, elongation at break, modulus, crimp rigidity, fabric testing for dimension, weight, thickness, shrinkage and air permeability,

Fabric testing for elongation, tensile, bursting, and tearing strength, abrasion resistance, flexural rigidity, crease recovery and draping qualities of fabric

TT-652, Yarn Manufacturing-IV

Operating, setting and gauging of ring frame and doubling frame, study of constructional details of machinery, various controls, change places etc., Practice in checking the quality of single and double yarn, common yarn faults and their remedies, calculations pertaining to gearing, speeds, constant, draft, TPI and production in ring frame and doubling frame.

TT-653, Fabric Manufacturing-IV

Construction, names of parts, setting of automatic pirn change, drop box motions, and shuttle box, Names of parts, setting and fitting of warp protecting, warp and weft stop motions.

7th Semester B. Tech. Textile Engineering

1. Open Elective from Other Department

1.1 Process Control in Spinning (NTT-701) (L T P 2 0 0)

Unit (1): Importance of evolving a system for process control, control of mixing quality through fibre characteristics, simultaneous control of mixing cost and quality, concept of bale management. **Total Lectures required =7**

Unit (2): Control of waste in blow room and carding, norms for waste and cleaning efficiency in blow room & card, control of neps, assessment of performance of blow room & card, control of comber waste, concept of yarn realization, calculation pertaining to waste & yarn realization **Total Lectures required =8**

Unit (3) Measurement and analysis of productivity, means to improve productivity, maximizing machine efficiency in ring spinning, controlling end breakage rate in ring spinning, control of soft waste and hard waste, control of yarn faults and package defects-slubs, crackers, spinner's doubles, bad piecing & slough off. **Total Lectures required =9**

Unit (4): Control of yarn quality- count, strength and their variability, study of CV% (within bobbin and between bobbin), control of variability of lea strength, single yarn strength and elongation %, Control of yarn unevenness, imperfections and hairiness.

Total Lectures required =9

Grant Total of lectures Required =35

Reference Books:

1. Process Control in Spinning by ATIRA
2. Process Control in Spinning by K.R. Salhotra

1.2 Dynamics of Textile Machines (NTT-703) (L T P 2 0 0)

Unit 1: Static and Dynamic Force Analysis: Static force analysis of planer mechanisms, dynamic force analysis including inertia and frictional forces of planer mechanisms. Dynamics of Reciprocating Engines: engine types, indicator diagrams, gas forces, equivalent masses, inertia forces, bearing loads in a single cylinder engine, crankshaft torque, engine shaking forces.

Total Lectures required =9

Unit 2: Balancing of Rotating Components: static balance, dynamic balance, balancing of rotating masses, two plane balancing, graphical and analytical methods, balancing of rotors, balancing machines, field balancing. Balancing of Reciprocating Parts : Balancing of single cylinder engine, balancing of multi cylinder; inline, radial and V type engines, firing order.

Total Lectures required =9

Unit 3: Governors : introduction, types of governors, characteristics of centrifugal governors, gravity controlled and spring controlled centrifugal governors, hunting of centrifugal governors, inertia governors. Dynamometers : types of dynamometers, Prony brake, rope brake and band brake dynamometers, belt transmission dynamometer, torsion dynamometer, hydraulic dynamometer.

Total Lectures required =8

Unit 4: Gyroscope : gyroscopes, gyroscopic forces and couples, gyroscopic stabilization, ship stabilization, stability of four wheel and two wheel vehicles moving on curved paths.

Total Lectures required =8

Grand Total Lectures required =34

Reference Books:

1. Mechanism and Machine Theory: J.S. Rao and R.V. Dukkipati, New age International.
2. 2 Theory of Machines and Mechanisms: Joseph Edward Shigley and John Joseph Uicker, Jr. Second Edition Mc Graw Hill, Inc
3. Theory of Mechanisms and Machines: Amitabha Ghosh and Ashok kumar Mallik, Third Edition Affiliated East-West Press.
4. Theory of Machine: S.S. Rattan, McGraw Hill Higher Education.

2. Open elective from other department

2.1 Quality Management (NOE-072) (L T P 3 1 0)

UNIT-I : Quality Concepts: Evolution of Quality Control, concept change, TQM Modern concept, Quality concept in design, Review of design, Evolution of proto type. **3**

Control on Purchased Product: Procurement of various products, evaluation of supplies, capacity verification, Development of sources, procurement procedure. **2**

Manufacturing Quality: Methods and techniques for manufacture, inspection and control of product, quality in sales and services, guarantee, analysis of claims. **5**

UNIT-II: Quality Management

Organization structure and design, quality function, decentralization, designing and fitting, organization for different type products and company, economics of quality value and contribution, quality cost, optimizing quality cost, seduction program. **3**

Human Factor in quality (11)

Attitude of top management, cooperation of groups, operators attitude, responsibility, causes of apparatus error and corrective methods. **2**

UNIT-III: Control Charts, Theory of control charts, measurement range, construction and analysis of R charts, process capability study, use of control charts. **5**

Attributes of Control Chart , Defects, construction and analysis of charts, improvement by control chart, variable sample size, construction and analysis of C charts. **5**

UNIT -IV : Defects diagnosis and prevention defect study, identification and analysis of defects, correcting measure, factors affecting reliability, MTTF, calculation of reliability, building reliability in the product, evaluation of reliability, interpretation of test results, reliability control, maintainability, zero defects, quality circle. **8**

UNIT –V: ISO-9000 and its concept of Quality Management, ISO 9000 series, Taguchi method, JIT in some details.

Text / Reference Books:

1. Lt. Gen. H. Lal, "Total Quality Management", Eastern Limited, 1990.
2. Greg Bounds, "Beyond Total Quality Management", McGraw Hill, 1994.
3. Menon, H.G, "TQM in New Product manufacturing", McGraw Hill 1992.

2.2 OPERATION RESEARCH (NOE-073) (L T P 3 1 0)

UNIT-I: Introduction:

Definition and scope of operations research (OR), OR model, solving the OR model, art of modelling, phases of OR study.

Linear Programming: Two variable Linear Programming model and Graphical method of solution, Simplex method, Dual Simplex method, special cases of Linear Programming, duality, sensitivity analysis.

UNIT-II : Transportation Problems: Types of transportation problems, mathematical models , transportation algorithms,

Assignment: Allocation and assignment problems and models, processing of job through machines.

UNIT-III : Network Techniques: Shortest path model, minimum spanning Tree Problem, Max-Flow problem and Min-cost problem.

Project Management: Phases of project management, guidelines for network construction, CPM and PERT.

UNIT-IV: Theory of Games:

Rectangular games, Minimax theorem, graphical solution of $2 \times n$ or $m \times 2$ games, game with mixed strategies, reduction to linear programming model.

Quality Systems: Elements of Queuing model, generalized poisson queuing model, single server models. (12)

UNIT-V: Inventory Control, Models of inventory, operation of inventory system, quantity discount., Replacement, Replacement models: Equipments that deteriorate with time, equipments that fail with time.

Text / Reference Books:

1. Wayne L. Winston, "Operations Research" Thomson Learning, 2003.
2. Hamdy H. Taha, "Operations Research-An Introduction" Pearson Education, 2003.
3. R. Panneer Seevam, "Operations Research" PHI Learning, 2008.
4. V.K.Khanna, "Total Quality Management" New Age International, 2008.

3. Principles & Design of Spinning Machines (NTT-706 (L T P 3 1 0))

Unit 1: Transmission of motion through belts, ropes, chains, tapes etc. Tangential belt drive, Variable speed drive, Design of cone drums for Scutcher, principles of mixing, opening, cleaning in Blow Room line, difference in aerodynamics of lint and trash and its utilization in blow room machinery design, redesigning of openers by using different principles for better performance. **Total Lectures Required = 9**

Unit 2: Transmission of motion to various parts of carding machine, detail study of varieties of licker-in, cylinder and flat clothing and its influence on carding performance,

different systems of carding web collection, sliver coiling system, Inertia of carding engine, latest carding machine developments. **Total Lectures Required = 9**

Unit 3: Concept of lap formation for comber, designing concept of comber cylinder, top comb, detaching system, concept of noil control, latest machinery developments in comber frame. **Total Lectures Required = 8**

Unit 4: Different drafting systems in draw frame, roller weighing system, roller setting, and different stop motion, Differential motions used in speed frame, design of cone drums for speed frame, Design of flyer, spindle vibration measurement and control, building motion of speed frame. **Total Lectures Required = 8**

Unit 5: Design and analysis of ring frame comes, designing concept of building motion of ring frame, design of ring spindle and bolster, designing concept of various rings and travelers. **Total Lectures Required = 8**

Grand Total of Lectures Required = 42

Text Books & Reference Books

1. Spun Yarn Technology by Eric Oxtoby
2. The technology of Short Staple Spinning- W. Klien
3. Mechanics of Spinning by R.S. Rengasamy

4. Knitting Technology (NTT-705) (L T P 3 1 0)

Unit 1: Difference between knits and wovens, knitting terms and definitions (Course,, wale, stitch density) different type of knitting needles: bearded needle, latch needle, sinker, jack, cam arrangement, overlap, under lap, closed lap, open lap. **Total Lectures required =8**

Unit 2: Comparison of warp and weft knitting, Classification of weft knitting machine, elements of knitting machine like type of needles, sinkers, etc Needle numbering system, technology of loop formation, geometry of loop structure, Elements of loop structure: needle loop, sinker loop, relation between yarn count, machine gauge and stitch density.

Total Lectures required =9

Unit 3: Classification of knit-structures, loop formation on: single jersey, Rib machines and inters look machines, socks knitting technology, Loop formation on flat bed machine

Total Lectures required =9

Unit 4: Four primary base knitting structures: Plain knitted fabric, Rib fabric, Interlock and Purl fabric, Special knitting machines: Fabric machine, garment length machine, flat machine, circular machine fabrics and Spacer fabrics. **Total Lectures required =7**

Unit 5: Basic warp knitting machines, classification of warp knitting, Modern developments in weft knitting technique, calculations regarding production, gsm, stitch density etc, Causes and remedies of faults of knitted fabrics. **Total Lectures required =9**

Grand total of lectures required = 42

Reference and Text Book-

1. Knitting Technology – Chamberlin
2. Knitting Technology – W.J. Spencer
3. International Textile Journal – Knitting
4. Knitting Calculation – Chamberlin
5. Wet Knitting Vol. 1&2 –Published by IIT New Delhi.

6. Knitting – NCUTE

Laboratory work: As per Lab Syllabus

5. Departmental Elective III

5.1 Nonwoven (NTT-031) (L T P 3 1 0)

Unit 1: National and international scenario on non-woven fabric production, Concept about felts and non woven, Classification of non-woven fabrics, fibres for non-woven fabrics, ., Felt Manufacturing process. **Total Lectures Required =9**

Unit 2: Various method of web formation, web chrematistic and their influence on properties of non-woven fabrics, (3) Non woven fabric by Needle punch, Description of needle punching machine, effect of process variables on properties of needle punch fabric **Total Lectures Required =9**

Unit 3: Non-woven fabric by hydroentanglement, Description of hydroentanglement machine, effect of process variables on properties of hydroentanglement non woven fabric, Non-woven fabric by adhesive bonding, mechanical bonding, Melt blown process of non-woven fabric manufacturing. **Total Lectures Required =8**

Unit 4: Non-woven fabric by Stitch bonding, Non-woven fabric by chemical bonding, Non-woven fabric by bonding with thermoplastic adhesives, Non-woven fabric by Spun laced, Effect of process variables on properties of stitch bonding, chemical bonding spun laced non-woven fabrics. **Total Lectures Required =8**

Unit 5: Flocked fabric, Laminates, latest development in non-woven industry: ultrasonic bonding, Infra-red bonding, bonding by bi-component fibres,. Application of various non woven fabrics. **Total Lectures Required =8**

Grand total of Lectures Required= 42

Reference & Text Books

1. Non Woven – N.N. Banarjee
2. Non woven – NCUTE
3. Knitting technology : Spencer

5.2 Fibre Reinforced Composites (NTT-032) (L T P 3 1 0)

Unit 1: Definition of composites, Types of composites - fibre particulate and laminar composites, Fibre composites: Constituents - functions of fibre and matrix

Total Lectures Required =9

Unit 2: Types of high performance fibres - properties - types of matrix materials - Thermoset and Thermo plastics properties: short fibre composites, fibre matrix interface, coupling agents, coupling of interfaces and interfacial reaction in fibre composites, fracture mode in fibre composites. **Total Lectures Required =9**

Unit 3: Introduction to fibre reinforced composite material manufacturing techniques, Textile performs for composites: weaving, knitting, braiding. **Total Lectures Required =8**

Unit 4: Vacuum bagging, compression molding, injection molding, pultrusion, thermoforming, filament winding, resin transfer molding. **Total Lectures required =8**

Unit 5: Testing of composites- Fibre volume fraction -Laminar tensile - shear - compression - and flexural properties, applications of fibre reinforced composites.

Total Lectures Required =8

Grand Total of Lectures Required =42

Reference Books:

7. D hull An Introduction to composite materials, Cambridge university press, 1998
8. L Gupta “Advanced Composite Materials”, Himalayan Book, New Delhi, 1998
9. Mathews F.L and Rawlings R.D “Composite Materials Engineering science” Chapman and Hall London, 1994
10. Hearle. J.W.S “High performance fibres composites and engineering textile structures” JTI (special issue) 1990
11. Textile Progress monogram on “Hybrid yarns and textile performing for thermoplastic composites” by R. Alagirusamy, R Fanguero, V. Ogale and N. Padaki Textile Progress 2006 Vol 38 No. 4 (Wood Head Publishing Limited)
12. De.S.K. and White J.R. Short fibre polymer composites, Wood head, 2001

7th SEMESTER LAB SYLLABUS

TT-705: Knitting Technology

To study the path of yarn through circular and flat knitting machine, different knitting elements including the cam system, driving mechanism of plain knitting machine, cloth take-up mechanism of plain knitting m/c, rib knitting m/c including arrangement of dial and cylinder needles, cam, system and driving mechanism, Interlock knitting m/c including arrangement of dial and cylinder needle, cam system and driving mechanism, Warp knitting machine constructional details and mechanism of operation.

8TH SEMESTER TEXTILE ENGINEERING

1. Open Elective from Other Departments

1.1 Technical Textiles (NTT-801) (L T P 3 1 0)

Unit (1): Introduction to technical textile, types of technical textiles, textiles used in industry such as filtration, filter fabric construction- woven, needle felt & knitted filter fabric, finishing treatment of filter fabric, thermal and chemical properties of filter fabric, essential requirements of good filter fabric..

Total Lectures required =8

Unit (2): Manufacture and properties of protective textiles- water proof/coated and water repellent, antimicrobial, flame retardant, chemical resistance, Nuclear and biological resistance, mechanical resistance such as bullet proof, cut proof, stab proof

Total Lectures required =9

Unit (3): Medical textiles, fibres used, classification of medical textiles- non-implantable material wound dressings, bandages, plasters, etc, Extra-corporal devices – Artificial kidney, liver lung, implantable material- suture, soft tissue implant, Orthopedic implants, Cardiovascular implants, Healthcare/ hygiene products, medical cost, surgical gown, face mast etc.**Total Lectures required =8**

Unit (4): Smart textiles, brief introduction of smart textiles, classification of smart textiles, passive smart textiles, active smart textiles, brief discussion of smart shirt, smart suit, musical jacket, space suit etc. automotive textiles: type cord, seat belt, air bag, seat upholstery, carpets, headliners, helmets etc, Agro textile: Shade net, green house film, Mulch net, crop cover, anti hail and bird protection net, finishing net etc.**Total Lectures required =9**

Unit (5): Introduction of geo textile, classification of geo textiles, functions of geo textile- soil reinforcement, drainage (fluid transmission), filtration, separation, erosion control/ absorption, objective of geo textiles, manufacturing of geo textile, essential properties of geo textiles- Mechanical determinants, Hydraulic determinants, durability determinants

Total Lectures required =8

Grand total of lectures required = 42

Text Books and Reference material:

4. Hand book of technical textiles- A.R. Horrocks & S.C. Anand
5. Smart fibre, fabrics and clothing Tao X
6. Shears handbook of industrial Textiles.

1.2 PRODUCT DEVELOPMENT (NOE-083) (L T P 3 1 0=4)

UNIT-1: Concept of Product, definition and scope. Design definitions, old and new design methods, design by evolution, examples such as evolution of sewing M/C, bicycle,

safety razor etc., need based developments, technology based developments physical reliability & economic feasibility of design concepts.

UNIT –II: Morphology of design, divergent, transformation and convergent phases of product design, identification of need, Analysis of need. Design criteria; functional, aesthetics, ergonomics, form, shape, size, colour. Mental blocks, Removal blocs, Ideation techniques, Creativity, Check list.

UNIT –III: Transformations, Brainstorming& Synetics, Morephological techniques. Utility Concept, Utility Valaue, Utility Index, Decision making under Multiple Criteria. Economic aspects, Fixed and variable costs, Break-even analysis.

UNIT-IV: Reliability considerations, Bath tub curve, Reliability of systems in series and parallel, Failure rate, MTTF and MTBF, Optimum spares from Reliability considerations. Design of display and controls, Man-machine interface, Compatibility of displays and controls. Ergonomic aspects, Anthropometric data and its importance in design. Application of Computers in Product development & design.

UNIT-V: Existing techniques, such as work-study, SQC etc. for improving method & quality of product. Innovation versus Invention. Technological Forecasting. Use of Standards for Design.

Text/Reference Books:

1. A.K. Chitab& R.C. Gupta “Product design & Manufacturing” – Prentice Hall (EE)
2. R.P. Crewford, “The Technology of creation Thinking” Prentice Hall.
3. C.D. Cain, “Product Design & Decision” Bussiness Books.
4. C.D. Cain, “Engg. Product Design” Bussiness Books.

2. Mill Planning & Organization (NTT-803) (L T P 3 1 0=4)

Unit-1: Selection of site for a textile mill. Preparation of project report). Construction of building of a textile mill, Types of buildings, single and multistoried buildings. Fire hazards and their control Safety rules for textile industry (1). Prevention tours accidents,
Total of lectures required=9

Unit-2: Humidification of a textile mill, Humidifiers and dehumidifiers,. Ventilation in textile mill,. Air conditioning and refrigeration System, lighting used in textile mill.
Total of lectures required=8

Unit-3: Balancing of machines for spinning and weaving mills Layout of different machines of spinning and weaving..
Total of lectures required=7

Unit-4: Costing,, introduction to cost terms and purposes,. Cost volume, profit analysis, Master budget, flexible budget, cost allocation, process costing, waste cost in textile mill,

labour and material cost, wage system in textile mill, Predetermining spinning and weaving cost, Viability evaluation of a project .

Total of lectures required = 10

Unit (5) Calculation regarding payback period and Break-even point, Types of staff organization, Staff organization system in textile mills

Total of lectures required = 8

Grand total of Lectures Required = 42

Text Books & Reference Material

1. Industrial Engineering, Organization & management by Tarachand
2. Industrial Economics & Principle of Management by T.M. Chabra
3. Industrial Economics & Principle of Management by S. K Sharma

3. Departmental Elective IV

3.1 Theory of Textile Structure (NTT-041) (L T P 3 1 0)

Unit (1): Classification of yarns, Yarn geometry- idealized yarn geometry, relationship of yarn number and twist factor, packing of fibres in a yarn, ideal packing, hexagonal close packing and radial packing, packing factor and its measurement, yarn diameter, method of measurement of twist contraction **Total Lectures required =10**

Unit (2): Fibre migration: mean fibre position, amplitude of migration and frequency of migration, mechanism of migration, spinning-in coefficient and fibre extent. estimation of strength of blended yarn **Total Lectures required =6**

Unit 3: Mechanism of staple fibre yarns, translation of fibre properties into yarn properties, twist and strength relationship, limit of twist, spinability of textile fibres, relation with end-breakage rate. **Total Lectures required =9**

Unit (4): Elements of fabric geometry, cloth setting theories, flexible and rigid thread model, Pierce's equation and later modifications. **Total Lectures required =7**

Unit (5): Relation of fabric properties to simple geometry, crimp interchange in woven fabric, crimp balance equation, Fabric cover, cover factor and their significance, relation between cover and weight per unit area of fabric, Theoretical treatment of fabric deformation in tension. **Total Lectures required =10**

Grand total of lectures required = 42

Text Books and Reference material:

4. Textile Yarn- B.C. Goswami, J.G. Martindale, F.L. Scardine
5. Textile structure- J.W.S. Hearle, S. Backer, Grossberg.
6. Pierce's geometry- Textile institute

3.2 Mechanical Machine Design (NTT-042) (L T P 3 1 0)

Unit 1: Design Philosophy: Problem identification- problem statement, specifications, constraints, Feasibility study technical feasibility, economic & financial feasibility, societal & environmental feasibility, Generation of solution field (solution variants), Brain storming, Preliminary design, Selection of best possible solution, Detailed design, Selection of Fits and tolerances and analysis of dimensional chains. Selection of Materials: Classification of Engg. Materials, Mechanical properties of the commonly used engg. Materials, hardness, strength parameters with reference to stress-strain diagram, Factor of safety.

Total Lectures Required =11

Unit 2: Mechanical Joints: ISO Metric Screw Threads, Bolted joints in tension, Eccentrically loaded bolted joints in shear and under combined stresses, Design of power screws, Design of various types of welding joints under different static load conditions. Riveted Joints, Cotter & Knuckle Joints: Design of various types of riveted joints under different static loading conditions, eccentrically loaded riveted joints, design of cotter and knuckle joints.

Total Lectures Required =11

Unit 3: Belt rope and chain drives: Design of belt drives, Flat & V-belt drives, Condition for Transmission of max. Power, Selection of belt, design of rope drives, design of chain drives with sprockets. Keys, Couplings & Flywheel: Design of Keys – Flat, Kennedy Keys, Splines, Couplings design – Rigid & Flexible coupling, turning Moment diagram, coefficient of fluctuation of energy and speed, design of flywheel –solid disk & rimmed flywheels.

Total Lectures Required =10

Unit 4: Clutches: Various types of clutches in use, Design of friction clutches – Disc. Multidisc, Cone & Centrifugal, Torque transmitting capacity. Brakes: Various types of Brakes, Self energizing condition of brakes, Design of shoe brakes – Internal & external expanding, band brakes, Thermal Considerations in brake designing.

Total Lectures Required =10

Grant Total of Lectures Required = 42

Text Books & Reference Material :

8. Engineering design – George Dieter, MGH, New York.
9. Product Design and Manufacturing , A.K.Chitale and R.C.Gupta, PHI.
10. Machine Design An Integrated Approach: Robert L.Norton, Addison Wesley.
11. Machine Design : S.G. Kulkarni - Tata MacGraw Hill.
12. Design of machine elements-C S Sharma, Kamlesh Purohit, PHI.
13. Mechanical Engg. Design - First Metric Editions: Joseph Edward Shigley-MGH, New York.
14. Design of Machine Elements – V.B. Bhandari – Tata McGraw Hill, New Delhi.

4. Departmental Elective V

4.1 Electronics in Textiles (NTT-051)

Unit 1: Overview of applications of electronic and controls in textile equipments and machines, Overview of basic analog electronics (R L C, V, I)**Total lectures required =9**

Unit 2: Basic circuits used for controllers, Overview of basic digital electronic: Gates and ICs,
Total lectures required =9

Unit 3: Various types of sensors and transducers used in textile industry (displacement, position, force, temperature, pressure, flow)**Total lectures required =8**

Unit 4: Signal conditioning, control elements, system and examples, Data acquisition analysis, Control and automation by microprocessors, and microcontrollers,
Total lectures required =8

Unit 5: Motor and power drives, some applications of data acquisition and control systems in textiles, **Total lectures required =8**

Grand Total of Lectures required = 42

Reference books:

4. Semiconductor Devices and Circuits,,: Alope K Dutta
5. Solid state electronic devices: D K Bhattacharya
6. Principle of semiconductor devices: Sima Dimitrejev

4.2 Principles & Design of Weaving Machines (NTT-053) (L T P 3 1 0)

Unit 1: Designing concepts of drum winding, designing of winding drum, traverse in different winding machines, Concepts of latest tensioners for winding, designing concept of slub catchers **Total Lectures Required = 8**

Unit 2: Designing concepts of warping drums, sectional warping, designing concepts of high efficiency creels, Transmission of motion in warping machines, concept of designing of stop motions in warping **Total Lectures Required = 8**

Unit 3: Designing concept of saw box for sizing machine, designing of drying cylinder, heating system for drying cylinder, Concept of cold sizing for worsted warp sizing, latest machinery developments in sizing machines
Total Lectures Required = 9

Unit 4: Principles governing the design of looms. Mechanics of basic weaving operations, Kinetics of slay, slay eccentricity, designing concepts of tappet for different twill weaves, warp tension measurement and its control, Different picking system, weft insertion system of sulzer, rapier, airjet and waterjet systems**Total Lectures Required = 9**

Unit 5: Brief introduction of electronic Dobby and Jacquard, Designing concept of multiphase weaving, mechanism of different stop motions on shuttleless looms
Total Lectures Required = 8

Grand Total Lectures Required = 42

Text Books & Reference Material

5. Modern development in weaving machine, by Duxburg
6. Weaving mechanism, machine and management, by Talukdar.
7. Weaving mechanism, by Robinson
8. Modern weaving preparation and machinery, by A. Ormerod

U.P. TECHNICAL UNIVERSITY, LUCKNOW

Study and Evaluation scheme

Man Made Fibre Technology

[Effective From-2014-15]

Year 2nd, Semester-III

S. No.	Subject Code	Name of Subject	Periods			Evaluation Scheme			Subject Total	Credits	
			L	T	P	Sessional Assessment		ESE			
						CT	TA				Total
THEORY SUBJECT											
1	NAS301/NOE 031-039	Engg. Mathematics-III/ Science based open elective	3	1	0	30	20	50	100	150	4
2	NTT-305	Yarn Technology-I	3	1	0	30	20	50	100	150	4
3	NTT-306	Fabric Technology -I	3	1	0	30	20	50	100	150	4
4	NTT-303	Wet Processing of Textiles-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	NTT-304	Textile Fibres-I	2	1	0	15	10	25	50	75	3
	AUC-001/ AUC-002	Human Value & Professional Ethics/ Cyber Security	2	0	0	15	10	25	50	75*	
PRACTICAL/ DESIGN/DRAWING											
7	NTT-355	Yarn Technology-I Lab	0	0	3	10	10	20	30	50	1
8	NTT-356	Fabric Technology-I	0	0	3	10	10	20	30	50	1
9	NTT-353	Wet Processing of Textiles -I Lab	0	0	2	10	10	20	30	50	1
10	NTT-354	Textile Fibres-I Lab	0	0	2	10	10	20	30	50	1
11	NGP-301	General proficiency								50	
		Total	18	5	10					1000	25

Science Based Open Elective:

1. NOE- 031:-Non-Linear Dynamics Systems
2. NOE- 032: Nano Sciences
3. NOE- 033: Laser Systems & Application
4. NOE- 034:Space Sciences
5. NOE- 035:Polymer Science & Technology
6. NOE- 036:Nuclear Science
7. NOE- 037:Material Science
8. NOE- 038:Discrete Mathematics
9. NOE-039 : Applied Linear Algebra

U.P. TECHNICAL UNIVERSITY, LUCKNOW

Study and Evaluation scheme

Man Made Fibre Technology

[Effective From-2014-15]

Year 2nd, Semester-IV

S. No.	Subject Code	Name of Subject	Periods			Evaluation Scheme			Subject Total	Credits	
			L	T	P	Sessional Assessment		ESE			
						CT	TA				Total
THEORY SUBJECT											
1	NAS 401/ NOE 041- 049	Engg. Mathematics-III/ Science based Open Elective	3	1	0	30	20	50	100	150	4
2	NTT-405	Yarn Technology-II	3	1	0	30	20	50	100	150	4
3	NTT-406	Fabric Technology-II	3	1	0	30	20	50	100	150	4
4	NTT-403	Wet Processing of Textiles-II	3	1	0	30	20	50	100	150	4
5	NHU401/ NHU402	Industrial Psychology/ Industrial Sociology	2	0	0	15	10	25	50	75	2
6	NTT-404	Textile Fibre-II	2	1	0	15	10	25	50	75	3
	AUC-002/ AUC-001	Cyber Security / Human Value & Professional Ethics	2	0	0	15	10	25	50	75*	
PRACTICAL/ DESIGN/DRAWING											
7	NTT- 455	Yarn Technology-II Lab	0	0	3	10	10	20	30	50	1
8	NTT- 453	Wet Processing of Textiles-II Lab	0	0	2	10	10	20	30	50	1
9	NTT-456	Fabric Technology-II Lab	0	0	3	10	10	20	30	50	1
10	NTT-454	Textile Fibre-II Lab	0	0	2	10	10	20	30	50	1
11	NGP-401	General Proficiency								50	
		Total	18	5	10					1000	25

Science Based Open Elective:

1. NOE 041:-Non-Linear Dynamics Systems
2. NOE 042: Nano Sciences
3. NOE 043: Laser Systems & Application
4. NOE 044:Space Sciences
5. NOE 045:Polymer Science & Technology
6. NOE 046:Nuclear Science
7. NOE 047:Material Science
8. NOE 048:Discrete Mathematics

U P. TECHNICAL UNIVERSITY, LUCKNOW

Study and Evaluation scheme

Man Made Fibre Technology

[Effective From-2014-15]

Year 3rd, Semester-V

S. No.	Subject Code	Name of Subject	Periods			Evaluation Scheme			Subject Total	Credits	
			L	T	P	Sessional Assessment					
						C T	TA	Total			
THEORY SUBJECT											
1	NTT-501	Textile Testing-I	3	1	0	30	20	50	100	150	4
2	NTT-506	Polymer Chemistry	3	1	0	30	20	50	100	150	4
3	NTT-507	Principle of Chemical Engineering	3	1	0	30	20	50	100	150	4
4	NTT-504	Colour & Design	3	1	0	30	20	50	100	150	4
5	NTT-505	Fabric Structure	2	1	0	15	10	25	50	75	3
6		HS	2	0	0	15	10	25	50	75	2
PRACTICAL/ DESIGN/DRAWING											
7	NTT-551	Textile Testing-I Lab	0	0	3	10	10	20	30	50	1
8	NTT-556	Polymer Chemistry Lab	0	0	3	10	10	20	30	50	1
9	NTT-557	Principle of Chemical Engineering Lab	0	0	2	10	10	20	30	50	1
10	NTT-555	Fabric Analysis Lab	0	0	2	10	10	20	30	50	1
11	NGP-501	General Proficiency								50	
		Total	16	5	10					1000	25

P. TECHNICAL UNIVERSITY, LUCKNOW

Study and Evaluation scheme

Man Made Fibre Technology

[Effective From-2014-15]

Year 3rd, Semester-VI

S. No.	Subject Code	Name of Subject	Periods			Evaluation Scheme			Subject Total	Credits	
			L	T	P	Sessional Assessment					ESE
						CT	TA	Total			
THEORY SUBJECT											
1	NTT- 601	Textile Testing-II	3	1	0	30	20	50	100	150	4
2	NTT- 604	Post Spinning Operation	3	1	0	30	20	50	100	150	4
3	NTT-605	Structure & Properties of Fibre	3	1	0	30	20	50	100	150	4
4	NTT- 012/ NTT- 014	Garment Manufacture Technology/ Instrumentation & Automatic Control	3	1	0	30	20	50	100	150	4
5	NTT-022/ NTT- 023	Multi & Long Fibre Spinning/ Textured Yarn Technology	2	1	0	15	10	25	50	75	3
6		HS	2	0	0	15	10	25	50	75	2
PRACTICAL/ DESIGN/DRAWING											
7	NTT- 651	Textile Testing-II Lab	0	0	3	10	10	20	30	50	1
8	NTT-654	Post Spinning Operation Lab	0	0	3	10	10	20	30	50	1
9	NTF-655	Structure & Properties of Fibre Lab	0	0	2	10	10	20	30	50	1
10	NTT-654	SEMINAR			2			50		50	1
11	NGP-601	General Proficiency								50	
		Total	16	5	10					1000	25

Departmental Elective I

1. NTT-014 Instrumentation & Automatic Control
2. NTT-012 Garment Manufacturing Technology

Departmental Elective II

1. NTT-022 Multi & Long Fibre Spinning
2. NTT-023 Textured Yarn Technology

P. TECHNICAL UNIVERSITY, LUCKNOW

Study and Evaluation scheme

Man Made Fibre Technology

[Effective From-2014-15]

Year 4th, Semester-VII

S. No.	Subject Code	Name of Subject	Periods			Evaluation Scheme			Subject Total	Credits	
			L	T	P	Sessional Assessment		ESE			
						CT	TA				Total
THEORY SUBJECT											
1	NTT-701/ NTT-702	Process Control in Spinning/ Process Control in Weaving	2	0	0	15	10	25	50	75	2
2	NOE-071/ NOE-072/ NOE-073	Entrepreneurship Development/ Quality Management/ Operation Research	3	1	0	30	20	50	100	150	4
3	NTT-707	Fibre Manufacturing & Process Control	3	1	0	30	20	50	100	150	4
4	NTT-708	Fibre Reinforced Composite	3	1	0	30	20	50	100	150	4
5	NTT 031/ NTT-033	Non-woven/ Knitting Technology	3	1	0	30	20	50	100	150	4
PRACTICAL/ DESIGN/DRAWING											
6	NTT-751	Project (mid term evaluation)	0	0	8	10	10	20	30	50	4
7	NTT-752	Industrial Training	0	0	3	10	10	20	30	50	2
8	NTT-757	Fibre Production & Characterization Lab	0	0	2	10	10	20	30	50	4
9	NGP-701	General Proficiency								50	
		Total	14	4	13					1000	25

Open Elective from Other Departments 1

5. NTT-701 Process Control in Spinning
6. NTT-702 Process Control in Weaving

Open Elective from Other Departments 2

4. NOE-071 Entrepreneurship Development/Quality Management
5. NOE-072 Quality Management
6. NOE-073 Operation Research

Departmental Elective III

1. NTT-031 Non Woven
2. NTT-033 Knitting Technology

P. TECHNICAL UNIVERSITY, LUCKNOW

Study and Evaluation scheme

Man Made Fibre Technology

[Effective From-2014-15]

Year 4th, Semester-VIII

S. No.	Subject Code	Name of Subject	Periods			Evaluation Scheme			Subject Total	Credits	
			L	T	P	Sessional Assessment					
						CT	TA	Total			
THEORY SUBJECT											
1	NTT-801/ NOE-083	Technical Textiles/ Product Development	3	1	0	30	20	50	100	150	4
2	NTT-803	High Performance Fibres	3	1	0	30	20	50	100	150	4
3	NTT- 041/ NTT- 043	Theory of Textile structure / Mill Planning & Organization	3	1	0	30	20	50	100	150	4
4	NTT-054/ NTT- 055	Special topics in Man Made fibre / Coating of Textiles	3	1	0	30	20	50	100	150	4
PRACTICAL/ DESIGN/DRAWING											
5	NTT-851	PROJECT	0	0	12		100	100	150	250	7
6	NTT-852	SEMINAR	0	0	3		100	100		10	2
7	NGP- 801	General Proficiency								50	
		Total	12	4	15					1000	25

Open Elective from Other Departments

1. NTT-801 Technical Textiles
2. NOE-082 Product Development

Departmental Elective IV

1. NTT-041 Theory of Textile Structure
2. NTT-042 Mill Planning & Organization

Departmental Elective V

1. NTT-053 Special topics in Man Made Fibre Technology
2. NTT-054 Coating of Textiles

3rd Semester B. Tech. MAN MADE FIBRE TECHNOLOGY

1. **Engineering Mathematics-III/ Science based Open Elective (NAS 301/ NOE-031-038):** Syllabus as decided by U.P.T.U. (L T P 3 1 0 =4)

2. **YARN TECHNOLOGY-I (NTT-305) (L T P 3 1 0)**

Unit (1): Picking and cotton harvesting. Ginning, pre-cleaning of cotton .Pre and post ginning. Description and working of knife roller, mecarthy and saw gins, kinds of mixing. Principles of selection of cotton for mixing hand, bin, stack mixing, auto mixer, different cotton varieties advantage and disadvantage of mixing.

Total lectures required = 09

Unit (2): Object of blow room. Types of openers, beaters, Lap forming mechanism. Lap rejection and lap defects. Production and efficiency of different m/c. Chute feed system, latest openers and beaters.

Total lectures required = 09

Unit (3): Objects, feeding, carding and doffing of material. Specification of different parts of card & card clothing, Types of card clothing, card setting, stripping grinding, assessment of neps, basic card calculation, auto levelers in card.

Total lectures required = 08

Unit (4): Objects of draw frame, different drafting systems, roller slip and drafting waves, roller weighting, various stop motion, different weighting systems.

Total lectures required = 08

Unit (5): Working of draw frame, drafting and its types, Concept of high speed draw frame. calculation on draft and production.

Total lectures required = 08

Grand Total Lectures Required = 30

Text Books & Reference material:

1. Man made fibre and their processing by W.Kiein
2. Spinning of man made and blends on cotton systems by K.R.Solholore
3. Manual of cotton spinning by Frank Fharnley
4. Technology of carding by R.Chattopadhyay
5. Spinning blow room and carding by Prof. K.R. Solholora

Laboratory work: As per the lab Syllabus

3. FABRIC TECHNOLOGY-I (NTT-306) (L T P 3 1 0)

Unit (1): Study of different types of knots, classification of different warp winding m/c's with detail specification), working principles of thread stop motion, different types of tensioners, different types of slub catchers, yarn travesty system, different winding faults with remedies.

Total lectures required = 09

Unit (2): Auto-coner: Objective of auto-coner, important parts of auto-coner and their functions, concept of yarn clearing, concept of splicing, Classification of weft winding m/c, working principle of various types of weft winders, yarn numbering system, average and resultant count of plied yarns.

Total lectures required = 08

Unit (3): Objective of warping, Classification of various types of warping m/c with specification, Sectional warping machines, Waxing attachment, computerized warping machines, working of stop motion, full beam stop motion used on warping motion, quality of good beam, warping beam defect with remedies.

Total lectures required = 08

Unit (4): Object of sizing, different ingredients with method of preparation of size-paste, classification of sizing m/c, working principles of various controls used on sizing m/c, size-recipe, size-beam faults with remedies.

Total lectures required = 08

Unit (5): Estimation of efficiency and productivity of various types of winding & warping machines,

Total lectures required = 8

Grand Total Lectures Required = 42

Text Books:

1. Tablets (ATIRA) a. Winding b. Warping c. Sizing
2. Process control in warping, winding and sizing (ATIRA,BTRA)
3. Yarn preparation Vol. I & II R. Sengupta
4. Warp sizing by Rame Bottom
5. Yarn calculation by R. Sengupta

Laboratory work: As per the lab Syllabus

4. Wet Processing of Textiles -I (NTT-303) (L T P 3 1 0)

Unit (1): Role of water & its quality for wet processing, Principle and application of surfactant in textile processing, Sequence of chemical processing, of textiles, natural and added impurities in textiles, Various preparatory processes for cotton, wool, silk, nylon, polyester, acrylic and blends including optical whitening

Total Lectures required =9

Unit (2): Objectives of desizing, scouring, bleaching and mercerization of textile materials, Different types of desizing and bleaching agents, methods of desizing, singeing, scouring and bleaching of textile material, various faults in bleaching and their remedies and removal.

Total Lectures required =9

Unit (3): Objective of heat setting, Objective of mercerization, physical and chemical aspects of mercerization, method and types of heat setting and mercerizing, yarn and fabric mercerizing, Optical brightening agents, and their application

Total Lectures required =8

Unit (4): Brief introduction to processing machinery and new processes development in machinery for preparatory and dyeing.

Total Lectures required =8

Unit (5): Introduction to colours and their mixing, Measurement of colour, Application of Computer Colour Matching system as a quality control tools to evaluate strength/ Purity of dye, shade matching, whiteness/ yellowness index

Total Lectures required =8

Grand Total Lectures Required =42

Books:

1. Chemical processing of cotton and p/c blends – ATIRA
2. A glimps on the chemical technology and textile fibres by R.R. Chackrawartty
3. Technology of bleaching and mercerization by V.A. Shenai
4. Technology of finishing by V.A. Shenai

Laboratory work: As per the lab Syllabus

**5. Industrial Psychology/ Industrial Sociology (NHU301/NHU302)
Syllabus to be decided by UPTU (L T P 2 0 0=2)**

6. Textile Fibre-I: (NTT-304) (L T P 2 1 0)

Unit (1): Fibre, textile fibre (1). Classification of natural textile fibres (1), Essential and desirable properties of textile fibres (2), National and international production and consumption of various natural fibres (cotton, wool, silk linen, ramie, jute etc) Advantages and disadvantages of natural and man-made fibres.

Total Lectures required = 08

Unit (2): Geographical distribution and cultivation of cotton fibre, varieties of cotton fibre, Morphological structure of cotton fibre, Physical properties of cotton fibre, Effect of acid and alkalis on cotton fibre, Grading of cotton, Fibre Quality Index.

Total Lectures required = 09

Unit (3): Cultivation, extraction, morphological structure, properties and uses of bast fibres such as flax, jute, hemp, and ramie, Production of raw silk, Morphological structure of silk, Production of waste silk yarn, Chemical composition and physical properties of silk, effect of acid and alkalies, varieties of silk with brief description etc.

Total Lectures required = 08

Unit (4): Morphological structure of wool, Composition of wool fibre, Wool scouring, and combing, Properties of wool fibres, Varieties of wool fibre with brief description. **Total Lectures required =8**

Grand total of Lectures = 33

Books:

1. W.E. Morton & J.W.S. Hearle, Physical properties of textile fibres, Textile Institute, U.K.
2. Progress in textiles: Science and technology Vol.-2 By Dr. V.K. Kothari, I.I.T. Delhi.
3. Hand book of textile fibres by J.Gordon Cook
4. Fibre Science and Technology, S P Mishra

Laboratory work: As per the lab Syllabus

7. Human Value & Professional Ethics/ Cyber Security: Audit Course

Common Syllabus as Decided by UPTU BOS

3RD SEMESTER LAB SYLLABUS

TT-355: Yarn Technology-I:

Practice in handling and operation of blow room, study of constructional details of machinery in blow room, calculating speed of different machine parts, Blows per inch of Krishna beater, Production calculation of blow room, various controls points and change places, Practice in checking the quality of laps

Study of constructional details of card, change places and speed calculation of a carding machine, finding out individual draft and total draft in carding machine, flat speed.

Study of construction details of draw frame, various control and change places etc, calculation pertaining to gearing, speeds, constant, draft and production etc

TT-356: Fabric Technology-I

Study of cone winding, cheese winding, pirn winding and auto coner, constructional details of machine, types of packages produced by them and package faults, Calculations pertaining to cone winding, cheese winding, pirn winding

Study of beam warping & sectional warping machine, stop motion and tensioners in warping, Calculations pertaining to warping machines.

TT-353 Wet Processing of Textiles-I:

Sizing, scouring, bleaching and mercerization of cotton fabric and to evaluate the effectiveness of each process using various test such as Tewega test, drop absorption test, whiteness index, barium activity number test, measure wax content, ash content and scouring loss of cotton fabric, find out available chlorine in a given sample of sodium hypo chloride, determine strength of H₂O₂ (Hydrogen peroxide) by titration method, to finish fabric with water repellent and flame retardant finishes and test water repellency and flame retardant property using appropriate test method.

TT-354: Textile Fibres-I

Principle of microscopy, microscopic identification of natural fibres, preparation and mounting of specimen for longitudinal view, standard scheme of analysis of homogeneous fibre and blend by physical and chemical methods, preparation of reagents used for chemical analysis

4th Semester B. Tech Man Made Fibre Technology

1. **Engineering Mathematics / Science based elective (NAS-401/NOE-041-048): (L T P 3 1 0 =4)**

2. **Yarn Technology-II (NTT-405) (L T P 3 1 0)**

Unit 1: Objectives of combing, system of lap preparation, sliver lap, ribbon lap and super lap machines, configuration of fibre feed and its effect on the quality of product and efficiency of comber, combing cycle.

Total lectures required = 8

Unit 2: Important parts of comber and their functioning, Combing cycle, concept of forward and backward feed, concept of comber waste, calculation pertaining to production and noil percentage,.

Total lectures required = 8

Unit 3: Objectives of speed frame, important parts of speed frame and their functioning, Mechanism involved in drafting, twisting, and winding, different types of roller drafting systems, Common defects in roving package, calculations pertaining to gearing, draft, t.p.i. and production, twist multiplier and roving twist

Total lectures required = 9

Unit 4: Introduction and objective of ring frame, important parts of ring frame and their functions, principle and mechanism involved in drafting, twisting and winding, Types of rings and travelers, mechanism of cop formation, common package size,

Total lectures required = 8

Unit 5: Control in yarn faults, ring frame calculations pertaining to TPI, production and draft, Doubling - Objects and terminology, study of ring doublers, Reeling: Objects and terminology, types of reeling construction and working of a reel yarn bundling,

Total lectures required = 09

Grand Total Lectures Required = 42

Text Books & reference Books:

1. Man-made fibre and their processing by W.Kiein
2. Spinning of man-made and blends on cotton systems by K.R.Solholore
3. Manual of cotton spinning by Frank Fharnley
4. Technology of carding by R.Chattopadhyay

Laboratory work: As per the lab Syllabus

3. Fabric Technology-II (NTT-406) (L T P 3 1 0)

Unit (1): Introduction to weaving process, Classification of loom, their mechanical details, settings and adjustments, primary, secondary and auxiliary motions., different primary motion of handloom & power looms, .Secondary motion of loom, **Total of lectures required=8**

Unit (2): Various ways of shedding, various types of sheds, tappet shedding, and idea of construction of tappet, under pick and over pick mechanism, beating up motion, early and late shedding, healds, reed & temples and their utility in loom.

Total of lectures required=8

Unit (3): Working principle of dobby, classification of various shedding arrangements, working principles of jacquard, and working principle of drop box motion..

Total of lectures required=9

Unit (4): Warp protecting motion, side and centre weft fork motion, description of various types of dobby's, negative and positive dobby, various timings and settings used on loom for filament weaving

Total of lectures required=9

Unit (5): Classification of automatic loom, study of various auxiliary motion of automatic loom, calculation regarding cloth production, efficiency, yarn inventory etc., fabric defects and remedies.

Total of lectures required=8.

Grand total lectures required=33

Text Books & Recommended Books:-

1. Weaving mechanism Vol.1 & II by N.N.Banarjee.
2. Weaving by ATIRA.
3. Automatic loom by ATIRA (tablet)
4. Weaving calculation by R.Sen Gupta.
5. Weaving Mechanism (Fox).
6. Mechanism/Weaving machine (TALUKDAR)

Laboratory work: As per the lab Syllabus

4. Industrial Psychology/ Industrial Sociology: Syllabus provided by UPTU BOS

5. Wet Processing of Textiles-II (NTT-403) (L T P 3 1 0)

Unit (1): Classification of dyes according to their mode of application, Dyeing of cellulosic material with direct, reactive, vat and sulphur dyes. Dyeing of polyester with disperse dyes, exhaust and continuous dyeing

Total Lectures required =9

Unit (2): Dyeing of nylon, wool, and silk with acid, metal complex dyes, dyeing of acrylic with basic dyes, cross dyeing of polyester and cellulosic blends, Dyeing of nylon and wool and will and acrylic blends.

Total Lectures required =8

Unit (3): Styles and methods of printing outline of various methods and their limitations. Application and type of printing thickeners, Properties of thickner, printing auxiliaries, Technology of printing

Total Lectures required =8

Unit (4): Finishing: Introduction to finishing, Classification of finishing (mechanical and chemical), Various types of mechanical finishing such as singeing, calendaring, Milling, raising, napping, brushing, and shrinking, Heat setting,

Total Lectures required =8

Unit (5): Various types of chemical finishing such as softner, flame retardant, antistatic, anti piling, oil & soil resistance, bactericidal & fungicidal, water repellent, easy care. Application of finishes, Thickeners and their application .Various style of printing –direct style resist style and discharge style of printing.

Total Lectures required =9

Text Books and Reference material:

15. Chemical processing of cotton & p/c blends- ATIRA
16. A glimpse on the chemical technology of textile fibres, by R.R. Chakraborty
17. Technology of fdyeing, by V.A. Shenai
18. Technology of finishing, by V.A. Shenai
19. Technology of Printing, by V.A. Shenai
20. Dyeing and chemical technology of textile fibres by E.R. Trotman
21. An introduction to Textile finishing by J.T. Marsh.

Laboratory work: As per the lab Syllabus

6. Textile Fibre-II (NTT-404) (L T P 2 1 0)

Unit (1): General definition of man-made or manufactured fibres, classification of man-made fibre, and introduction to manufacturing processes of man-made fibres, Study of various systems of spinning: melt, wet & dry spinning- basic principles, brief idea about spinning head, spinneret, quench chamber, & coagulation bath, spin finish application

Total Lectures required =9

Unit (2): Introduction to synthetic fibres, Polyethylene Terephthalate fibre- polymer production by DMT & PTA route, chip drying, spinning of filament yarns and staple fibre manufacturing, effect of process variable on properties of polyester fibre, some dope additives for specialty polyester fibre, Properties of polyester fibre,

Total Lectures required =8

Unit (3): Polyamide fibre- Different types of polyamide fibres, Nylon polymer production by continuous polymerization in VK tube, Manufacturing of Nylon 6 and Nylon 6,6 by melt spinning, Properties of Nylon 6 and Nylon 66 fibre, Polyacrylonitrile (PAN) fibre, Acrylic fibre-formation by dry spinning, dry-jet-wet spinning process, Total Lectures required =9

Unit (4): Introduction to regenerated fibre, concepts of regeneration of fibre, Raw material for viscose rayon, manufacturing sequence of viscose fibre, wet spinning of viscose rayon, formation of serrated edge cross-section of viscose rayon, viscose fibre properties, Introduction to cuprammonium rayon in brief, introduction of cellulose acetate rayon in brief.

Total Lectures required =9

Grand total of lectures required = 35

Reference Books:

15. Manufactured fibre Technology, by V.B. Gupta & V.K. Kothari
16. Essential fibre chemistry, by M.E. Miller
17. Production of Synthetic Fibres, by A.A. Vaidhya
18. Fibre Chemistry by M. Lewin, E.M. Pearce, Marcel & Dekkan Inc
19. Regenerated Cellulose fibre, by C. WEooding, Woodhead Publishing Ltd.
20. Handbook of Textile fibre, by Gordon Cook
21. Man Made Fibres, by R.W. Moncrief

Laboratory work: As per the lab Syllabus

7. Human Value & Professional Ethics/ Cyber Security: Audit Course
Common Syllabus as Decided by UPTU BOS

4TH SEMESTER LAB SYLLABUS

TT-455: Yarn Technology-I:

Constructional details of sliver lap, ribbon lap and comber, change places and speed calculation of a sliver lap, ribbon lap & comber, Calculation of draft at different zones and production at sliver lap, ribbon lap & comber,

Passage of material at roving frame, change places in roving frame, calculation of speeds of different parts, draft, twist & production at roving frame.

Operating, setting and gauging of ring frame and doubling frame, study of constructional details of machinery, various controls, change places etc.

TT-456: Fabric Technology-I

Introduction to loom, its different parts and passage of material on it, Names of parts, setting and fitting of tappet shedding, dobby shedding, jacquard shedding, over pick, under pick, beat up, five wheel take up, seven wheel take up, negative let-off and semi-positive let-off motions

Construction, names of parts, setting of automatic pirn change, drop box motions, and shuttle box, Names of parts, setting and fitting of warp protecting, warp and weft stop motions.

TT-453: Wet Processing of Textiles-I:

Dye cotton with direct, reactive, vat and sulphur dye, dyeing polyester, wool, silk, acrylic and nylon using appropriate disperse, acid and basic dyes, Print cotton fabric using various styles of printing, namely, direct, resist and discharge, Evaluate colour fastness to washing, light, perspiration and rubbing properties

TT-454: Textile Fibres-II

Principle of microscopy, microscopic identification of man-made fibres, preparation and mounting of specimen for longitudinal view, standard scheme of analysis of homogeneous fibre and blend by physical and chemical methods, preparation of reagents used for chemical analysis

5th Semester B. Tech. Man Made Fibre Technology

1. Textile Testing-I (NTT-501) (L T P 3 1 0)

Unit (1): Introduction to fiber, yarn and fabric testing, sampling, random sampling, biased sampling, sampling techniques, square and cut-square technique, selection of sample for testing. **Total Lectures required =8**

Unit (2): Atmospheric conditions for testing, absolute and relative humidity, moisture regain & moisture content and their measurement, dry and wet bulb hygrometer, importance of moisture in textiles, effect of moisture on properties (physical, & mechanical) of textile material, factors affecting the regain, Shirley moisture meter, control of atmospheric conditions during testing. **Total Lectures required =9**

Unit (3): Measurement of physical characteristics of cotton viz. length, fineness, maturity, bundle strength, colour and foreign matter including principle, construction, operation, and calibration of the equipment in common use. **Total Lectures required =8**

Unit (4): Mechanical properties of fibres, relation between structure and mechanical properties of fibres, Measurement of physical properties of man-made fibres i.e. length, denier, strength, elongation, modulus, work of rupture, crimp, spin finish, fibre quality index etc. **Total Lectures required =8**

Unit (5): determination of yarn count, diameter, average & resultant count of folded yarn, relation between Ne, D, T, Nm, Instruments used for determination of count, quadrant balance, Knowles balance, Beesley balance and physical balance, Twist, classification of twist, twist measurement, direct counting method, continuous twist tester, twist-untwist method, Twist tester, R.B. twist tester, level of twist . **Total Lectures required =9**

Grand total of lectures required = 42

Text Books and Reference material:

9. Quality control and testing management, by V.K. Kothari

10. Principles of textile testing, by J.E. Booth

11. Physical testing of textiles, by B.P. Savile

12. Physical properties of fibres, by W.E. Morton and J.W.S. Hearle

Laboratory work: As per lab syllabus

2. Polymer Chemistry (NTT-506) (L T P 3 1 0)

Unit (1) Scope of Polymer Chemistry, (a) definition of monomers, homo-polymers and copolymers, (b) Chemistry of important monomers, (c) Thermo sets (d) Thermoplastic (e) Elastomers (f) Tg, Tm, and solution properties of polymers. **Total Lectures Required = 9**

Unit (2): Condensation polymerization, (b) Mechanism, kinetic and molecular weight build up , (c) Bulk, Solution, Emulsion and suspension polymerization(d) comparison of condensation and addition polymerization. **Total Lectures Required = 8**

Unit (3): Addition polymerization, (b) Type of addition polymerization, (c) Radical, cationic and anionic polymerization (d) Mechanism and kinetics of polymerization, (e) Copolymerization, Stereo-Regular polymerization, Block and Graft polymerization (2).

Total Lectures Required = 9

Unit (4): Characterization of molecular weight of polymers, End-Group analysis method, Viscosity of measurement method, gel permeable chromatography. Techniques for measurement Polydispersity.

Total Lectures Required = 8

Unit (5): Application of polymer to textiles, Fiber forming synthetic polymer, Properties of fiber forming synthetic polymer. **Total Lectures Required = 8**

Grand Total Lectures required = 42

Text Books & Reference Books:

1. Text Book of Polymer science by **F.W. Bill Meyer**
2. Text book of Polymer, Vol. I, II, III by M.S. Bhatnagar
3. Polymer science by **Gawaskar, Vishwanathan, Sreedhar and Jaydev**
4. Polymer chemistry by B.K. Sharma

3 Principle of Chemical Engineering (NTT-405) (L T P 3 1 0=4)

Unit-1: Industrial calculation, material balance, energy balance, Flow of fluids, mechanism of fluid flow (1), viscosity measure, flow meters, reciprocating pumps, centrifugal pumps. **Total of lectures required=12**

Unit-2: Evaporation, types of Evaporation, drying tunnel and rotary driers (1) distillation, steam distillation, distillation method), mixing type of mixers, paddle stirrers, kneeding m/c..

Total of lectures required=9

Unit-3: Gas absorption, gas absorption equipment, theory of Gas absorption, extraction, type of extraction, theory of extraction. **Total of lectures required=9**

Unit-4: Crystallization, crystal forms, Crystallization theory, rate of growth of crystal, Crystallization apparatus, filtration, filtration apparatus. **Total of lectures required=10**

Grand total lectures required =40

Text Books & Reference Books:

Laboratory work: As per the lab Syllabus

4. Colour & Design (NTT-504) (L T P 3 1 0=4)

Unit (1): Light and colour phenomena, physical basis of colour, Emission & absorption theory of light, Colour vision and light theory of colours, Complementary colours, Chromatic circle, Pigment theory of colours, Brewster circle, Attributes of the primary & secondary colours, **Total Lectures required = 11**

Unit (2): Colour measurement, Primary, Secondary, Tertiary & compound colours, Biren's triangle, Modification of colours, Coloured greys, Colours in combination, Colour contrast, contrast

in hue, contrast of tone, colour harmony, Relative spaces occupied by colours, divisional colours, Application of colours, Mixed colour effect,.

Total Lectures required =11

Unit (3): Composition of designs, Condition to be observed during ornamentation of fabrics, Mode shade, Harmony of succession, gradation of hue, Different stages of colouring of textile materials, Colour and weave effect and its classification. Bases of Textile design, One third and one fourth drop design, Half drop and drop reverse design,

Total Lecture required = 10

Unit (4): Unit repeating design, Geometric ornamentation, Construction of symmetrical designs, Stripe and check effect designs, Sari border / vertical border design, Factor affecting the woven designs, reversing inclined figure, Diamond, Ogee, & diagonal waved line base, applications of colours. **Total Lecture required = 10**

Unit (5): Art sheet based question covering all above units

Grand total Lectures required = 34

Reference Books:

5. W. Watson- Textile design and colour
6. Traditional Textile designs B K Behera

5. Fabric Structure (NTT-505) (L T P 2 1 0=3)

Unit (1): Classification of various fabrics, construction of plain weave and its derivatives (rib and mat weave), ordinary twill, right hand twill, warp faced, weft faced & balanced twills,

Total Lectures required = 8

Unit (2): Satin regular, irregular and their extension. Combined twills, end to end and pick-to-pick combination, elongated twills, steep twills, broken twill, curved twill, Fancy twills-large diagonal shaded twills, Wave/ zig-zag, herringbone twill. **Total Lectures Required = 8**

Unit (3): Regular and irregular satin, sateen base diagonals and brained twills, Diamond, mock leno, ordinary honeycomb, brighten honeycomb, Huck-a-back and crepe weave.

Total Lectures Required = 9

Unit (4): derivatives of hopsack, barley corn stitched hopsack and twilled hopsack, Ripstop weave, Simple and wadded bed ford cords (1), weft and piques (1), principle of figuring with extra material extra warp figuring, extra weft, limitation of extra thread.

Total Lectures Required = 9

Grand Total Lectures Required = 34

Reference Book: -

1. W. Watson Textile Design & colour Longmans Greens Co. London.
2. Z.J Grosicki Watson's Textile design and colour Newnes Buter Worth, London.
3. Z.J. Grosicki, Advance Textile Design Newnes Butter Worth, London.
4. "Nishant" A Grammar of textile.

Laboratory work: As per the lab Syllabus

6. HS: Common Syllabus as decided by UPTU) (L T P 2 0 =2)

5th SEMESTER LAB SYLLBUS

TT-551, Textile testing-I

Measurement of fibre length and its distribution, fineness, moisture content and strength etc using different methods and instruments, Fibre diameter and its variability, cleanliness of cotton, testing of neps in card web, sliver, roving and yarns, Analysis and interpretation of test results.

Measurement of hank of sliver, roving and count of yarn and their variability, Single yarn strength and elongation, Lea strength measurement, Use of statistical techniques for evaluation of experimental results

TT-556, Polymer Chemistry Lab

Chemistry of monomer, T_g, T_m & solution properties of monomer, Characterization of polymers, End group analysis, molecular weight measurement by viscosity method,

TT-557, Principle of Chemical Engineering Lab

Flow of fluids, Mechanism of fluid flow, flow meter, Crystallization , filtration analysis,

TT-555: Fabric Analysis:

Analysis of various types of fabric structures like plain, twill, satin, hopsack, barleycorn etc , measurement of cover factor and crimp of fabrics.

6th Semester B. Tech. Man Made Fibre Technology

1. Textile Testing-II (NTT-601) (L T P 3 1 0)

Unit (1): Tensile properties of yarn and fabric, stress-strain curve, various methods for finding of yield point, methods for finding of various modulus, destination of tenacity, and stiffness of fabric.

Total Lectures Required = 7

Unit (2): Procedure of determination of strength and elongation in the spun yarns, knowledge about the equipment used, yarn tensile strength testing machines, single yarn strength tester,lea strength tester, fabric strength tester- impact tester, Grab test, fabric B.S. Test, Scott serigraph, Instron tensile tester. . **Total Lectures Required = 9**

Unit(3): Measurement of evenness testing of yarns, nature and causes of irregularities, principles and methods of evenness testing, evaluation and interpretation of evenness diagram & spectrogram and their associated equipment, Classimat faults .

Total Lectures required =9

Unit (4): Measurement of physical properties of fabric and the knowledge of the equipment used, tensile strength, bursting strength, tearing strength, pilling, air permeability, crimp, thickness, EPI, PPI, weight and cover factor.

Total Lectures required =10

Unit (5): Measurement of water repellency, shrinkage, measurement of fastness to light and rubbing, thermal transmission, Brief introduction to FAST and KAWABATA.

Total Lectures required =7

Grand total of lectures required = 42

Reference Books: -

1. Physical testing of textiles by B.P. Saville.
2. Quality control and testing management by Dr. V.K. Kothari.
3. Principles of textile testing by J.E. Booth.
4. Quality control by V.K. Kothari.

2. Post Spinning Operation (NTT-604) (L T P 3 1 0)

Unit (1): Concept of drawing, drawing unit Factors influencing drawability, Influence of drawing on structure and properties of fibres. Methods used for orientation stretching- single stage, multi stage, drawing of melt spun filaments, drawing of as-spun fibres through neck formation. **Total of lectures required=9**

Unit (2); Heat setting ,nature of heat set, Influence of heat setting variables on structures & properties of fibres, Temporary, semi permanent and permanent heat setting, heat –setting equipments. **Total of lectures required=9**

Unit (3): Tow to top conversion, stretch breaking, cutting method, Sydel stretch breaking, Pacific tow to top cutting system, Turbo stapler. **Total of lectures required=9**

Unit (4): Need for crimping, crimping methods, manufacture of high shrink fibres, twisting of continuous filaments, up twisters and two for one twister. **Total of lectures required=8**

Unit 5: Twist setting, Systems used conversion of fibres in to yarn, influence of fibre and process variables on properties of blended yarns. **Total of lectures required=7**

Grand total lectures required =42

Text Books & Reference book:-

1. Manufactured fibre technology by V.B.Gupta & V.K.Kothari.
2. Synthetic fibre by Vaidhya
3. Textile fibre part-II by V.K.Kothari.
4. Textured yarn technology by J.W.S.Hearle.

Laboratory work: As per the lab Syllabus

3. Structure & properties of Fibres (NTT-011) (L T P 3 1 0)
Unit (1): Unit (1): Basic structural features of fibre, Structure of Cotton, wool, silk, and other textile fibres, relation between fibre structure and fibre, Methods of estimating molecular weight, orientation, crystallinity & crystalline orientation of fibre forming polymer, Overall orientation by “sonic modulus tester. **Total Lectures Required = 8**

Unit (2): Concept of scanning electron microscope (SEM), Concept of transmission electron microscope (TEM) Fourier Transform Infrared Spectroscopy (FTIR), Atomic force microscopy, fibre fracture. **Total Lectures Required = 8**

Unit (3): Thermal behavior of textile fibres by Differential Scanning Calorimeter (DSC), TGA, thermal mechanical analysis (TGA), Thermomechanical Analyser (TMA) Density gradient column, Preparation of density gradient column, Crystallinity by density gradient column. **Total Lectures Required = 8**

Unit (4): Optical properties of fibres, Birefringence behavior, dielectric properties, fibre friction, fibre friction measurement, fibre to fibre, yarn to yarn friction measurement
Total Lectures Required = 8

Unit (5): Creep behavior, concept of moisture absorption by fibres, Moisture absorption, heat of absorption, differential heat of absorption, integral heat of absorption, Quantitative theory of heat moisture absorption, Rate of moisture absorption **Total Lectures Required = 10**

Grand Total of lectures required = 42

Reference Book: -

1. Manufactured fibre technology by V.B. Gupta, V.K. Kothari
2. Physical properties of fibre by J.W.S. Hearle
3. Thermal behavior of material by Turi
4. Modern yarn production by Ray
5. Textile fibres by ATIRA
6. ASTM Standard books

7. Polymers by fibre & textiles encyclopedia
8. Advances in fibre source by S.K. Mukhopadhyaya

4. Departmental Elective I

4.1 Garment Manufacture Technology (NTT-012) (L T P 3 1 0)

Unit (1): Introduction to garment manufacturing technology, Sample cutting, ZFusing, Sewing, Pressing, Finishing and inspection, Line balancing concept.

Total Lectures required =8

Unit (2): Introduction to measurement of fabric dimensional properties, fabric comfort, thermal comfort, objective evaluation of fabric, low stress fabric properties, Kawabata system, fabric assurance by sample testing, fabric defects, Fabric inspection and feedback to back process. **Total Lectures required =9**

Unit (3) Introduction to garment cutting, Marker planning, Efficiency of Marker planning, methods of marker planning and marker use, spreading of the fabric, to form a lay, spreading requirements, methods of spreading, fabric packages, objective of cuttings, methods of cuttings. **Total Lectures required =9**

Unit (4): Introduction to seam, stitch, stitch classification, stitch structure, seam formation, joining material, surface characteristics, seam appearance, damages (thermal and mechanical), seam performance, seam degradation, seam failure, seam puckering and seam testing. **Total Lectures required =9**

Unit (5): Importance of garment processing and finishes, types of garment, processing of garments and special garment finishes. **Total Lectures required =7**

Grand total of lectures required = 42

Text Books and Reference material:

7. Introduction to Garment Manufacturing Technology By T Ramchandran
8. 2. Garment Manufacturing Technology by By T Ramchandran
3. Practical Clothing Construction Part I & II by Mary Methews

4.2 Instrumentation & Automatic Control (NTT-013) (L T P 3 1 0)

Unit (1): The principle of measurement, static and dynamic measurement, functional elements for measuring systems. transducers, amplifier and recording systems.

Total lectures required = 10

Unit (2); Instrumentation for measurement of motion(1), strain force(1),torque, temperature, pressure, flow, surface, texture etc., design consideration in optical mechanical and electrical instruments. **Total lectures required = 10**

Unit (3): Numerical control basic concepts, point to point systems, straight line and controlling system, Programme control-electrical, magnetic&, tape control, optical and mechanical methods.

Total lectures required = 09

Unit (4): Numerical control components, manual part programming, computer aided programming, C.N.C., D.N.C. **Total lectures required = 09**

Grand Total Lectures Required = 38

Text Books:

1. Industrial instruments & control-S.K.Singh
2. Mechanical measurements-B.S.Sirohi &H.C.
3. Computer control of manufacturing-Yoren Koren.

5. Departmental Elective II

5.1 Advance Fabric structure (NTT-021) (L T P 2 1 0)

Unit (1): Backed cloths, weft backed cloths, warp backed cloths with weeding threads, double cloths, center stitched, self stitched, inter changing double cloth, cut effect in interchanging double cloths. **Total Lectures required =9**

Unit (2) Turkish towel, Ornamentation of terry weave, triple cloth, Types of carpets and classification of carpets. **Total Lectures required =8**

Unit (3) Damask weaves, Brocade, Tapestry, Velvet, Velveteen, Colour and weave effect,. **Total Lectures required =8**

Unit (4): Gauge and leno weave with their mechanism; Lappet and Swivel weave, Ondule fabric, figured pique, draft & peg plan for above weaves.

Total Lectures required =9

Grand total of lectures required = 34

Text Books & Reference Book: -

1. W. Watson Textile Design & colour Longmans Greens Co. London.
2. Z.J Grosicki Watson's Textile design and colour Newnes Buter Worth, London.
3. Z.J. Grosicki, Advance Textile Design Newnes Butter Worth, London.
4. "Nishant" A Grammar of textile.

5.2 Multi & Long Fibre Spinning (NTT-022) (L T P 2 1 0=3)

Unit 1: Characteristics of manmade fibres, spinnability, blending, and its objectives, Spinnability, blending & its objectives, processing of Man made fibres & blends on short, medium and long staple spinning systems.

Total Lectures Required = 10

Unit 2: Spinning of dyed fibres, estimation of blends intimacy, factors affecting the blend irregularity, structural properties of blended yarns.

Total Lectures Required = 8

Unit 3: Production of bulked yarn, characteristic difference in the physical & mechanical properties of various long staple fibres & their influence in the choice of preparatory & spinning machinery.

Total Lectures Required = 8

Unit 4: Woolen, semi-worsted & worsted systems of spinning, retting of flax, & jute, Jute & flax spinning, manufacturing of spun silk.

Total Lectures Required = 8

Grand total lectures required =34

Reference book:-

15. Spun Yarn technology: Eric Oxtoby
16. Spun yarn technology: Eric Oxtoby.
17. Wool Spinning by Vickerman, Abhishek Publication
18. Principle of woolen spinning by Priestman
19. Woolen & Worsted yarn manufacture by J. W Redcliff
20. Jute Spinning Calculation by Andrew Smith
21. Worsted Drawing & Spinning by Miles

6. HS: Syllabus as decided by UPTU) (L T P 2 0)

6^h SEMESTER LAB SYLLBUS

TT-551, Textile testing-II

Use of microscope for testing of yarns for appearance, twist and diameter, measurement of evenness, measurement of yarn strength, tenacity, elongation at break, modulus, crimp rigidity, fabric testing for *dimension*, weight, thickness, shrinkage and air permeability,

Fabric testing for elongation, tensile, bursting, and tearing strength, abrasion resistance, flexural rigidity, crease recovery and draping qualities of fabric

TT-552, Post Spinning Operation

Drawing behavior of thermoplastic fibres, influence of heat setting on thermoplastic polymers, spin finish measurement, twist setting, analysis of yarn bulk and crimp rigidity of yarn.

TT-553, Structures & Properties of Fibres

Differential Scanning Calorimeter (DSC), TGA, thermal mechanical analysis (TGA), Thermo-mechanical Analyser (TMA), creep behavior analysis, Birefringence study, Fibre density measurement by density gradient column

7th Semester B. Tech. Man Made Fibre Technology

1. Open Elective from Other Department

1.1 Process Control in Spinning (NTT-701) (L T P 2 0 0)

Unit (1): Importance of evolving a system for process control, control of mixing quality through fibre characteristics, simultaneous control of mixing cost and quality, concept of bale management. **Total Lectures required =7**

Unit (2): Control of waste in blow room and carding, norms for waste and cleaning efficiency in blow room & card, control of neps, assessment of performance of blow room & card, control of comber waste, concept of yarn realization, calculation pertaining to waste & yarn realization. **Total Lectures required =8**

Unit (3) Measurement and analysis of productivity, means to improve productivity, maximizing machine efficiency in ring spinning, controlling end breakage rate in ring spinning, control of soft waste and hard waste, control of yarn faults and package defects- slubs, crackers, spinner's doubles, bad piecing & slough off.
Total Lectures required =9

Unit (4): Control of yarn quality- count, strength and their variability, study of CV% (within bobbin and between bobbin), control of variability of lea strength, single yarn strength and elongation %, Control of yarn unevenness, imperfections and hairiness.

Total Lectures required =9

Grant Total of lectures Required =35

Reference Books:

1. Process Control in Spinning by ATIRA
2. Process Control in Spinning by K.R. Salhotra

1.2 Process Control in Weaving (NTT-702) (L T P 2 0 0)

Unit (1): Scope of process control, systems of process control in weaving, setting norms and schedule of checks, machinery audit, process control in weaving, optimizing quality of preparation, control of quality of knot, producing good package, selection of healds, selection of reeds, dressing of the beams for reducing incidence of cross ends.

Total Lectures required =9

Unit (2): Process control in warping, minimizing end breakage in warping, quality of warping beam, control of productivity, factors responsible for loss in efficiency, control of productivity. **Total Lectures required =7**

Unit (3): Process control in sizing, choice recipe and size pick-up, control of size pick-up, control of yarn stretch, quality of sized beams, control of productivity.

Total Lectures required =8

Unit (4): Process control in loom shed, snap study and time and motion study, control of warp and weft breakage, causes and remedies of fabric defects, factors responsible for loss in efficiency, control of productivity, process control in grey inspection, and folding sections.

Total Lectures required =8

Grand total of lectures required = 32

Reference Books

1. Weaving tablets by ATIRA
2. Machine catalogues of various machines manufacture
3. Process control in weaving by ATIRA

2. Open elective from other department

2.1 Quality Management (NOE-072) (L T P 3 1 0)

UNIT-I : Quality Concepts: Evolution of Quality Control, concept change, TQM Modern concept, Quality concept in design, Review of design, Evolution of proto type. **3**

Control on Purchased Product: Procurement of various products, evaluation of supplies, capacity verification, Development of sources, procurement procedure. **2**

Manufacturing Quality: Methods and techniques for manufacture, inspection and control of product, quality in sales and services, guarantee, analysis of claims. **5**

UNIT-II: Quality Management

Organization structure and design, quality function, decentralization, designing and fitting, organization for different type products and company, economics of quality value and contribution, quality cost, optimizing quality cost, seduction program. **3**

Human Factor in quality (11)

Attitude of top management, cooperation of groups, operators attitude, responsibility, causes of apparatus error and corrective methods. **2**

UNIT-III: Control Charts, Theory of control charts, measurement range, construction and analysis of R charts, process capability study, use of control charts. **5**

Attributes of Control Chart , Defects, construction and analysis of charts, improvement by control chart, variable sample size, construction and analysis of C charts. **5**

UNIT -IV : Defects diagnosis and prevention defect study, identification and analysis of defects, correcting measure, factors affecting reliability, MTTF, calculation of reliability, building reliability in the product, evaluation of reliability, interpretation of test results, reliability control, maintainability, zero defects, quality circle. **8**

UNIT -V: ISO-9000 and its concept of Quality Management, ISO 9000 series, Taguchi method, JIT in some details. **7**

Text / Reference Books:

1. Lt. Gen. H. Lal, "Total Quality Management", Eastern Limited, 1990.
2. Greg Bounds, "Beyond Total Quality Management", McGraw Hill, 1994.
3. Menon, H.G, "TQM in New Product manufacturing", McGraw Hill 1992.

2.2 OPERATION RESEARCH (NOE-073) (L T P 3 1 0)

UNIT-I: Introduction:

Definition and scope of operations research (OR), OR model, solving the OR model, art of modelling, phases of OR study.

Linear Programming: Two variable Linear Programming model and Graphical method of solution, Simplex method, Dual Simplex method, special cases of Linear Programming, duality, sensitivity analysis.

UNIT-II : Transportation Problems:

Types of transportation problems, mathematical models , transportation algorithms,

Assignment: Allocation and assignment problems and models, processing of job through machines.

UNIT-III : Network Techniques:

Shortest path model, minimum spanning Tree Problem, Max-Flow problem and Min-cost problem.

Project Management: Phases of project management, guidelines for network construction, CPM and PERT.

UNIT-IV: Theory of Games:

Rectangular games, Minimax theorem, graphical solution of $2 \times n$ or $m \times 2$ games, game with mixed strategies, reduction to linear programming model.

Quality Systems: Elements of Queuing model, generalized poisson queuing model, single server models. (12)

UNIT-V:

Inventory Control, Models of inventory, operation of inventory system, quantity discount., Replacement, Replacement models: Equipments that deteriorate with time, equipments that fail with time.

Text / Reference Books:

1. Wayne L. Winston, "Operations Research" Thomson Learning, 2003.
2. Hamdy H. Taha, "Operations Research-An Introduction" Pearson Education, 2003.
3. R. Panneer Seevam, "Operations Research" PHI Learning, 2008.
4. V.K.Khanna, "Total Quality Management" New Age International, 2008.

3. Fibre Manufacture & Process Control (NTT-707) (L T P 3 1 0=4)

Unit-1: Melt spinning line-extruder, design features of extruder screws (2) mixing of additives, Continuous polymer filter, spin pack and spinneret (2) spinning pump disassembly and cleaning of spinnerets, inspection of spinnerets (2) spinning variables and conditions for continuous spinning, special features of high speed spinning (3). **Total of lectures required=9**

Unit-2: Quenching system and quench chamber, Different quenching system (2). High speed winder, automatic winder, metering pump (1) spin finish application, chips drying. (1) Effects of

variable throughout rate. (2)Consequence of crystallization in chips on fibre spinning (2) structure formation during spinning (1).**Total of lectures required=8**

Unit-3: Introduction to solution spinning classification of solution spinning (2)wet spinning, coagulation in wet spinning, effect of coagulation conditions on fibre properties(2) dry spinning, spinning cell for dry spinning (2),Cross-section formation in dry-spinning, spin finish during dry-spinning, coagulation of viscose fibre in coagulation bath(4). **Total of lectures required=9**

Unit-4: Dry-jet-wet spinning, coagulation process (2) development of structure & morphology during dry-jet-wet spinning (2) importance of dry-jet-wet spinning (2) process control in dry-jet-wet spinning (2). **Total of lectures required=8**

Unit-5: Role of spin-finish (2) introduction to spin finishes components (2) spin finish application. Different techniques of spin finish application, dipping roller method, metered finish system, quench duct lubricating system, spray technique(4). **Total of lectures required=8**

Total of lectures required=42

Text Books & Reference Material:

1-Manufactured fibre technology-V.B.Gupta&V.K.Kothari,Chapmann&Hall

2-Textile Fibre- V.K.Kothari(vol.2) IAFL Publication

3-High speed fibre spinning-A.Ziabickey-john willey

4-Essential fibre chemistry-ME CarterMarcel Dekker mc.N.york

5-Handbook of Fibre Science: M Leoineli and M Pearce

4. Fibre Reinforced Composites (NTT-708) (L T P 3 1 0)

Unit 1: Definition of composites, Types of composites - fibre particulate and laminar composites, Fibre composites: Constituents - functions of fibre and matrix

Total Lectures Required =9

Unit 2: Types of high performance fibres - properties - types of matrix materials - Thermoset and Thermo plastics properties: short fibre composites, fibre matrix interface, coupling agents, coupling of interfaces and interfacial reaction in fibre composites, fracture mode in fibre composites. **Total Lectures Required =9**

Unit 3: Introduction to fibre reinforced composite material manufacturing techniques, Textile performs for composites: weaving, knitting, braiding. **Total Lectures Required =8**

Unit 4: Vacuum bagging, compression molding, injection molding, pultrusion, thermoforming, filament winding, resin transfer molding. **Total Lectures Required =8**

Unit 5: Testing of composites- Fibre volume fraction -Laminar tensile - shear - compression - and flexural properties, applications of fibre reinforced composites

Total Lectures Required =8

Grand Total of Lectures Required =42

Reference Books:

13. D hull An Introduction to composite materials, Cambridge university press, 1998
14. L Gupta “Advanced Composite Materials”, Himalayan Book, New Delhi, 1998
15. Mathews F.L and Rawlings R.D “Composite Materials Engineering science” Chapman and Hall London, 1994
16. Hearle. J.W.S “High performance fibres composites and engineering textile structures” JTI (special issue) 1990
17. Textile Progress monogram on “Hybrid yarns and textile performing for thermoplastic composites” by R. Alagirusamy, R Fanguero, V. Ogale and N. Padaki Textile Progress 2006 Vol 38 No. 4 (Wood Head Publishing Limited)
18. De.S.K. and White J.R. Short fibre polymer composites, Wood head, 2001

5. Departmental Elective III

5.1 Nonwoven (NTT-031) (L T P 3 1 0=4)

Unit 1: National and international scenario on non-woven fabric production, Concept about felts and non woven, Classification of non-woven fabrics, fibres for non-woven fabrics, ., Felt Manufacturing process

Total Lectures Required =9

Unit 2: Various method of web formation, web chrematistic and their influence on properties of non-woven fabrics, (3) Non woven fabric by Needle punch, Description of needle punching machine, effect of process variables on properties of needle punch fabric

Total Lectures Required =9

Unit 3: Non-woven fabric by hydroentanglement, Description of hydroentanglement machine, effect of process variables on properties of hydroentanglement non woven fabric, Non-woven fabric by adhesive bonding, mechanical bonding, Melt blown process of non-woven fabric manufacturing

Total Lectures Required =8

Unit 4: Non-woven fabric by Stitch bonding, Non-woven fabric by chemical bonding, Non-woven fabric by bonding with thermoplastic adhesives, Non-woven fabric by Spun laced, Effect of process variables on properties of stitch bonding, chemical bonding spun laced non-woven fabrics

Total Lectures Required =8

Unit 5: Flocked fabric, Laminates, latest development in non-woven industry: ultrasonic bonding, Infra-red bonding, bonding by bi-component fibres,. Application of various non woven fabrics

Total Lectures Required =8

Grand total of Lectures Required= 42

Reference & Text Books

1. Non Woven – N.N. Banarjee
2. Non woven – NCUTE
3. Knitting technology : Spencer

5.2 Knitting Technology (NTT-033) (L T P 3 1 0)

Unit 1: Difference between knits and wovens, knitting terms and definitions (Course,, wale, stitch density) different type of knitting needles: bearded needle, latch needle, sinker, jack, cam arrangement, overlap, under lap, closed lap, open lap

Total Lectures required =8

Unit 2: Comparison of warp and weft knitting, Classification of weft knitting machine, elements of knitting machine like type of needles, sinkers, etc Needle numbering system, technology of loop formation, geometry of loop structure, Elements of loop structure: needle loop, sinker loop, relation between yarn count, machine gauge and stitch density.

Total Lectures required =9

Unit 3: Classification of knit-structures, loop formation on: single jersey, Rib machines and inters look machines, socks knitting technology, Loop formation on flat bed machine

Total Lectures required =9

Unit 4: Four primary base knitting structures: Plain knitted fabric, Rib fabric, Interlock and Purl fabric, Special knitting machines: Fabric machine, garment length machine, flat machine, circular machine fabrics and Spacer fabrics.

Total Lectures required =7

Unit 5: Basic warp knitting machines, classification of warp knitting, Modern developments in weft knitting technique, calculations regarding production, gsm, stitch density etc, Causes and remedies of faults of knitted fabrics.

Total Lectures required =9

Grand total of lectures required = 42

Reference and Text Book-

1. Knitting Technology – Chamberlin
2. Knitting Technology – W.J. Spencer
3. International Textile Journal – Knitting
4. Knitting Calculation – Chamberlin
5. Wet Knitting Vol. 1&2 –Published by IIT New Delhi.
6. Knitting – NCUTE

Laboratory work: NA

7th SEMESTER LAB SYLLABUS

TT-757: Fibre Production & Characterization (0 0 2)

To study the path of yarn through circular and flat knitting machine, different knitting elements including the cam system, driving mechanism of plain knitting machine, cloth take-up mechanism of plain knitting m/c, rib knitting m/c including arrangement of dial and cylinder needles, cam, system and driving mechanism, Interlock knitting m/c including arrangement of dial and cylinder needle, cam system and driving mechanism, Warp knitting machine constructional details and mechanism of operation.

8th Semester Man Made Fibre Technology

1. Open Elective from Other Departments

1.1 Technical Textiles (NTT-801) (L T P 3 1 0=4)

Unit (1): Introduction to technical textile, types of technical textiles, textiles used in industry such as filtration, filter fabric construction- woven, needle felt & knitted filter fabric, finishing treatment of filter fabric, thermal and chemical properties of filter fabric, essential requirements of good filter fabric..

Total Lectures required =8

Unit (2): Manufacture and properties of protective textiles- water proof/coated and water repellent, antimicrobial, flame retardant, chemical resistance, Nuclear and biological resistance, mechanical resistance such as bullet proof, cut proof, stab proof

Total Lectures required =9

Unit (3): Medical textiles, fibres used, classification of medical textiles- non-implantable material wound dressings, bandages, plasters, etc, Extra-corporal devices – Artificial kidney, liver lung, implantable material- suture, soft tissue implant, Orthopedic implants, Cardiovascular implants, Healthcare/ hygiene products, medical cost, surgical gown, face mast etc.

Total Lectures required =8

Unit (4): Smart textiles, brief introduction of smart textiles, classification of smart textiles, passive smart textiles, active smart textiles, brief discussion of smart shirt, smart suit, musical jacket, space suit etc. automotive textiles: type cord, seat belt, air bag, seat upholstery, carpets, headliners, helmets etc, Agro textile: Shade net, green house film, Mulch net, crop cover, anti hail and bird protection net, finishing net etc.

Total Lectures required =9

Unit (5): Introduction of geo textile, classification of geo textiles, functions of geo textile-soil reinforcement, drainage (fluid transmission), filtration, separation, erosion control/ absorption, objective of geo textiles, manufacturing of geo textile, essential properties of geo textiles- Mechanical determinants, Hydraulic determinants, durability determinants

Total Lectures required =8

Grand total of lectures required = 42

Text Books and Reference material:

7. Hand book of technical textiles- A.R. Horrocks & S.C. Anand
8. Smart fibre, fabrics and clothing Tao X
9. Shears handbook of industrial Textiles.

1.2 PRODUCT DEVELOPMENT (NOE-083) (L T P 3 1 0=4)

UNIT-1: Concept of Product, definition and scope. Design definitions, old and new design methods, design by evolution, examples such as evolution of sewing M/C, bicycle, safety razor etc., need based

developments, technology based developments physical reliability & economic feasibility of design concepts.

Total Lectures required =9

UNIT –II: Morphology of design, divergent, transformation and convergent phases of product design, identification of need, Analysis of need. Design criteria; functional, aesthetics, ergonomics, form, shape, size, colour. Mental blocks, Removal blocs, Ideation techniques, Creativity, Check list.

UNIT –III: Transformations, Brainstorming& Synetics, Morephological techniques. Utility Concept, Utility Valaue, Utility Index, Decision making under Multiple Criteria. Economic aspects, Fixed and variable costs, Break-even analysis.

UNIT-IV: Reliability considerations, Bath tub curve, Reliability of systems in series and parallel, Failure rate, MTTF and MTBF, Optimum spares from Reliability considerations. Design of display and controls, Man-machine interface, Compatibility of displays and controls. Ergonomic aspects, Anthropometric data and its importance in design. Application of Computers in Product development & design.

UNIT-V: Existing techniques, such as work-study, SQC etc. for improving method & quality of product. Innovation versus Invention. Technological Forecasting. Use of Standards for Design.

Text/Reference Books:

1. A.K. Chitab& R.C. Gupta “Product design & Manufacturing” – Prentice Hall (EE)
2. R.P. Crewford, “The Technology of creation Thinking” Prentice Hall.
3. C.D. Cain, “Product Design & Decision” Bussiness Books.
4. C.D. Cain, “Engg. Product Design” Bussiness Books.

2. High Performance Fibres (NTT-803) (L T P 3 1 0)

Unit – I; Introduction- Definition, molecular dimensionality mechanical properties, Fibre markets, Hi - Performance Gelspun Polyethylene fibres- Manufacture, fibres characteristics, properties & applications. **Total lectures required=9**

Unit- II: Aramids- Introduction, polymer preparation, Spinning, Structure & properties, applications, Fibres based on liquid crystalline polymer (PPTA fibre). **Total lectures required=8**

Unit- III: Carbon Fibres- Physical properties, PAN bases Carbon fibres, Pitch based Carbon fibres, Vapour grown Carbon fibres, Applications. **Total lectures required= 8**

Unit-4:Glass Fibres- Glass for Fibres, Fibre manufacture, fibre finish, fibre properties& application, optical fibres. **Total lectures required=8**

Unit –5: Vectran (Melt spun wholly aromatic polyester fibre), Fibre production, properties & application, PBO (Polyphenylene benzobisoxazole) fibres- Fibre production, properties & application. PEEK Fibres -Fibre production, properties & application. **Total lectures required=9**

Grand total of lectures required= 42

Reference Books

1. High Performance Fibree by J.W.S. Hearle

3. Departmental Elective IV

3.1 Theory of Textile Structure (NTT-041) (L T P 3 1 0)

Unit (1): Classification of yarns, Yarn geometry- idealized yarn geometry, relationship of yarn number and twist factor, packing of fibres in a yarn, ideal packing, hexagonal close packing and radial packing, packing factor and its measurement, yarn diameter, method of measurement of twist contraction. **Total Lectures required =10**

Unit (2): Fibre migration: mean fibre position, amplitude of migration and frequency of migration, mechanism of migration, spinning-in coefficient and fibre extent. estimation of strength of blended yarn. **Total Lectures required =6**

Unit 3: Mechanism of staple fibre yarns, translation of fibre properties into yarn properties, twist and strength relationship, limit of twist, spinability of textile fibres, relation with end-breakage rate. **Total Lectures required =9**

Unit (4): Elements of fabric geometry, cloth setting theories, flexible and rigid thread model, Pierce's equation and later modifications. **Total Lectures required =7**

Unit (5): Relation of fabric properties to simple geometry, crimp interchange in woven fabric, crimp balance equation, Fabric cover, cover factor and their significance, relation between cover and weight per unit area of fabric, Theoretical treatment of fabric deformation in tension. **Total Lectures required =10**

Grand total of lectures required = 42

Text Books and Reference material:

7. Textile Yarn- B.C. Goswami, J.G. Martindale, F.L. Scardine
8. Textile structure- J.W.S. Hearle, S. Backer, Grossberg.
9. Pierce's geometry- Textile institute

3.2 Mil Planning & Organization (NTT-043) (L T P 3 1 0)

Unit-1: Selection of site for a textile mill. Preparation of project report). Construction of building of a textile mill, Types of buildings, single and multistoried buildings. Fire hazards and their control Safety rules for textile industry (1). Prevention tours accidents, **Total of lectures required=9**

Unit-2: Humidification of a textile mill, Humidifiers and dehumidifiers,. Ventilation in textile mill,. Air conditioning and refrigeration System, lighting used in textile mill. **Total of lectures required=8**

Unit-3: Balancing of machines for spinning and weaving mills Layout of different machines of spinning and weaving. **Total of lectures required=7**

Unit-4: Costing, introduction to cost terms and purposes,. Cost volume, profit analysis, Master budget, flexible budget, cost allocation, process costing, waste cost in textile mill, labour and material cost, wage system in textile mill, Predetermining spinning and weaving cost, Viability evaluation of a project. **Total of lectures required = 10**

Unit (5) Calculation regarding payback period and Break-even point, Types of staff organization, Staff organization system in textile mills. **Total of lectures required = 8**

Grant total of Lectures Required = 42

Text Books & Reference Material

1. Industrial Engineering, Organization & management by Tarachand
2. Industrial Economics & Principle of Management by T.M. Chabra
3. Industrial Economics & Principle of Management by S. K Sharma

4. Departmental Elective-V

4.1 Special Topics in Manmade Fibres (NTT-053) (L T P 3 1 0)

Unit 1: Various modifications in molecular chain of polyethylene terephthalate fibre, Incorporation of various dope additives to manufacturer inherent flame retardant, X-ray absorbing, and fluorescent fibres, Cationic dyeable polyester

Unit 2: Modification of regenerated fibre on special attention to Lyocell fibre, Kinetics of coagulation bath for viscose fibre regeneration, spinning of polylactic acid (PLA) Fibres

Unit 3: Modification in Nylon fibres: Nylon 6 and Nylon 66, Modification in polyurethane fibres, Electrospun Nanofibers from Biopolymers and Their Biomedical Applications, Chemistry and its Applications in Biocidal Textiles and Polymers.

Unit 4: Modification in Polyacrylonitrile fibres by modification during polymerization, By addition of various copolymers for specific purposes, synthesis and spinning of modacrylic fibre,

Unit 5: Fibres by chemical vapour deposition (CVD) technique, silicon carbide (SiC) fibres, Boron fibres, Carbon nanotube manufacturing, Carbon nanotube (CNT) in various man made fibres

Text Books/Reference books:

1. Chemical Vapor Deposition: Jong-Hee Park, T. S. Sudarshan
2. The material science of thin films: Milton Ohring
3. Modified Fibers with Medical and Specialty Applications: Edwards, Vincent; Buschle-Diller, Gisela; Goheen, Steve

5.1 Coating of Textiles (NTT-054) (L T P 3 1 0=4)

Unit-1: Polymeric materials for coating- (Rubbers: natural and synthetic, Polyvinyl chloride, Polyurethane, Acrylic polymers, Adhesive treatment. **Total lecture required=8**

Unit-2: Coating Methods: Knife coating, Roller coating, transfers coating, Rotary screen printing, calendaring hot melt coating. **Total lecture required=8**

Unit-3: Physical properties of coated fabric (2) Rheology of coating pastes, Rheological Behaviors of fluids, pastes (1) hydrodynamic analysis of coating, **Total lecture required=8**

Unit-4: Coating for foul weather protection, Impermeable coating, breathable coating, Non Apparel coating, Coating for Chemical protection, Thermo chromic coating, Temperature Adaptable coating, Camouflage nets, Metal and conducting polymer-coated fabrics, Radiation cured coating, **Total lecture required=10**

Unit-5: Test methods for coated fabrics, Coating per Unit area, Degree of fusion/curing of coating, blocking, Abrasion resistance, Test for colour- Fastness to dry and wet rubbing, Resistance to water penetration, Air permeability, water vapour permeability, low temperature bend test, low temperature impact test, Adhesion test

Total lecture required=8

Grand Total lecture required=42

Text Books/ Reference Books:

1. Coating & Laminated Textiles by Water Fung
2. Coated Textile by A.K. Sen
3. Coated Fabric technology Vol. 1-3 Technomic publication
4. Coated & laminated Fabric by AATCC symposium

U.P TECHNICAL UNIVERSITY, LUCKNOW

Study and Evaluation scheme

B. Tech. Textile Chemistry

[Effective from the Session 2014-15]

YEAR 2nd, SEMESTER- III

S. No	Course Code	Subject	Periods			Evaluation Scheme			Subject Total	Credit	
			L	T	P	SESSIONAL EXAM					
						C T	TA	Total			
THEORY SUBJECTS											
1	NAS-301/ NOE-031-039	Engg. Mathematics-III/ Science base elective	3	1	0	30	20	50	100	150	4
2	NTT-308	Principle of Yarn Manufacture	3	1	0	30	20	50	100	150	4
3	NTT-307	Technology of Bleaching and mercerization	3	1	0	30	20	50	100	150	4
4	NTT-309	Principles of Fabric Manufacture	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	NTT-304	Textile Fibre-I Lab	2	1	0	15	10	25	50	100	3
7	AUC-001/ AUC-002	Human Values & Professional Ethics/ Cyber Security	2	0	0	15	10	25	50	75*	-
PRACTICAL/ DESIGN/DRAWING											
8	NTT-358	Principle of Yarn Manufacture Lab	0	0	3	0	20	20	30	50	1
9	NTT-359	Principles of Fabric Manufacture Lab	0	0	3	0	20	20	30	50	1
10	NTT-357	Bleaching and mercerization Lab	0	0	2	0	20	20	30	50	1
11	NTT-354	Textile Fibre-I Lab	0	0	2	0	20	20	30	50	1
12	NGP-301	General Proficiency	-	-	-	-	-	50	-	50	
			18	5	10					100	25

*** Audit course**

Paper Code Science Based Open Electives:

NOE-031 Introduction to Soft Computing (Neural Network, Fuzzy Logic and Genetic Algorithm)

NOE-032 Nano Sciences

NOE-033 Laser Systems and Applications

NOE-034 Space Sciences

NOE-035 Polymer Science & Technology

NOE-036 Nuclear Science

NOE-037 Material Science

NOE-038 Discrete Mathematics

NOE-039 Applied Linear Algebra

U.P TECHNICAL UNIVERSITY, LUCKNOW

Study and Evaluation scheme

B. Tech. Textile Chemistry

[Effective from the Session 2014-15]

YEAR 2nd, SEMESTER- IV

S. No	Course Code	Subject	Periods			Evaluation Scheme			Subject Total	Credit	
			L	T	P	SESSIONAL EXAM		ESE			
						CT	TA				Total
THEORY SUBJECTS											
1	NAS-401/ NOE-041-049	Engg. Mathematics-III/ Science based Open Elective	3	1	0	30	20	50	100	150	4
2	NTT-407	Industrial Chemistry	3	1	0	30	20	50	100	150	4
3	NTC-408	Technology of Dyeing-I	3	1	0	30	20	50	100	150	4
4	NTC-409	Textile Auxiliaries	3	1	0	30	20	5	100	150	4
5	NHU-401/ NHU-402	Industrial Sociology/ Psychology	2	0	0	15	10	25	50	75	2
6	NTT-404 404	Textile Fibre-II	2	1	0	15	10	25	50	75	3
7	AUC-002/ AUC-001	Cyber Security / Human Values & Professional Ethics	2	0	0	15	10	25	50	75*	-
PRACTICAL/ DESIGN/DRAWING											
8	NTT-457	Industrial Chemistry lab	0	0	2	0	20	20	30	50	1
9	NTT-458	Technology of dyeing-I Lab	0	0	3	0	20	20	30	50	1
10	NTT-459	Textile Auxiliaries	0	0	3	0	20	20	30	50	1
11	NTT-454	Textile Fibre-II Lab	0	0	2	0	20	20	30	50	1
12	NGP-401	General Proficiency	-	-	-	-	-	50	-	50	
			18	5	10					1000	26

*** Audit course**

1. NOE 041:-Non-Linear Dynamics Systems
2. NOE 042: Nano Sciences
3. NOE 043: Laser Systems & Application
4. NOE 044:Space Sciences
5. NOE 045:Polymer Science & Technology
6. NOE 046:Nuclear Science
7. NOE 047:Material Science
8. NOE 048:Discrete Mathematics
9. NOE-049 : Applied Linear Algebra

U.P TECHNICAL UNIVERSITY, LUCKNOW

Study and Evaluation scheme

B. Tech. Textile Chemistry

[Effective from the Session 2015-16]

YEAR 3rd, SEMESTER- V

S. No	Course Code	Subject	Periods			Evaluation Scheme				Subject Total	Credit
						SESSIONAL EXAM			ESE		
			L	T	P	CT	TA	Total			
THEORY SUBJECTS											
1	NTT-501	Textile Testing-I	3	1	0	30	20	50	100	150	4
2	NTT-508	Tech. of Printing-I	3	1	0	30	20	50	10	150	4
3	NTT-509	Technology of Dyeing-II	3	1	0	30	20	50	100	150	4
4	NTT-506	Polymer Chemistry	3	1	0	30	20	50	100	150	4
5	NTT-505	Fabric Structure	3	0	0	15	10	25	50	75	3
6		*HS	2	0	0	15	10	25	50	75	2
PRACTICAL/ DESIGN/DRAWING											
7	NTT-551	Textile Testing-I Lab	0	0	3	-	20	20	30	50	1
8	NTT-558	Tech of Printing I Lab	0	0	3	-	20	20	30	50	1
9	NTT-559	Tech. of Dyeing II Lab	0	0	2	-	20	20	30	50	1
10	NTT-556	Polymer Chemistry Lab	0	0	2	-	20	20	30	50	1
11	GP-501	General Proficiency	-	-	-	-	-	50	-	50	
			16	5	10					1000	25

* Audit course

U.P TECHNICAL UNIVERSITY, LUCKNOW

Study and Evaluation scheme

B. Tech. Textile Chemistry

[Effective from the Session 2015-16]

YEAR 3rd, SEMESTER- VI

S. No	Course Code	Subject	Periods			Evaluation Scheme				Subject Total	Credit
						SESSIONAL EXAM			ESE		
			L	T	P	CT	TA	Total			
THEORY SUBJECTS											
1	NTT-601	Textile Testing-II	3	1	0	30	20	50	100	150	4
2	NTT-606	Technology of Printing-II	3	1	0	30	20	50	100	150	4
3	NTT-607	Tech. of finishing-I	3	1	0	30	20	50	100	150	4
4	NTT- 011/ NTT- 012	Structure & Properties of Fibers /Garment Manufacturing technology	3	1	0	30	20	50	100	150	4
5	NTT-024/ NTT-023	Chemistry of Dyes & Colour Chemistry/ Textured Yarn Technology	2	1	0	15	10	25	50	75	3
6		HS	2	0	0	15	10	25	50	75	2
PRACTICAL/ DESIGN/DRAWING											
8	NTT-651	Textile Testing-II Lab	0	0	3	0	20	20	30	50	1
9	NTC-656	Tech. of Printing II Lab	0	0	3	0	20	20	30	50	1
10	NTT-657	Tech. of Finishing I Lab	0	0	2	0	20	20	30	50	1
11	NTT-654	SEMINAR			2		50	50		50	1
12	NGP-601	General Proficiency	-	-	-	-	-	50	-	50	
		Total	16	5	10	-	-	-	-	1000	25

* Audit course

Departmental Elective-I

1. NTT-011 Structure & Properties of Fibers
2. NTT-012 Garment Manufacturing technology

Departmental Elective-II

1. NTT-024 Chem. of Dyes & Color Chemistry
2. NTT-023 Textured Yarn technology

U.P TECHNICAL UNIVERSITY, LUCKNOW

Study and Evaluation scheme

B. Tech. Textile Chemistry

[Effective from the Session 2016-17]

YEAR 4th, SEMESTER- VII

S. No	Course Code	Subject	Periods			Evaluation Scheme			Subject Total	Credit	
						SESSIONAL EXAM					ESE
			L	T	P	CT	TA	Total			
THEORY SUBJECTS											
1	NTT-711/ NTT-702	Physical Chemistry of Dyeing / Process control in Weaving	2	0	0	15	10	25	50	75	2
2	NTC-709	Technology of Finishing-II	3	1	0	30	20	50	100	150	4
3	NTT-710	Waste Management & Pollution Control	3	1	0	30	20	50	100	150	4
4	NTT-708	Fiber Reinforced composites	3	1	0	30	20	50	100	150	4
5	NTT-031/ NTT-033/	Non Woven/ Knitting Technology	3	1	0	30	20	50	100	150	4
PRACTICAL/ DESIGN/DRAWING											
6	NTT-759	Finishing- II Lab	0	0	3	-	20	20	30	50	1
7	NTT-751	Project	0	0	8	-	50	50	100	150	4
8	NTT-752	Industrial Training Viva Voice	0	0	2	-	75	75		75	2
9	NGP-701	General Proficiency	-	-	-	-	-	50	-	50	
		Total	14	4	13					1000	25

* Audit course

**** Open Elective from other departments -I**

1. NTT-711 Physical Chemistry of Dyeing
2. NTT-702 Process control in weaving

Departmental Elective-III

1. NTT-031 Non-woven
2. NTT-033 Knitting Technology

U.P TECHNICAL UNIVERSITY, LUCKNOW

Study and Evaluation scheme

B. Tech. Textile Chemistry

[Effective from the Session 2011-12]

YEAR 4th, SEMESTER- VIII

S. No	Course Code	Subject	Periods			Evaluation Scheme			Subject Total	Credit	
			L	T	P	SESSIONAL EXAM		ESE			
						CT	TA				Total
THEORY SUBJECTS											
1	NTT-801/ NOE-082	Technical Textiles/ Product Development	3	1	0	30	20	50	100	150	4
2	NTT-805	Process House Planning & Organization	3	1	0	30	20	50	100	150	4
3	NTT-042/ NTT-044	High Performance Fibre/ Developments in Wet Processing	3	1	0	30	20	50	100	150	4
4	NTT-053/ NTT- 054	Special topics in Man Made Fibre / Coating of Textiles	3	1	0	30	20	50	100	150	4
PRACTICAL/ DESIGN/DRAWING											
6	NTT-851	PROJECT	0	0	12	-	100	100	150	250	7
	NTT-852	SEMINAR	0	0	3		100	100		100	2
7	NGP-801	General Proficiency	-	-	-	-	-	50	-	50	
		Total	12	4	15					1000	25

* Audit course

****Open Elective from other departments-II**

1. NTT-801 Technical textiles
2. NOE-082 Product Development

Departmental Electives

1. NTT-042 High Performance Fibre
2. NTT-044 Developments in Wet Processing

Departmental Electives

1. NTT-053: Special topics in Man Made Fibre Technology
2. NTC-054 Coating of Textiles

3rd Semester B. Tech Textile Chemistry

(Engineering Core: Interdisciplinary)

1. Engineering Mathematics-III (NAS-301)/ Science based electives (NOE-031-038): (Common Syllabus as provided by UPTU) (L T P 3 1 0)

2. Principle of Yarn Manufacture (NTT-308) (L T P 3 1 0)

Unit-1: Cotton ginning, Name of ginning machines, different types of mixing. Different machines of blow room department with the basic idea of each machines along with their opening and cleaning principle. Lap formation and chute feed system

Total lectures required=09

Unit-2: Objectives of carding process. Description of carding machine parts with passage of materials, Carding and doffing actions. Flexible and metallic Card clothing. Carding, striping and grinding actions. Different carding engine setting and speed of different parts. Drafts (actual & mechanical) and draft constant, Quality of web and neps etc.

Total lectures required=09

Unit-3: Objectives of Draw frame. Different types of drafting systems. Stop motion and their importance, weighting system used in draw frame, passage of material on modern draw frame machine, Concept of draft.

Total lectures required=08

Unit-04: Objectives of Comber, Passage of material of modern comber alongwith functions of various parts of comber machine, Fibre presentation and its effects on combing. Preparatory machines for comber and its working.

Total lectures required=08

Unit-5: Objectives of speed frame, drafting, twisting & winding mechanism of speed frame. Package building on speed frame, ring frame, drafting twisting and winding on ring frame, double apron drafting system on ring frame

Total lectures required=08

Grand total lectures required=42

Reference Books:

1. Essential elements of practical cotton spinning by T.K. Pattabhiram
2. Cotton blow room, carding, ring frame by Gilbert R. Merrill
3. Cotton spinning by W. Taggart
4. Spun yarn technology by Eric Oxtoby

Laboratory work: As per the lab Syllabus

3. Principle of Fabric Manufacture (NTT-309) (L T P 3 1 0)

Unit: 1: Objects of winding process, working principles of automatic cone and cheese winders. Precision and drum winding machine, pirn winding, winding faults and remedies.

Total lectures required = 9

Unit: 2: Objectives warping process, working principles of Beam warping m/c. Sectional warping m/c, beaming, warper beam defects: cause and remedies.

Total lectures required = 9

Unit: 3: Objectives sizing process, Slasher Sizing machine, Brief description of modern sizing machine with proper function of each essential part, multicylinderdrying, hot air drying and unconventional drying of sized yarns, . Sizing ingredients used for cotton and synthetic yarns.

Total lectures required = 8

Unit: 4: Drawing-in process, Passage of material on handloom and power loom, Study and working principles of Handloom, Powerloom and Automatic Loom Primary, secondary and auxiliary motions of a power loom,

Total lectures required = 8

Unit: 5: Comparison between shuttle and shuttleless looms, Basic concepts of shuttleless looms, Brief description of various shuttleless weft insertion principles, Fabric faults and remedies.

Total lectures required = 8

Grand Total Lectures Required = 42

Text Books:

1. Tablets (ATIRA) a. Winding b. Warping c. Sizing
2. Process control in warping, winding and sizing (ATIRA,BTRA)
3. Yarn preparation Vol. I & II R. Sengupta
4. Warp sizing by Rame Bottom
5. Yarn calculation by R. Sengupta

Laboratory work: As per the lab Syllabus

4. Technology of Bleaching and Mercerization (NTT-307) (L T P 3 1 0)

UNIT-1: Natural and added impurities in grey fabric, Singeing-its object and various types of singeing. Introduction to various preparatory processes for cotton, wool, silk, nylon polyester, acrylic and their blends. Preparatory Process for wool: scouring, decatizing, **Lecture required=10**

Unit-2 : Desizing- its objects, various desizing methods with its advantages, disadvantages and comparative study (hydrolytic, oxidative methods), Scouring of cotton and fabric: conventional and bioscouring, Kiers – various types of kiers and their working. **Lecture required=8**

UNIT-3: Objectives of Bleaching, various types of bleaching agent such as NaOCl, CaOCl₂ and H₂O₂, NaClO₂. Bleaching chemistry and mechanism of above mentioned bleaching agents, batch wise, semi continuous and continuous bleaching processes: J-box, Continuous bleaching range (CBR), **Lecture required=8**

UNIT-4: Methods used for determination of degradation of cotton during scouring and bleaching such as copper no., methylene blue absorption method, cuprammonium fluidity etc. optical whitening agent and their applications. **Lecture required=8**

UNIT-5: Objectives of mercerization, physical and chemical changes in cotton due to mercerization. Methods and equipment for yarn and fabric mercerization . various methods of determination of efficiency of mercerization.**Lecture required=8**

Grand Total Lecture required=42

Text Books/ Reference Books:

1. Technology of bleaching Vol. 3 by V.A. Shenai
2. Textile Scouring & Bleaching by E.R. Trotman
3. Bleaching & mercerization by J.T. Marsh
4. Bleaching & mercerization by BTRA

5. Industrial Psychology (NHU-301/ Industrial Sociology-NHU-302: Syllabus as provided by U.P.T.U. (L T P 2 0 0=2)

6. Textile Fibres-I (NTT-304) (L T P 3 1 0)

Unit (1): Fibre, textile fibre (1). Classification of natural textile fibres (1), Essential and desirable properties of textile fibres (2), National and international production and consumption of various natural fibres (cotton, wool, silk linen, ramie, jute etc) Advantages and disadvantages of natural and man-made fibres. **Total Lectures required = 08**

Unit (2): Geographical distribution and cultivation of cotton fibre, varieties of cotton fibre, Morphological structure of cotton fibre, Physical properties of cotton fibre, Effect of acid and alkalis on cotton fibre, Grading of cotton, Fibre Quality Index. **Total Lectures required = 09**

Unit (3): Cultivation, extraction, morphological structure, properties and uses of bast fibres such as flax, jute, hemp, and ramie, Production of raw silk, Morphological structure of silk, Production of waste silk yarn, Chemical composition and physical properties of silk, effect of acid and alkalies, varieties of silk with brief description etc. **Total Lectures required = 08**

Unit (4): Morphological structure of wool, Composition of wool fibre, Wool scouring, and combing, Properties of wool fibres, Varieties of wool fibre with brief description. **Total Lectures required =8**

Grand total of Lectures = 33

Books:

1. W.E. Morton & J.W.S. Hearle, Physical properties of textile fibres, Textile Institute, U.K.
2. Progress in textiles: Science and technology Vol.-2 By Dr. V.K. Kothari, I.I.T. Delhi.
3. Hand book of textile fibres by J.Gordon Cook
4. Fibre Science and Technology, S P Mishra

Laboratory work: As per the lab Syllabus

7.*Human Values & Professional Ethics/ Cyber Security (Audit course for all Semester) Syllabus as provided by U.P.T.U.

3RD SEMESTER LAB SYLLABUS

NTT-358: Principle of Yarn Manufacture (L T P 0 0 3)

Practice in handling and operation of blow room, study of constructional details of machinery in blow room, card, draw frame, speed frame & ring frame, calculating speed of different machine parts, Study of constructional details of card, change places and speed calculation of a carding machine, finding out individual draft and total draft in carding machine, draw frame, ring frame and roving frame

NTT-359: Principles of Fabric Manufacture (L T P 0 0 3)

Study of cone winding, cheese winding, pirn winding and auto coner, constructional details of machine, types of packages produced by them and package faults, Calculations pertaining to cone winding, cheese winding, pirn winding

Study of beam warping & sectional warping machine, stop motion and tensioners in warping, Calculations pertaining to warping machines.

Study of different types of looms, their constructional details, working of doobby & jacquards.

TT-357: Technology of Bleaching and Mercerization (L T P 0 0 2):

Bleaching and mercerization of cotton fabric and to evaluate the effectiveness of each process using various test such as Tewega test, drop absorption test, whiteness index, barium activity number test, measure wax content, ash content and scouring loss of cotton fabric,

TT-354: Textile Fibres-I (L T P 0 0 2)

Principle of microscopy, microscopic identification of natural fibres, preparation and mounting of specimen for longitudinal view, standard scheme of analysis of homogeneous fibre and blend by physical and chemical methods, preparation of reagents used for chemical analysis

4th Semester B. Tech. Textile Chemistry

4. Engineering Mathematics / Science based elective (NAS-401/NOE-041-048): (L T P 3 1 0 =4)

5. Industrial Chemistry (NTT-407) (L T P 3 1 0)

Unit (1): Clausius- Claparyon equation and its applications , General Phase theory-Phase rule, phase equilibrium and P.T. diagram for one component system , Equilibrium in two and three component system. **Total Lectures required = 09**

Unit (2): General introduction about Acids- (a)Hydrochloric Acid, Sulphuric Acid (b)Acetic Acid, Formic Acid;(3) Alcohols, Aldehydes, and Ketones and their application in textiles. **Total Lectures required = 08**

Unit (3): General methods of preparation and properties of – Monohydric alcohols, polyhydric alcohols e.g. Glycol and glycerol, Aldehydes-formaldehyde and Ketones-acetone, Dicarboxylic acids- oxalic acid, DMF and their application in textiles. **Total Lectures required = 08**

Unit (4): Introduction of Solution- saturated and unsaturated, ideal and non ideal solution Different type of concentration units, Effect of temperature on concentration. **Total Lectures required = 08**

Unit (5): Determination of strength of hypochlorite, hydrogen peroxide, hydrosulphite, Estimation of strength of NaOH containing sodium carbonate volumetrically and by Tw meter **Total Lectures required = 09**

Grand Total Lectures required = 34

Reference books:

1. Industrial Chemistry by **B.K.Sharma**
2. Synthetic Organic Chemistry by **Chatwal and Gurdeep**
3. Chemistry of Dyes and Principles of Dying by **V.A.Shenai**
4. Physical Chemistry of Surfaces by **A.W.Adamson**
5. Chemical Principles of Synthetic Fibre Dying by **S.M.Burkinshaw**
6. Physical Chemistry of Dying by **Vickerstaff**

Laboratory work: As per the lab Syllabus

6. Technology of Dyeing-I (NTT-408) (L T P 3 1 0)

Unit – 1: Classification of dyes according to the methods of application, Principles of dyeing. Mechanism of dyeing, Dye fibres interaction bonds, various method of dyeing- Batch, Semi continuous, Continuous dyeing. **Total lectures required – 8**

Unit – 2: Dyeing of cellulosic fibres with direct dyes Reactive Dyes Vat dyes Soubise vat dyes. **Total lectures required – 8**

Unit – 3: (1) Dyeing of cellulosic fibres with Sulphur, Azoic, Oxidation colour, mineral colours, chrome dyes – metal complex dyes **Total lectures required -8**

Unit – 4: (1) Dyeing of protein fibres with acid (2) Metal Complex 1:1, 1:2, 2:1 metal complex, (3) Chrome dyes (4) Basic Dyes **Total lectures required -8**

Unit – 5: (1) Dyeing of synthetic fibres viz- polyester (2) Acrylic (3) Nylon and their blends (4) Problems associated with dyeing (5) Common fault and their remedies **Total lecture required - 10**

Total no. of lectures=42

Reference Books:

1. Chemical processing of cotton and p/c blends – ATIRA
2. A glimpse on the chemical technology and textile fibres by R.R. Chackrawartty
3. Technology of Dyeing by V.A. Shenai
4. Chemical technology of fibrous material by F.Shadov

Laboratory work: As per the lab Syllabus

4. Industrial Psychology/ Industrial Sociology: Syllabus provided by UPTU BOS

5. Textile Auxiliaries (NTT-409) (L T P 3 1 0)

Unit-1: General Consideration and classification of textile auxiliaries, Physical principles involved in detergency conditions for efficient detergency, Preparation of detergents. **Total lecture required – 8**

Unit-2: Dyeing auxiliaries- wetting agents, dispersing, leveling, carriers, sequestering, stripping dia fixing agents, Essential requirement of surfactants, Mechanism of surface activity, Surface active agents wetting and detergency. **Total lecture required – 8**

Unit-3: Printing auxiliaries- thickness, hygroscopic agents, antifoaming, binders, fixers, and reducing agents. **Total lecture required – 8**

Unit-4: Synthetic resin emulsion use in textile industry, PV alcohol, PVC acrylic polymer, silicon emulsion, urea formaldehyde resin etc. **Total lecture required – 8**

Unit-5: Performance evaluation of textile auxiliaries- Testing of wetting agents, detergents, foaming characteristics, soil release agents, leveling agents, flame retarding agents, water repel us . **Total lecture required – 10**

Grand Total no. of lectures =40

Text Books & Reference Books

1. Textile auxiliaries - V.A. Shanai
2. Textile auxiliaries finishing chemicals-A.A. Vaidaya Trivedi
3. Textile Scouring and bleaching-V.A. Shanai

6. Textile Fibre-II (NTT-404) (L T P 2 1 0)

Unit (1): General definition of man-made or manufactured fibres, classification of man-made fibre, and introduction to manufacturing processes of man-made fibres, Study of various systems of spinning: melt, wet & dry spinning- basic principles, brief idea about spinning head, spinneret, quench chamber, & coagulation bath, spin finish application. **Total Lectures required =9**

Unit (2): Introduction to synthetic fibres, Polyethylene Terephthalate fibre- polymer production by DMT & PTA route, chip drying, spinning of filament yarns and staple fibre manufacturing, effect of process variable on properties of polyester fibre, some dope additives for specialty polyester fibre, Properties of polyester fibre, **Total Lectures required =8**

Unit (3): Polyamide fibre- Different types of polyamide fibres, Nylon polymer production by continuous polymerization in VK tube, Manufacturing of Nylon 6 and Nylon 6,6 by melt spinning, Properties of Nylon 6 and Nylon 66 fibre, Polyacrylonitrile (PAN) fibre, Acrylic fibre- formation by dry spinning, dry-jet-wet spinning process, **Total Lectures required =9**

Unit (4): Introduction to regenerated fibre, concepts of regeneration of fibre, Raw material for viscose rayon, manufacturing sequence of viscose fibre, wet spinning of viscose rayon, formation of serrated edge cross-section of viscose rayon, viscose fibre properties, Introduction to cuprammonium rayon in brief, introduction of cellulose acetate rayon in brief.

Total Lectures required =9

Grand total of lectures required = 35

Reference Books:

22. Manufactured fibre Technology, by V.B. Gupta & V.K. Kothari
23. Essential fibre chemistry, by M.E. Miller
24. Production of Synthetic Fibres, by A.A. Vaidhya
25. Fibre Chemistry by M. Lewin, E.M. Pearce, Marcel & Dekkan Inc
26. Regenerated Cellulose fibre, by C. Wooding, Woodhead Publishing Ltd.
27. Handbook of Textile fibre, by Gordon Cook
28. Man Made Fibres, by R.W. Moncrief

Laboratory work: As per the lab Syllabus

7. Human Value & Professional Ethics/ Cyber Security: Audit Course
Common Syllabus as Decided by UPTU BOS

4TH SEMESTER LAB SYLLABUS

1. NTT-457: Industrial Chemistry (L T P 0 0 3):

Methods of preparation and properties of – Monohydric alcohols, polyhydric alcohols e.g. Glycol and glycerol, Aldehydes-formaldehyde and Ketones-acetone, Dicarboxylic acids- oxalic acid, DMF and their application in textiles. Determination of strength of hypochlorite, hydrogen peroxide, hydrosulphite, Estimation of strength of NaOH containing sodium carbonate volumetrically and by Tw meter

2. NTT-458: Technology of Dyeing-I (L T P 0 0 2)

Dye cotton with direct, reactive, vat and sulphur dye, dyeing polyester, wool, silk, acrylic and nylon using, appropriate disperse, acid and basic dyes, Print cotton fabric using various styles of printing, namely, direct, resist and discharge, Evaluate colour fastness to washing, light, perspiration and rubbing properties

3. NTT-459: Textile Auxiliaries (L T P 0 0 3)

Testing of wetting agents, detergents, foaming characteristics, soil release agents, leveling agents, flame retarding agents, water repel us

4. NTT-454: Textile Fibres-II (L T P 0 0 2)

Principle of microscopy, microscopic identification of man-made fibres, preparation and mounting of specimen for longitudinal view, standard scheme of analysis pf homogeneous fibre and blend by physical and chemical methods, preparation of reagents used for chemical analysis

5th Semester B. Tech. Textile Chemistry

1. Textile Testing-I (NTT-501) (L T P 3 1 0)

Unit (1): Introduction to fiber, yarn and fabric testing, sampling, random sampling, biased sampling, sampling techniques, square and cut-square technique, selection of sample for testing. **Total Lectures required =8**

Unit (2): Atmospheric conditions for testing, absolute and relative humidity, moisture regain & moisture content and their measurement, dry and wet bulb hygrometer, importance of moisture in textiles, effect of moisture on properties (physical, & mechanical) of textile material, factors affecting the regain, Shirley moisture meter, control of atmospheric conditions during testing. **Total Lectures required =9**

Unit (3): Measurement of physical characteristics of cotton viz. length, fineness, maturity, bundle strength, colour and foreign matter including principle, construction, operation, and calibration of the equipment in common use.

Total Lectures required =8

Unit (4): Mechanical properties of fibres, relation between structure and mechanical properties of fibres, Measurement of physical properties of man-made fibres i.e. length, denier, strength, elongation, modulus, work of rupture, crimp, spin finish, fibre quality index etc.

Total Lectures required =8

Unit (5): determination of yarn count, diameter, average & resultant count of folded yarn, relation between Ne, D, T, Nm, Instruments used for determination of count, quadrant balance, Knowles balance, Beesley balance and physical balance, Twist, classification of twist, twist measurement, direct counting method, continuous twist tester, twist-untwist method, Twist tester, R.B. twist tester, level of twist .

Total Lectures required =9

Grand total of lectures required = 42

Text Books and Reference material:

13. Quality control and testing management, by V.K. Kothari
14. Principles of textile testing, by J.E. Booth
15. Physical testing of textiles, by B.P. Savile
16. Physical properties of fibres, by W.E. Morton and J.W.S. Hearle

Laboratory work: As per lab syllabus

2. Polymer Chemistry (NTT-506) (L T P 3 1 0)

Unit (1) Scope of Polymer Chemistry, (a) definition of monomers, homo-polymers and copolymers (b) Chemistry of important monomers (c) Thermo sets (d) Thermoplastic (e) Elastomers (f) Tg, Tm, and solution properties of polymers. **Total Lectures Required = 9**

Unit (2) Condensation polymerization (b) Mechanism, kinetic and molecular weight build up, (c) Bulk, Solution, Emulsion and suspension polymerization (d) comparison of condensation and addition polymerization. **Total Lectures Required = 8**

Unit (3): Addition polymerization , (b) Type of addition polymerization , (c) Radical, cationic and anionic polymerization (d) Mechanism and kinetics of polymerization (e) Copolymerization, Stereo-Regular polymerization, Block and Graft polymerization. **Total Lectures Required = 9**

Unit (4): Characterization of molecular weight of polymers, End-Group analysis method, Viscosity of measurement method, gel permeable chromatography. Techniques for measurement Polydispersity **Total Lectures Required = 8**

Unit (5): Application of polymer to textiles, Fiber forming synthetic polymer, Properties of fiber forming synthetic polymer. **Total Lectures Required = 8**

Grand Total Lectures required = 42

Text Books & Reference Books:

5. Text Book of Polymer science by **F.W. Bill Meyer**
6. Text book of Polymer, Vol.I, II, III by M.S.Bhatnagar
7. Polymer science by **Gawaskar, Vishwanathan, sreedhar and Jaydev**
8. Polymer chemistry by B.K.Sharma

3 Technology of Printing (NTT-508) (L T P 3 1 0)

Unit (1): Introduction to printing, methods and styles of printing, classification of printing thickeners and methods of thickeners paste preparation, emulsion thickeners, synthetic thickeners, and mechanism of viscosity build up in emulsion and synthetic thickness, Rheological behavior of thickeners **Total Lectures Required = 9**

Unit (2): Preparation of cloth for printing, preparation of paste for printing, General description, preparation of paste, wetting agents, hygroscopic chemicals dispersing agents, oxidation and reducing agents etc., precaution **Total Lectures Required = 9**

Unit (3): Methods of printing - block printing, block preparation, spray printing, transfer printing-fundamental principle of transfer printing, various machines and application techniques, its advantages and disadvantages (2), roller engraving and chroming rollers. **Total Lectures Required = 8**

Unit (4): Screen printing- preparation of screens, Manual and automatic flat bed screen printing, rotary screen printing, rotary screen preparation-manual and photosensitive, its method of application, merits and demerits. Faults and prevention in printing methods, **Total Lectures Required = 8**

Unit (5): Pigment printing of cotton, Faults in printing & their prevention. Methods of print fixation, and machines used for after treatment of printing goods- steaming, ageing, curing etc. **Total Lectures Required = 8**

Grand Total of lectures required = 42

Text Books/Reference Books:-

1. Tech. Of printing - V.A. Shenai
2. Printing - D.G. Kale
3. Tech. Of textile printing – R.S. Prayag

4. Technology of Dyeing-II (NTT-509) (L T P 3 1 0)

Unit – 1: Mass coloration of Man Made fibres viz, polyester, nylon, acrylics, viscose and various methods- colour additions in polymerization, chips coating, master batch addition systems, Advantages and limitations of the above processes.

Total lecture required – 9

Unit – 2 Development in dyeing m/is- jet dyeing m/cs, soft flow m/cs, infra colour dyeing m/cs, closed jiggers and contentious dyeing ranges .

Total lecture required – 7

Unit – 3: Natural dyes (1), their sources and extraction, Different mordents used in dyeing, different methods – pre, post, simultaneous mordanting.

Total lecture required – 9

Unit – 4 : Dyeing of cotton, wool, silk, with natural dyes Fastness properties of dyed goods , Light, washing rubbing, sublimation perspiration etc.

Total lecture required – 9

Unit 5: Computer colour matching, colour matching tristimulus values, spectral match, Delta and K/S values, K-M theory, Technique for CCM for textiles, Advantage of CCM. German Ban, its importance and acts, various pollutants caused by dyeing with various dyes.

Total lecture required – 8

Total lecture required – 40

Reference & text Books:

1. Technology of Dyeing Vol 6 by V.A. Shenai
2. Dyeing & Chemical technology of textile Fibres by E.R. Trotman
3. Textile Chemistry Vol III by R.H. Petters
4. Chemical Processing of Synthetic Fibres & Blends by Datye & Vaidhya

5. Fabric Structure (NTT-505) (L T P 2 1 0)

Unit (1): Classification of various fabrics, construction of plain weave and its derivatives (rib and mat weave), ordinary twill, right hand twill, warp faced, weft faced & balanced twills, **Total Lectures required = 8**

Unit (2): Satin regular, irregular and their extension. Combined twills, end to end and pick-to-pick combination, elongated twills, steep twills, broken twill, curved twill, Fancy twills-large diagonal shaded twills, Wave/ zig-zag, herringbone twill.

Total Lectures Required = 8

Unit (3): Regular and irregular satin, sateen base diagonals and brained twills, Diamond, mock leno, ordinary honeycomb, brighten honeycomb , Huck-a-back and crepe weave.

Total Lectures Required = 9

Unit (4): derivatives of hopsack, barley corn stitched hopsack and twilled hopsack, Ripstop weave, Simple and wadded bed ford cords (1), weft and piques (1), principle of figuring with extra material extra warp figuring, extra weft, limitation of extra thread.

Total Lectures Required = 9

Grand Total Lectures Required = 34

Reference Book: -

1. W. Watson Textile Design & colour Longmans Greens Co. London.
2. Z.J Grosicki Watson's Textile design and colour Newnes Buter Worth, London.
3. Z.J. Grosicki, Advance Textile Design Newnes Butter Worth, London.
4. "Nishant" A Grammar of textile.

6. HS: Common Syllabus as decided by UPTU) (L T P 2 0 =2)

5th SEMESTER LAB SYLLBUS

TT-551, Textile testing-I

Measurement of fibre length and its distribution, fineness, moisture content and strength etc using different methods and instruments, Fibre diameter and its variability, cleanliness of cotton, testing of neps in card web, sliver, roving and yarns, Analysis and interpretation of test results.

Measurement of hank of sliver, roving and count of yarn and their variability, Single yarn strength and elongation, Lea strength measurement, Use of statistical techniques for evaluation of experimental results

TT-556, Polymer Chemistry Lab

Chemistry of monomer, Tg, Tm & solution properties of monomer, Characterization of polymers, End group analysis, molecular weight measurement by viscosity method,

TT-558, Technology of Printing-I

Preparation of cloth for printing, preparation of paste for printing, General description, preparation of paste, block printing, block preparation, spray printing, transfer printing, Screen printing- preparation of screens, , rotary screen printing, rotary screen preparation, Methods of print fixation

TT-559: Technology of Dyeing-II:

. Dyeing of cotton, wool, silk, with natural dyes Fastness properties of dyed goods, Light, washing rubbing, sublimation perspiration

6th Semester B. Tech. Textile Chemistry

1. Textile Testing-II (NTT-601) (L T P 3 1 0)

Unit (1): Tensile properties of yarn and fabric, stress-strain curve, various methods for finding of yield point, methods for finding of various modulus, determination of tenacity, and stiffness of fabric. **Total Lectures Required = 7**

Unit (2): Procedure of determination of strength and elongation in the spun yarns, knowledge about the equipment used, yarn tensile strength testing machines, single yarn strength tester, lea strength tester, fabric strength tester- impact tester, Grab test, fabric B.S. Test, Scott serigraph, Instron tensile tester. **Total Lectures Required = 9**

Unit(3): Measurement of evenness testing of yarns, nature and causes of irregularities, principles and methods of evenness testing, evaluation and interpretation of evenness diagram & spectrogram and their associated equipment, Classimat faults. **Total Lectures required =9**

Unit (4): Measurement of physical properties of fabric and the knowledge of the equipment used, tensile strength, bursting strength, tearing strength, pilling, air permeability, crimp, thickness, EPI, PPI, weight and cover factor.

Total Lectures required =10

Unit (5): Measurement of water repellency, shrinkage, measurement of fastness to light and rubbing, thermal transmission, Brief introduction to FAST and KAWABATA. **Total Lectures required =7**

Grand total of lectures required = 42

Text Books & Reference Books: -

1. Physical testing of textiles by B.P. Saville.
2. Quality control and testing management by Dr. V.K. Kothari.
3. Principles of textile testing by J.E. Booth.
4. Quality control by V.K. Kothari.

2. Technology of Printing-II (NTT-606) (L T P 3 1 0=4)

Unit-1: Various styles of printing including direct, resist & discharge style of printing, printing of cotton, wool and silk with different dye classes using the above styles. **Total lecture required=9**

Unit-2: Printing with different dye classes of polyester, nylon, acrylic and their blends such as p/v, p/c, wool/acrylic, wool/nylon and different types of union fabrics-cotton/wool,cotton/silk etc.With different dye classes. **Total lecture required=9**

Unit-3: Other styles of printing like raised, crepon, damask, metal and flock, Poly chromatic dyeing, foam printing, bubble printing etc. **Total lecture required=8**

Unit-4: Various machines used for drying (1) steaming, washing, ageing and curing) Transfer printing, methods. Sublimation, transfer printing of polyester Digital or inkjet printing. **Total lecture required=8**

Unit-5: printing of non woven's-carpets, hosiery goods and bonded goods, inkjet printing, camaflogue printing, costing of printing. **Total lecture required=8**

Grand Total lecture required=42

Text Books/ Reference & text Books:

1. Technology of Printing by V.A. Shenai
2. Technology of Printing by G.D. Kale
3. Chemical Processing of Synthetic Fibres & Blends by Datye & Vaidhya

3. Technology of Finishing-I (NTT-607) (L T P 3 1 0)

Unit – 1: Principle of finishing of cotton, wool, silk , linen &jute, Classification of various finishing – (a) Mechanical, Chemical, , Temporary and durable/ permanent finishes, semi- permanent. **Total lectures-10**

Unit – 2: Finishing machines – Mangle &their function, drying machines-, Stentering, Calendaring, Sanforising, Decatlisng. **Total lecture required – 8**

Unit – 3: Beetling of linen, Crimping of Silk & rayon, Softening, Stiffening.
Total lecture required – 8

Unit–4: Easy care finish, minimum application technique including foam technology-blow ratio foam generator, stabilizer, applicator. **Total lecture required= 8**

Unit – 5: Finishing of woolen fabrics Dry Wet decatizing, Felting, Milling, Permanent Setting, Shrink Proofing.
Total lecture required – 8

Total no. of lectures =42

Reference & Text Books:

1. Introduction to textile finishing by J.T. marsh
2. Chemical Processing of Synthetic Fibres & Blends by Datye & Vaidhya
3. Textile Finishing by V.A. Shenai

4. Departmental Electives I

4.1 Structure and Properties of Fibres (NTT-011) (L T P 3 1 0)

Unit 1: Basic structural features of fibre, Structure of Cotton, wool, silk, and other textile fibres, relation between fibre structure and fibre, Methods of estimating molecular weight, orientation, crystallinity & crystalline orientation of fibre forming polymer, Overall orientation by “sonic modulus tester, **Total Lectures Required = 8**

Unit (2): Concept of scanning electron microscope (SEM), Concept of transmission electron microscope (TEM) Fourier Transform Infrared Spectroscopy (FTIR), Atomic force microscopy, fibre fracture. **Total Lectures Required = 8**

Unit (3): Thermal behavior of textile fibres by Differential Scanning Calorimeter (DSC), TGA, thermal mechanical analysis (TGA), Thermomechanical Analyser (TMA) Density gradient column, Preparation of density gradient column, Crystallinity by density gradient column. **Total Lectures Required = 8**

Unit (4): Optical properties of fibres, Birefringence behavior, dielectric properties, fibre friction, fibre friction measurement, fibre to fibre, yarn to yarn friction measurement
Total Lectures Required = 8

Unit (5): Creep behavior, concept of moisture absorption by fibres, Moisture absorption, heat of absorption, differential heat of absorption, integral heat of absorption, Quantitative theory of heat moisture absorption, Rate of moisture absorption.

Total Lectures Required = 10

Grand Total of lectures required = 42

Reference Book: -

1. Manufactured fibre technology by V.B. Gupta, V.K. Kothari
2. Physical properties of fibre by J.W.S. Hearle
3. Thermal behavior of material by Turi
4. Modern yarn production by Ray
5. Textile fibres by ATIRA
6. ASTM Standard books
7. Polymers by fibre & textiles encyclopedia
8. Advances in fibre source by S.K. Mukhopadhyaya

4.2 Garment Manufacturing Technology (NTT-012) (L T P 3 1 0)

Unit (1): Introduction to garment manufacturing technology, Sample cutting, ZFusing, Sewing, Pressing, Finishing and inspection, Line balancing concept.

Total Lectures required =8

Unit (2): Introduction to measurement of fabric dimensional properties, fabric comfort, thermal comfort, objective evaluation of fabric, low stress fabric properties, Kawabata system, fabric assurance by sample testing, fabric defects, Fabric inspection and feedback to back process. **Total Lectures required =9**

(3) Introduction to garment cutting, Marker planning, Efficiency of Marker planning, methods of marker planning and marker use, spreading of the fabric, to form a lay, spreading requirements, methods of spreading, fabric packages, objective of cuttings, methods of cuttings. **Total Lectures required =9**

Unit (4): Introduction to seam, stitch, stitch classification, stitch structure, seam formation, joining material, surface characteristics, seam appearance, damages (thermal and mechanical), seam performance, seam degradation, seam failure, seam puckering and seam testing. **Total Lectures required =9**

Unit (5): Importance of garment processing and finishes, types of garment, processing of garments and special garment finishes. **Total Lectures required =7**

Grand total of lectures required = 42

Text Books and Reference material:

1. Introduction to Garment Manufacturing Technology By T Ramchandran
2. Garment Manufacturing Technology by T Ramchandran
3. Practical Clothing Construction Part I & II by Mary Methews

5. Departmental Electives II

5.1 Chemistry of Dyes and Colour Chemistry (NTT-024) (L T P 2 1 0)

Unit 1: Fractional distillation of coal tar and its products, and their use in textile industry (3), Isolation of Xylene, Benzene, Toluene, Naphthalene and Anthracene, **Total lectures required = 8**

Unit 2: (4) Unit organic process/operation sulphonation, nitration, amination and hydroxy compound **Total lectures required = 8**

Unit 3: Classification of dyes according to chemical constitution Relation between colour and chemical constitution. Methods of preparation of Nitro, nitroso, Azo:-mono-azo and di-azo, diphenyl methane and triphenyl methane dyes., **Total lectures required = 10**

Unit 4: Chemistry of anthraquinone, acridine Chemistry of reactive dyes- monochloro triazine and dichlorotriazine, identification of dyes on fibres. **Total lectures required = 8**

Grand total lectures required = 36

Text Book: -

1. Synthetic dye stuff: Cain & thrope
2. Chemistry of dye agent principle of dyeing: U.K. Shenai

Reference Book:

3. Process of dye chemistry: Fierz, David & Ballengray
4. Dyeing and chemical technology of fibre: E.K. Frotran
5. Processing of textile fibres: Sadov
6. Chemistry of synthetic dyes: Venkataraman

5.2 Textured Yarn Technology (NTT-023) (L T P 2 1 0 3)

Unit (1): Importance of texturizing, Methods of texturizing, Basic principles of heat setting and texturizing, False twisting, Process variables, developments of false twist texturing machines, **Total Lectures Required = 8**

Unit (2):, Structural geometry of textured yarn, characterization of textured yarn, Stuffer box crimping, Edge crimping & other methods of texturing thermoplastic yarns. **Total Lectures Required = 8**

Unit (3): Textured yarn properties and fabric characteristics, principles of draw texturing, Draw texturing machines, and properties of draw textured yarn, Effect of process variables, time, temperature, twist and tension on properties of textured yarn. **Total Lectures Required = 8**

Unit (4): Principles of air bulking and properties of air bulked yarn, Texturing of non thermoplastic yarns cross linking and effect of process variables on properties of textured yarn, Texturing with the aid of solvent, Yarn characteristics, Morphological changes induced by mechano-thermal forms of texturing and their effect on properties of textured yarns. **Total Lectures Required = 10**

Grand total lectures required =43

Reference book:-

1. Textured yarn Technology by J.W.S.Hearle
2. Synthetic fibre by Vaidhya

6. HS: To be decided by UPTU

6^h SEMESTER LAB SYLLBUS

TT-651, Textile testing-I

Use of microscope for testing of yarns for appearance, twist and diameter, measurement of evenness, measurement of yarn strength, tenacity, elongation at break, modulus, crimp rigidity, fabric testing for *dimension*, weight, thickness, shrinkage and air permeability,

Fabric testing for elongation, tensile, bursting, and tearing strength, abrasion resistance, flexural rigidity, crease recovery and draping qualities of fabric

TT-656, Technology of Printing-II Lab (L T P 0 0 3)

Printing with different dye classes of polyester, nylon, acrylic and their blends such as p/v, p/c, wool/acrylic, wool/nylon and different types of union fabrics-cotton/wool,cotton/silk etc.With different dye classes

TT-657, Technology of Finishing-I Lab (L T P 0 0 3)

Finishing of cotton, wool, silk, linen & jute, Classification of various finishing – (a) Mechanical, Chemical, temporary and durable/ permanent finishes, semi- permanent.

7th Semester B. Tech Textile Chemistry

1. Open Elective from Other Department

1.1 Physical Chemistry of Dyeing (NTT-711) (L T P 2 0 0)

Unit 1: Introduction to the theory of dyeing absorption- law of light absorption, role of fibre structure in dyeing, Adsorption- Isotherms. **Total lectures required -9**

Unit 2: Chemical potential of dyes, activity of dye in solution and in fibre, physio- chemical factors in dyeing. Simple relation for calculation of affinity, diffusion coefficient of dyes into fibres. **Total lectures required -9**

Unit 3: Kinetic – diffusion of dyes inside the fibre rate of dyeing, thermodynamics – entropy of dyeing, temperature effects, heat of dyeing. **Total lectures required -9**

Unit 4: Colour measurement & C/E System, Numerical expression of colour difference- Adaims chromaticity value, Spectro photo meter.

Total lectures required -9

Total no. of lectures= 36

Text Books & Reference Books: -

1. Synthetic dye stuff – Cain & Thrope
2. Chemistry of dyes & principle of dyeing -V.A. Shenai
3. Process of dye chemistry: Fierz, David & Ballengray
4. Dyeing and chemical technology of fibre: E.K. Frotran
5. Processing of textile fibres: Sadov
6. Chemistry of synthetic dyes: Venkataraman
7. Chemistry of dyestuff: L.L. Liod, M. f

1.2 Process Control in Weaving (NTT-702) (L T P 2 0 0 =2)

Unit (1): Scope of process control, systems of process control in weaving, setting norms and schedule of checks, machinery audit, process control in weaving, optimizing quality of preparation, control of quality of knot, producing good package, selection of healds, selection of reeds, dressing of the beams for reducing incidence of cross ends. **Total Lectures required =9**

Unit (2): Process control in warping, minimizing end breakage in warping, quality of warping beam, control of productivity, factors responsible for loss in efficiency, control of productivity. **Total Lectures required =7**

Unit (3): Process control in sizing, choice recipe and size pick-up, control of size pick-up, control of yarn stretch, quality of sized beams, control of productivity.

Total Lectures required =8

Unit (4): Process control in loom shed, snap study and time and motion study, control of warp and weft breakage, causes and remedies of fabric defects, factors responsible for loss in efficiency, control of productivity, process control in grey inspection, and folding sections. **Total Lectures required =8**

Grand total of lectures required = 32

Text Books & Reference Books

1. Weaving tablets by ATIRA
2. Machine catalogues of various machines manufacture
3. Process control in weaving by ATIRA

2. Technology of Finishing-II (NTT-709) (L T P 3 1 0)

Unit – 1: Water proofing and water repelling, testing of water repellency, mechanism of water repelling, area of use. **Total lecture required – 9**

Unit – 2: Principle & mechanism of flame retardency, Flame retardency of cotton, polyester and P/C blends. Testing methods for evaluation of flame retardency..

Total lecture required =9

Unit – 3: Finishing of woolen fabrics- Moth proofing, permanent set& testing.

Total lecture required -8

Unit – 4: Finishing of Synthetic fibres/fabric – Heat setting, Delusturing , antistatic, soil resistance finishes .

Total lecture required – 8

Unit – 5: Finishing of synthetics and Lenin fabrics eg. 100% polyester, nylons, acrylics and their blends with cotton, viscose, wool.

Total lecture required -8

Grand total lecture required =42

Reference Books:

1. Introduction to textile finishing by J.T. marsh
2. Chemical Processing of Synthetic Fibres & Blends by Datye & Vaidhya
3. Textile Finishing by V.A. Shenai

3. Waste Management & Pollution Control (NTT-710) (L T P 3 1 0)

Unit (1): Management Techniques: Leadership, authority, responsibility, functions of management. Functional Management: Source of finance, brief idea of cash & credit, cheques, drafts, bill of exchanges, promissory note.

Total Lectures Required = 7

Unit (2): Marketing : Basic concept, market research, promotion, branding, packaging, pricing, planning & development, advertisement media and effectiveness , sales forecasting, marketing mix, pricing policy, sales promotion, and salesman ship. After sales services, complains and their redressal.

Total Lectures Required = 87

Unit (3): Material management: Function and duties of purchase department, purchase order, contracts, legality of contracts, type of contracts. Tenders, types of tenders, tendering procedure, earnest money and security money. Human Relations: Motivating the employees, Inter-personnel relations, Grievances and their handling, staff requirement, training and monitoring.

Total Lectures Required = 9

Unit (4): Foreign Trade: Export procuring channels of distribution in export trade, export promotion, registration of firm / factory in R.B.I. or others.

Source of water: Factors contributing water pollution and their effect, water pollution parameters, physical, biological, chemical standards for quality of treated water. Effluent treatment methods and control, basic principles- Unit operations (sedimentation, precipitation, filtration, and incineration), specific pollutants: unit process: waste maximization and recycling.

Total Lectures Required = 9

Unit (5): Pollution of air, causes, effect, monitoring and control, Source of noise pollution, its effect and control. Legislation- salient provisions of water act, Air act, Environment protection act, Forest Act, motor Vehicle Act, Wild life act. Environment Impact Assessment: Basic principles, purpose, components, methodology a constraints.

Total Lectures Required = 8

Grand Total Lectures Required = 42

Reference Books: Basic course in environmental studies. – S. Deswal & Anupama Deswal.

4. Fibre Reinforced Composites (NTT-708) (L T P 3 1 0=4)

Unit 1: Definition of composites, Types of composites - fibre particulate and laminar composites, Fibre composites: Constituents - functions of fibre and matrix

Total Lectures Required = 8

Unit 2: Types of high performance fibres - properties - types of matrix materials – Thermoset and Thermo plastics properties: short fibre composites, fibre matrix interface, coupling agents, coupling of interfaces and interfacial reaction in fibre composites, fracture mode in fibre composites.

Total Lectures Required = 8

Unit 3: Introduction to fibre reinforced composite material manufacturing techniques, Textile performs for composites: weaving, knitting, braiding

Total Lectures Required = 8

Unit 4: Vacuum bagging, compression moulding, injection moulding, pultrusion, thermoforming, filament winding, resin transfer moulding

Total Lectures Required = 8

Unit 5: Testing of composites— Fibre volume fraction -Laminar tensile - shear - compression -and flexural properties, applications of fibre reinforced composites

Total Lectures Required = 8

Grand Total Lectures Required = 42

Text Books & Reference Books:

19. D hull An Introduction to composite materials, Cambridge university press, 1998
20. L Gupta “Advanced Composite Materials”, Himalayan Book, New Delhi, 1998
21. Mathews F.L and Rawlings R.D “Composite Materials Engineering science” Chapman and Hall London, 1994
22. Hearle. J.W.S “High performance fibres composites and engineering textile structures” JTI (special issue) 1990
23. Textile Progress monogram on “Hybrid yarns and textile performing for thermoplastic composites” by R. Alagirusamy, R Fanguero, V. Ogale and N. Padaki Textile Progress 2006 Vol 38 No. 4 (Wood Head Publishing Limited)
24. De.S.K. and White J.R. Short fibre polymer composites, Wood head, 20

Departmental Elective III

5.1 Knitting Technology (NTT-033) (L T P 3 1 0=4)

Unit 1: Difference between knits and wovens, knitting terms and definitions (Course, wale, stitch density) different type of knitting needles: bearded needle, latch needle, sinker, jack, cam arrangement, overlap, under lap, closed lap, open lap

Total Lectures required =8

Unit 2: Comparison of warp and weft knitting, Classification of weft knitting machine, elements of knitting machine like type of needles, sinkers, etc Needle numbering system, technology of loop formation, geometry of loop structure, Elements of loop structure: needle loop, sinker loop, relation between yarn count, machine gauge and stitch density.

Total Lectures required =9

Unit 3: Classification of knit-structures, loop formation on: single jersey, Rib machines and inters look machines, socks knitting technology, Loop formation on flat bed machine

Total Lectures required =9

Unit 4: Four primary base knitting structures: Plain knitted fabric, Rib fabric, Interlock and Purl fabric, Special knitting machines: Fabric machine, garment length machine, flat machine, circular machine fabrics and Spacer fabrics.

Total Lectures required =7

Unit 5: Basic warp knitting machines, classification of warp knitting, Modern developments in weft knitting technique, calculations regarding production, gsm, stitch density etc, Causes and remedies of faults of knitted fabrics.

Total Lectures required =9

Grand total of lectures required = 42

Reference and Text Book-

1. Knitting Technology – Chamberlin
2. Knitting Technology – W.J. Spencer
3. International Textile Journal – Knitting
4. Knitting Calculation – Chamberlin
5. Wet Knitting Vol. 1&2 –Published by IIT New Delhi.

6. Knitting – NCUTE

5.2 Non-woven (NTT-031) (L T P 3 1 0=4)

Unit 1: National and international scenario on non-woven fabric production, Concept about felts and non woven (3), Classification of non-woven fabrics (2) fibres for non-woven fabrics (2), Felt Manufacturing process, **Total lectures required=7**

Unit 2: (4), Various method of web formation, web chromatistic and their influence on properties of non-woven fabrics, (3) Non woven fabric by Needle punch, Description of needle punching machine, effect of process variables on properties of needle punch fabric.

Total Lectures Required=7

Unit 3: Non-woven fabric by hydroentanglement, Description of hydroentanglement machine, effect of process variables on properties of hydroentanglement non woven fabric, Non-woven fabric by adhesive bonding, mechanical bonding, Melt blown process of non-woven fabric manufacturing. **Total Lectures Required = 6**

Unit 4: Non-woven fabric by Stitch bonding, Non-woven fabric by chemical bonding, Non-woven fabric by bonding with thermoplastic adhesives, Non-woven fabric by Spun laced, Effect of process variables on properties of stitch bonding, chemical bonding spun laced non-woven fabrics. **Total Lectures Required = 7**

Unit 5: Flocked fabric (2), Laminates (2), latest development in non-woven industry: ultrasonic bonding, Infra-red bonding, bonding by bi-component fibres (3). Application of various non woven fabrics. **Total Lectures Required = 7**

Grand total = 34

Reference Books

1. Non Woven – N.N. Banarjee
2. Non woven – NCUTE
3. Knitting technology : Spencer

7th SEMESTER LAB SYLLBUS

Technology of Finishing-II (NTT-759)

Water proofing and water repelling, testing of water repellency, Flame retardency of cotton, polyester and P/C blends, Finishing of woolen fabrics, antistatic, soil resistance finishes.

8th Semester B. Tech Textile Chemistry

1. Open Electives from other departments

1.1 Technical Textiles (NTT-801) (L T P 3 1 0)

Unit (1): Introduction to technical textile, types of technical textiles, textiles used in industry such as filtration, filter fabric construction- woven, needle felt & knitted filter fabric, finishing treatment of filter fabric, thermal and chemical properties of filter fabric, essential requirements of good filter fabric..

Total Lectures required =8

Unit (2): Manufacture and properties of protective textiles- water proof/coated and water repellent, antimicrobial, flame retardant, chemical resistance, Nuclear and biological resistance, mechanical resistance such as bullet proof, cut prof, stab proof

Total Lectures required =9

Unit (3): Medical textiles, fibres used, classification of medical textiles- non-implantable material wound dressings, bandages, plasters, etc, Extra-corporal devices – Artificial kidney, liver lung, implantable material- suture, soft tissue implant, Orthopedic implants, Cardiovascular implants, Healthcare/ hygiene products, medical cost, surgical gown, face mast etc.

Total Lectures required =8

Unit (4): Smart textiles, brief introduction of smart textiles, classification of smart textiles, passive smart textiles, active smart textiles, brief discussion of smart shirt, smart suit, musical jacket, space suit etc. automotive textiles: type cord, seat belt, air bag, seat upholstery, carpets, headliners, helmets etc, Agro textile: Shade net, green house film, Mulch net, crop cover, anti hail and bird protection net, finishing net etc.

Total Lectures required =9

Unit (5): Introduction of geo textile, classification of geo textiles, functions of geo textile-soil reinforcement, drainage (fluid transmission), filtration, separation, erosion control/ absorption, objective of geo textiles, manufacturing of geo textile, essential properties of geo textiles- Mechanical determinants, Hydraulic determinants, durability determinants **Total Lectures required =8**

Grand total of lectures required = 42

Text Books and Reference material:

10. Hand book of technical textiles- A.R. Horrocks & S.C. Anand
11. Smart fibre, fabrics and clothing Tao X
12. Shears handbook of industrial Textiles.

1.2 Product Development (NOE-082) (L T P 3 1 0)

UNIT-1: Concept of Product, definition and scope. Design definitions, old and new design methods, design by evolution, examples such as evolution of sewing M/C, bicycle, safety razor etc., need based developments, technology based developments physical reliability & economic feasibility of design concepts.

UNIT –II: Morphology of design, divergent, transformation and convergent phases of product design, identification of need, Analysis of need. Design criteria; functional, aesthetics, ergonomics, form, shape, size, colour. Mental blocks, Removal blocks, Ideation techniques, Creativity, Check list.

UNIT –III: Transformations, Brainstorming & Synetics, Morphological techniques. Utility Concept, Utility Value, Utility Index, Decision making under Multiple Criteria. Economic aspects, Fixed and variable costs, Break-even analysis.

UNIT-IV: Reliability considerations, Bath tub curve, Reliability of systems in series and parallel, Failure rate, MTTF and MTBF, Optimum spares from Reliability considerations. Design of display and controls, Man-machine interface, Compatibility of displays and controls. Ergonomic aspects, Anthropometric data and its importance in design. Application of Computers in Product development & design.

UNIT-V: Existing techniques, such as work-study, SQC etc. for improving method & quality of product. Innovation versus Invention. Technological Forecasting. Use of Standards for Design.

Text/Reference Books: 1. A.K. Chitab & R.C. Gupta “Product design & Manufacturing” – Prentice Hall (EE) 2. R.P. Crewford, “The Technology of creation Thinking” Prentice Hall. 3. C.D. Cain, “Product Design & Decision” Business Books. 5. C.D. Cain, “Engg. Product Design” Business Books.

2. Process House Planning & Organization (NTT-805)

Unit-1: Selection of site for a process house, preparation of project report for a process house, construction of building of a process house, types of buildings, single and multistoried buildings. Fire hazards and their control Safety rules for process house, prevention tours accidents. **Total of lectures required=9**

Unit-2: Importance of effluent management: their effect in environment, -Tolerance limit enforced by state pollution Boards & its purpose, Characteristics of process waste streams-process, process, possible pollutants & nature of waste water, methods of disposal of industrial waste (from dye house & print house specially), Water energy (steam) Source & its conservation, steam and water consumption, reutilization of water. **Total of lectures required=8**

Unit-3: Balancing of machines for a complete process house, Layout of different machines of a process house, Factors affecting plan layout, handling of dyes & chemicals, methods & precautions, Maintenance, Objective and various types of maintenance in process house. **Total of lectures required=8**

Unit-4: Costing, introduction to cost terms and purposes, cost volume, profit analysis, Master budget, flexible budget, cost allocation, process costing, waste cost in process house, labour and material cost, wage system in process house, predetermining dyeing, finishing and printing cost, viability evaluation of a project

Total number of lectures required =10

Unit (5) Calculation regarding payback period and break- even point, types of staff organization, .Staff organization system in textile mills . **Total number of lectures required =7**
Grant total of lectures required = 42

Text Books & Reference Books

- 1- Art of Dyeing by B.S. Chauhan
- 2-Health hazards in Textile mills by NITRA
- 3-Dye house management, Colour Publication, Bombay
- 4-Modern TextileManagementJ.BRattan, Abhishek Publication, Chandigarh.
- 5-Water and effluents in textile by ATIRA.
- 6-Economy, energy and environment in textile wet processing by S.S. Trived.
- 7-Occupational Health and Safety inn Textile mills by Dr. V.A.Shenai,Sevak Publication, Mumbai
- 8-Energy Conservation in Textile WET Processing by Dr.M.L. Gulrajani, Mahajan publication, Ahemdabad.

3. Departmental Electives IV

3.1 High Performance Fibres (NTT-042) (L T P 3 1 0)

Unit – I; Introduction- Definition, molecular dimensionality mechanical properties, Fibre markets, Hi - Performance Gelspun Polyethylene fibres- Manufacture, fibres characteristics, properties & applications. **Total lectures required=9**

Unit- II: Aramids- Introduction, polymer preparation, Spinning, Structure & properties, applications, Fibres based on liquid crystalline polymer (PPTA fibre). **Total lectures required=8**

Unit- III: Carbon Fibres- Physical properties, PAN bases Carbon fibres, Pitch based Carbon fibres, Vapour grown Carbon fibres, Applications. **Total lectures required= 8**

Unit-4:Glass Fibres- Glass for Fibres, Fibre manufacture, fibre finish, fibre properties& application, optical fibres. **Total lectures required=8**

Unit –5: Vectran (Melt spun wholly aromatic polyester fibre), Fibre production, properties & application, PBO (Polyphenylene benzobisoxazole) fibres- Fibre production, properties & application. PEEK Fibres -Fibre production, properties & application. **Total lectures required=9**

Grand total of lectures required= 42

Reference Books

1. High Performance Fibree by J.W.S. Hearle

3.2 Development in Wet Processing (NTT-044) (L T P 3 1 0)

Unit-1: Recent development in preparatory process- Scouring bleaching

Unit-2: Fundamentals of foam technology and its application to wet processing textiles, German Bann, Economics of dyeing process.

Unit-3: Advances in dyeing machines and dyeing methods, energy requirement and its Conservation Computer Colour matching.

Unit-4: Advance in Printing methods and machines, Digital Printing, Finishing of blends, Solvent dyeing.

Unit-5: Impact of textile chemicals on ecology. Environmental issues in textile industry, Eco-parameters for textile Industry, Eco-labeling, Eco standards

Reference Books

1. Eco-standards-- V.A. Shenai
2. Colourage Journals--- Line to Line articles published in the magazines must be compiled year-wise

4. Departmental Electives V

4.1 Special Topics in Manmade Fibres (NTT-053) (L T P 3 1 0=4)

Unit 1: Various modifications in molecular chain of polyethylene terephthalate fibre, Incorporation of various dope additives to manufacturer inherent flame retardant, X-ray absorbing, and fluorescent fibres, Cationic dyeable polyester. **Total Lectures required =10**

Unit 2: Modification of regenerated fibre on special attention to Lyocell fibre, Kinetics of coagulation bath for viscose fibre regeneration, Spinning of polylactic acid (PLA) Fibres. **Total Lectures required =8**

Unit 3: Modification in Nylon fibres: Nylon 6 and Nylon 66, Modification in polyurethane fibres, Electrospun Nanofibers From Biopolymers And Their Biomedical Applications, Chemistry and its Applications in Biocidal Textiles and Polymers. **Total Lectures required =8**

Unit 4; Modification in Polyacrylonitrile fibres by modification during polymerization, By addition of various copolymers for specific purposes, synthesis and spinning of modacrylic fibre, **Total Lectures required =8**

Unit 5: Fibres by chemical vapour deposition (CVD) technique, silicon carbide (SiC) fibres, Boron fibres, Carbon nanotube manufacturing, Carbon nanotube (CNT) in various man made fibres. **Total Lectures required =8**

Grand Total of Lectures Required =42

Text Books & Reference books:

1. Chemical Vapor Deposition: Jong-Hee Park, T. S. Sudarshan
2. The material science of thin films: Milton Ohring
3. Modified Fibers with Medical and Specialty Applications: Edwards, Vincent; Buschle-Diller, Gisela; Goheen, Steve

4.2 Coating of Textiles (NTC-054) (L T P 3 1 0)

Unit-1: Polymeric materials for coating- (Rubbers: natural and synthetic, Polyvinyl chloride, Polyurethane, Acrylic polymers, Adhesive treatment. **Total lecture required=8**

Unit-2: Coating Methods: Knife coating, Roller coating, transfers coating, Rotary screen printing, calendaring hot melt coating. **Total lecture required=8**

Unit-3: Physical properties of coated fabric (2) Rheology of coating pastes, Rheological Behaviors of fluids, pastes (1) hydrodynamic analysis of coating, **Total lecture required=8**

Unit-4: Coating for foul weather protection, Impermeable coating, breathable coating, Non Apparel coating, Coating for Chemical protection, Thermo chromic coating, Temperature Adaptable coating, Camouflage nets, Metal and conducting polymer-coated fabrics, Radiation cured coating, **Total lecture required=10**

Unit-5: Test methods for coated fabrics, Coating per Unit area, Degree of fusion/curing of coating, blocking, Abrasion resistance, Test for colour- Fastness to dry and wet rubbing, Resistance to water penetration, Air permeability, water vapour permeability, low temperature bend test, low temperature impact test, Adhesion test

Total lecture required=9

Grand Total lecture required=39

Text Books/ Reference Books:

1. Coating & Laminated Textiles by Water Fung
2. Coated Textile by A.K. Sen
3. Coated Fabric technology Vol. 1-3 Technomic publication
4. Coated & laminated Fabric by AATCC symposium