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Individual Elective Courses

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MANAGEMENT STREAM

HUMANITIES STREAM

IT STREAM

***

FOREWORD

Food, shelter and clothing are the fundamental needs of human beings. In fact clothing has ushered in us a sense of culture and civilization. Textile products include woven, knitted and nonwoven fabrics used for making clothes, furnishings, upholstery, carpets, lace etc. Therefore all these cover end products such as toothbrushes, shoe laces, socks, automobiles that are part and parcel of our everyday life. Polyester fabrics are used as prosthesis in the heart to replace worn out blood vessels and some of the important rocket component materials have high performance carbon fiber. Varied styles of dressing by people have resulted in improving the scope of ever growing and extremely dynamic textile and fashion technology field.

Today, fashion has a very significant influence on the textile sector and the Indian textile industries are taking up the challenge and utilizing the opportunities to cater the needs of domestic and international markets. As a result, textile business has become one of the booming sectors contributing to the growth of the Indian economy.

B.Tech. (Textile and Fashion Technology) program is aimed at offering the knowledge and skills in designing and controlling all aspects of fiber, textile and apparel processes, products and machinery. It includes research and development, manufacturing and merchandising. This knowledge is used for processing and production of all kinds of yarns and fabric products as well as manufacturing of garments dictated by the fashion industry.

In the R16 curriculum skill-oriented activities are included to enable the students to acquire hands on experience to make them better suited for industry requirements.

R16 curriculum comprises of:

- *Four elective streams covering current and advance technologies*
- *Advanced courses like clothing comfort, advancement in knitting technology and eco-friendly wet processing etc.*
- *Laboratory sessions to as many courses as possible.*

The Board of Studies of Textile and Fashion Technology comprises of the experts from industry and academia.

External BoS Members:

1. Prof. J. Hayavadana, *Professor and Programme Co-Ordinator, Osmania University.*
2. Dr. Shakeel Iqbal, *Associate Professor and Centre Co-ordinator, Department of Fashion Technology, NIFT, Hyderabad.*
3. Prof. G. Gunasekaran, *Professor and Head, Department of Fashion Technology, Sona College of Technology, Salem.*
4. Mr. Vasant Kothari, *Freelance Consultant, Former Joint Director, NIFT Bhopal.*

My heartfelt thanks to all the BoS and Academic Council Members who were actively involved in preparing this innovative curriculum and course contents.

Dr. M. Ramesh Naidu
HOD, TFT

B.Tech. - TEXTILE AND FASHION TECHNOLOGY

Programme Educational Objectives (PEO)

The main objectives of this program are to prepare the students to enable them to:

- *understand the basic concepts of manufacturing of textile material for apparel and other technical applications.*
- *analyze the present fashion scenario in garmenting and to prepare new styles covering future trends.*
- *satisfy the customer yarn and fabric needs and produce the appropriate textile materials.*
- *understand various technological systems of manufacturing of textile material and apply them for the development of new process and products.*
- *analyze the data regarding process control and quality requirements of textile and apparel materials.*
- *understand the management responsibilities related to issues such as social, ethical, environmental and personnel aspects of the textile industry.*

Programme Outcomes (PO)

On completion of the program the students will be able to:

- *become familiar with the fundamentals of textile and fashion technology.*
- *apply the basic concepts to design and translate the design into prototypes and products.*
- *analyze and interpret data related to textile design, manufacturing and quality analysis.*
- *acquire laboratory skills and become familiar with the use of various modern analytical equipment.*
- *develop skills to be an active and effective member of a team.*
- *equip with the knowledge and skills necessary for entry-level placement in both core as well as IT companies.*
- *develop capacity to understand professional and ethical responsibility and display skills required for continuous and life-long learning.*
- *acquire solid foundation for entering into higher education programs.*
- *have knowledge of contemporary issues and modern practices.*

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I YEAR

R-16 CURRICULUM

(Applicable for students admitted into First Year from academic year 2016-17 onwards)

I Year I Semester

Course Code	Course Title	L	T	P	C
16HS103	Engineering Mathematics-I	3	1	2	5
16HS102	Engineering Physics	3	-	-	3
16HS105	Technical English Communication	3	-	2	4
16CS101	Basics of Computers and Internet	3	-	2	4
16CS102	Computer Programming	3	1	2	5
16EE101	Basics of Engineering Products	3	-	2	4
16HS104	English Proficiency and Communication Skills	-	-	2	1
16HS110	Engineering Physics Laboratory	-	-	3	2
	Total	**18**	**2**	**15**	**28**

I Year II Semester

Course Code	Course Title	L	T	P	C
16HS108	Engineering Mathematics-II	3	1	2	5
16HS107	Engineering Chemistry	3	-	-	3
16ME101	Engineering Graphics	1	-	3	3
16EE102	Basics of Electrical and Electronics Engineering	3	-	2	4
16HS111	Engineering Chemistry Laboratory	-	-	3	2
16HS109	Environmental Science and Technology	2	-	-	2
16TF101	Textile Fibres	3	-	2	4
16CH102	Material Science and Technology	3	1	-	4
	Total	**18**	**2**	**12**	**27**

L : Lecture Hours/week ; T : Tutorial Hours/week ;
P : Practical Hours/week ; C : Credits of the Course ;

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II YEAR

R-16 CURRICULUM

(Applicable for students admitted into First Year from academic year 2016-17 onwards)

II Year I Semester

Course Code	Course Title	L	T	P	C
16HS202	Probability and Statistics	3	1	-	4
16EL102	Soft Skills Laboratory	-	-	2	1
16TF201	Technology of Manufactured Fibres	3	-	-	3
16TF202	Yarn Manufacturing	3	-	-	3
16TF203	Fabric Manufacturing	3	-	-	3
16TF204	Fashion, Art, Design and Accessories	3	-	-	3
16TF205	Pattern Engineering	3	-	-	3
16TF206	Fashion Illustration Laboratory	-	-	3	2
16TF207	Accessories and Surface Ornmentation Laboratory	-	-	3	2
	Employability and Life Skills Elective*	-	-	-	1-3
	Total	**18**	**1**	**8**	**25-27**

* Courses and Progrmmes such as Foreign Languages, Summer Internship, NCC, NSS, Yoga, Music, Dance, Value Added Courses etc. for which credits and other details shall be defined by concerned coordinators.

II Year II Semester

Course Code	Course Title	L	T	P	C
16EL103	Professional Communication Laboratory	-	-	2	1
16TF208	Garment Construction Techniques	3	-	2	4
16TF209	Technology of Knits and Non-wovens	3	-	-	3
16TF210	Fabric Structure and Design	3	-	2	4
16TF211	Textile Wet Processing	3	-	3	5
	Department Elective	-	-	-	3
	Department / Open Elective	-	-	-	3-4
	Employability and Life Skills Elective*	-	-	-	1-3
	Total	**12**	**-**	**9**	**24-27**

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III YEAR

R-16 CURRICULUM

(Applicable for students admitted into First Year from academic year 2016-17 onwards)

III Year I Semester

Course Code	Course Title	L	T	P	C
16TF301	Testing of Fibres and Yarns	3	-	2	4
16TF302	Apparel Production, Planning and Control	3	-	-	3
16TF303	Garment Dyeing, Printing and Embroidery	3	-	3	5
16TF304	Textile Mathematics	3	-	-	3
	Department Elective	-	-	-	3
	Department / Open Elective	-	-	-	3-4
	Employability and Life Skills Elective*	-	-	-	1-3
	Total	**12**	**-**	**5**	**22-25**

III Year II Semester

Course Code	Course Title	L	T	P	C
16HS301	Professional Ethics	2	-	-	2
16TF305	Garment Machinery	3	-	2	4
16TF306	Testing of Fabrics and Garments	3	-	2	4
16TF307	Apparel Merchandising	3	1	-	4
16TF308	Textile and Fashion CAD Lab	-	-	3	2
	Department Elective	-	-	-	3
	Department / Open Elective	-	-	-	3-4
	Employability and Life Skills Elective*	-	-	-	1-3
	Total	**11**	**1**	**7**	**23-26**

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IV YEAR

R-16 CURRICULUM

(Applicable for students admitted into First Year from academic year 2016-17 onwards)

IV Year I Semester

Course Code	Course Title	L	T	P	C
16MS201	Management Science	3	-	-	3
16TF401	Cloting Comfort	3	-	-	3
16TF402	Industrial Engineering for Textiles and Apparels	3	-	-	3
16TF403	Apparel Costing and Export Documentation	3	-	-	3
16TF404	Technical Textiles	3	-	-	3
16TF405	Men, Women, Children Wear Construction Laboratory	-	-	3	2
	Department Elective	-	-	-	3
	Department / Open Elective	-	-	-	3-4
	Employability and Life Skills Elective*	-	-	-	1-3
	Total	**15**	**-**	**3**	**24-27**

IV Year II Semester

Course Code	Course Title	L	T	P	C
16TF406/16TF407	Project work / Internship	-	-	30	15
	Total	**-**	**-**	**30**	**15**

In addition to L, T, P, C the following information in hours/semester is also provided for each course.

WA/RA : Writing Assignment / Reading Assignment
SSH/HSH : Self Study Hours / Home Study Hours
CS : Case Study and Example
SA : Skills Activity
S : Seminar
BS : Beyond Syllabus

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ELECTIVES

R-16 CURRICULUM

(Applicable for students admitted into First Year from academic year 2016-17 onwards)

DEPARTMENT ELECTIVE STREAMS AND COURSES

STREAM - 1: YARN MANUFACTURING

Course Code	Course Title	L	T	P	C
16TF250	Practical Aspects in Blow Room and Carding	3	-	-	3
16TF350	Practical Aspects in Drawing, Comber and Simplex	3	-	-	3
16TF351	Practical Aspects in Yarn Manufacturing	3	-	-	3
16TF450	Maintenance in Spinning	3	-	-	3

STREAM - 2: WOVEN FABRIC MANUFACTURING

Course Code	Course Title	L	T	P	C
16TF251	Practical Aspects in Weaving Preparatory	3	-	-	3
16TF352	Principles of Weaving	3	-	-	3
16TF353	Shuttleless Weaving	3	-	-	3
16TF451	Mechanics of Weaving Machines	3	-	-	3

STREAM - 3: KNITTING TECHNOLOGY

Course Code	Course Title	L	T	P	C
16TF252	Hand Knitting and Flat Knitting	3	-	-	3
16TF354	Circular Knitting	3	-	-	3
16TF355	Wrap Knitting	3	-	-	3
16TF452	Advancement in Knitting Technology	3	-	-	3

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ELECTIVES

R-16 CURRICULUM

(Applicable for students admitted into First Year from academic year 2016-17 onwards)

DEPARTMENT ELECTIVE STREAMS AND COURSES

STREAM - 4: TEXTILE WET PROCESSING

Course Code	Course Title	L	T	P	C
16TF253	Dyes and Pigments	3	-	-	3
16TF356	Dyeing and Printing Machinery	3	-	-	3
16TF357	Eco-Friendly Wet Processing	3	-	-	3
16TF453	Functional Finishes	3	-	-	3

STREAM - 5: INDIVIDUAL ELECTIVE COURSES

Course Code	Course Title	L	T	P	C
16TF358	Computer Applications in Textiles	3	-	-	3
16TF359	Lean and Six Sigma in Textiles and Apparels	3	-	-	3
16TF360	Physical Properties of Textile Fibres	3	-	-	3
16TF361	Process Control and Quality Management in Textiles	3	-	-	3

B.Tech.
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OPEN ELECTIVES

R-16 CURRICULUM

(Applicable for students admitted into First Year from academic year 2016-17 onwards)

OPEN ELECTIVE STREAMS AND COURSES

A) MINOR STREAMS:

MANAGEMENT STREAM

Course Code	Course Title	L	T	P	C
16MS202	Principles and Practice of Management	3	-	-	3
16MS301	Managerial Economics	3	-	-	3
16MS302	Finance for Engineers	3	-	-	3
16MS401	Engineering Entrepreneurship	3	-	-	3

HUMANITIES STREAM

Course Code	Course Title	L	T	P	C
16HS219	Indian History and Culture	3	-	-	3
16HS224	Polity and Governance of India	3	-	-	3
16HS307	Economic and Social Development of India	3	-	-	3
16HS308	Geography and Environmental Concerns of India	3	-	-	3

IT STREAM

Course Code	Course Title	L	T	P	C
16IT201	Object Oriented Programming	3	-	2	4
16CS303	Web Technologies	3	1	2	5
16CS254	Scripting Languages	3	-	2	4
16CS201	Database Management Systems	3	1	2	5
16IT309	Unix Programming	3	1	-	4
16CS301	Software Engineering	3	-	2	4
16CS302	Data Mining Techniques	3	-	2	4
16IT409	Multimedia Systems	3	-	2	4

B) OPEN STREAMS OF OTHER DEPARTMENTS

Elective Streams offered by other departments that are opted by the students are included in this category.

C) INDIVIDUAL ELECTIVE COURSES OF OTHER DEPARTMENTS

Individual elective courses of other departments that are opted by the students are included in this category.

I

YEAR

TEXTILE AND FASHION TECHNOLOGY

B.Tech.

I SEMESTER

- 16HS103 - Engineering Mathematics - I
- 16HS102 - Engineering Physics
- 16HS105 - Technical English Communication
- 16CS101 - Basics of Computer and Internet
- 16CS102 - Computer Programming
- 16EE101 - Basics of Engineering Products
- 16HS104 - English Proficiency and Communication Skills
- 16HS110 - Engineering Physics Laboratory

II SEMESTER

- 16HS108 - Engineering Mathematics - II
- 16HS107 - Engineering Chemistry
- 16ME101 - Engineering Graphics
- 16EE102 - Basics of Electrical and Electronics Engg.
- 16HS111 - Engineering Chemistry Laboratory
- 16HS109 - Environmental Science and Technology
- 16TF101 - Textile Fibers
- 16CH102 - Material Science and Technology

COURSE CONTENTS

I SEM & II SEM

16HS103 ENGINEERING MATHEMATICS - I

Hours Per Week :

L	T	P	C
3	1	2	5

Total Hours :

L	T	P
45	15	30

WA/RA	SSH/HSH	CS	SA	S	BS
10	45	-	-	-	-

Course Description and Objectives:

It is aimed to offer various analytical as well as numerical methods to solve first and second order ordinary differential equations; to impart the knowledge of partial differentiation; to acquaint with the various methods to solve first and second order partial differential equations; to make the student familiar with applications of first order ordinary differential equations. To make the student to use different mathematical tools of MATLAB related to above concepts.

Course Outcomes:

The student will be able to:

- recognise and solve different types of first order ordinary differential equations.
- find the complementary functions and particular integral of second and higher order ordinary differential equations with constant coefficients.
- apply the knowledge of ordinary differential equations in some instances.
- solve ordinary differential equations, with initial conditions, numerically.
- find the local maxima/minima of given function of two variables.
- eliminate arbitrary constants/functions from given relations to form partial differential equations.
- solve linear and non-linear partial differential equations of standard types.
- classify second order partial differential equations and solve them.

SKILLS:

- ✓ *Solve given differential equation by suitable method.*
- ✓ *Compute numerical solutions of differential equation by apt method.*
- ✓ *Compute maxima/minima of given function.*
- ✓ *Solve given partial differential equation by appropriate method.*

ACTIVITIES:

- *Differentiate methods to solve given differential equation.*
- *Compute numerical solutions to differential equation and compare the result with MATLAB output.*
- *Compute maxima/minima of given function.*
- *Differentiate methods to solve given partial differential equation.*
- *Estimation of acoustic impedance of a given material.*

UNIT - 1 **L-9, T-3**

FIRST ORDER DIFFERENTIAL EQUATIONS: Variable separable, Homogeneous differential equations, Linear differential equations, Bernoulli's differential equations, Exact and non-exact differential equations.

UNIT - 2 **L-9, T-3**

SECOND ORDER DIFFERENTIAL EQUATIONS: Linear differential equations with constant coefficients, Homogeneous differential equations of second and higher order, Methods to find particular integral when RHS is of the form - e^{ax}, sinax, cosax and x^n.

UNIT - 3 **L-9, T-3**

APPLICATIONS OF FIRST ORDER DIFFERENTIAL EQUATIONS: Orthogonal trajectories (including polar form), Newton's law of cooling, Law of natural growth and decay.

NUMERICAL METHODS TO SOLVE DIFFERENTIAL EQUATIONS: Taylor series method, Picard's method, Euler's and modified Euler's method, Runge-Kutta method.

UNIT - 4 **L-9, T-3**

MAXIMA/MINIMA OF FUNCTIONS OF TWO VARIABLES: Review of partial differentiation - Partial derivatives, Partial derivatives of higher order; Homogeneous function, Euler's theorem, Total differential coefficient, Maxima and Minima of a function of two variables, Conditions for extreme values, Lagrange method of undetermined multipliers.

JACOBIANS : Definition, Properties, Jacobian of implicit functions.

UNIT - 5 **L-9, T-3**

PARTIAL DIFFERENTIAL EQUATIONS: Formation of partial differential equations, Linear (Lagrange) equations, Method of multipliers, Non-linear partial differential equations (Types), Charpit's method, Second order linear equations with constant coefficients only, Classifications, Rules to find complimentary function and particular integral (special cases).

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS Total hours-30

1. Basic mathematical operations using MATLAB.
2. Solving simple expressions.
3. Limits.
4. Continuity.
5. Symbolic differentiation.
6. Symbolic integration.
7. Plotting of curves.
8. Plotting of surfaces.
9. Maxima & minima of functions of one variable.
10. Maxima & minima of functions of two variable.
11. Solving first order O.D.E.
12. Euler's Method and R-K Method.

TEXT BOOKS:

1. H. K. Dass and Er. Rajanish Verma, "Higher Engineering Mathematics", 3rd edition, S. Chand & Co, 2014.
2. B. S. Grewal, "Higher Engineering Mathematics", 44th edition, Khanna Publishers, 2014.
3. Rudra Pratap, "Getting started with MATLAB", Oxford University Publication, 2009.

REFERENCE BOOKS:

1. Srimanta Pal and Subodh C. Bhunia, "Engineering Mathematics", Oxford Publications, 2015.
2. B. V. Ramana, "Advanced Engineering Mathematics", McGraw Hill education, 25th reprint, 2015.

16HS102 ENGINEERING PHYSICS

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
10	45	-	10	-	10

Course Description and Objectives:

Technology is the experimental information for the physicist, where the theories can be tested. Recent technical developments have been the results of collaboration of physicists and engineers.

Study of engineering physics is a unique opportunity to learn the fundamental concepts of physics and apply this knowledge to both scientific and engineering problems.

The present course deals with various fields such as Lasers, Optical fibers, Photonics, Nano and functional materials, make the students to enrich basic knowledge in various fields of physics and apply the same in engineering fields.

Course Outcomes:

The student will be able to:

- understand the applications of ultrasonics and to calculate the velocity of ultrasonic waves in liquids.
- acquire basic knowledge in Non-destructive techniques.
- understand basic concepts of laser and optical fiber which help in designing and developing new devices in emerging fields.
- grasp the basics of quantum mechanics.
- understand the fabrication of solar devices.
- use nano science and technology for innovative and compact design.
- demonstrate synthesis, properties and applications of nanomaterials and functional materials.

SKILLS:

- ✓ *Determine the velocity of ultrasonics in a given liquid using interferometer.*
- ✓ *Study the wavelengths of light sources and lasers.*
- ✓ *Estimate the efficiency of a given solar cell.*
- ✓ *Learn about the type of the optical fiber and its ability to propagate light waves from its numerical aperture.*
- ✓ *Know voltage – current characteristics of a given light emitting diode.*

UNIT - 1 **L-9**

ULTRASONICS: Introduction, Production of ultrasonic waves - Piezoelectric method; Properties of ultrasonic waves, Types of ultrasonic waves, Determination of velocity of ultrasonic waves in solids and liquids, SONAR - Medical applications.

NON-DESTRUCTIVE TESTING: Introduction, Types, Visual inspection, Liquid penetrate testing, Ultrasonic Testing Systems, X - Ray radiography.

UNIT - 2 **L-9**

LASERS: Characteristics of laser light, Spontaneous and Stimulated emission of radiation, He-Ne laser, CO_2 laser, Semiconductor laser, Applications.

HOLOGRAPHY: Holography and applications.

FIBER OPTICS: Principle of optical fiber, Acceptance angle, Numerical aperture, Types of fibers, Dispersion and attenuation in optical fibers, Optical fiber communication system, Fiber optic sensors.

UNIT - 3 **L-9**

QUANTUM MECHANICS: Introduction, Matter waves, Schroedinger's time independent wave equation, Physical significance of the wave function, Particle in one dimensional potential well, Tunneling phenomenon.

FREE ELECTRON THEORY OF METALS: Introduction, Classical free electron theory, Electrical conductivity of metal, Quantum free electron theory, Fermi - Dirac distribution function and its variation with temperature.

PARTICLE ACCELERATORS: Introduction, Cyclotron, Synchrocyclotron, Betatron and applications.

UNIT - 4 **L-9**

SOLAR ENERGY: Solar radiation, Photovoltaic effect, Solar cells, Efficiency of solar cell, Solar thermal energy conversion systems.

PHOTONICS: LED, LCD, Photo conducting materials, Photo detectors, Photonic crystals, Non- linear optical behaviour of materials, Applications.

UNIT - 5 **L-9**

NANO MATERIALS: Introduction, Fabrication of nano materials - Ball milling - Sol-Gel method; Physical and chemical properties of nano materials, Applications.

FUNCTIONAL MATERIALS: Smart materials, Shape memory alloys, Chromic materials (Thermo, Photo and electro), Metallic glasses, Advanced ceramics, Composites, Fiber reinforced plastics/metals, Biomaterials.

TEXT BOOKS:

1. V.Rajendran, "Engineering Physics", 7th edition, McGraw Hill Education (India) Pvt.Ltd., 2014.
2. D.K. Bhattacharya and Poonam Tandon, "Engineering Physics", Oxford University Press, 2015.

REFERENCE BOOKS :

1. M.R. Srinivasan, "Engineering Physics", 1st edition, New Age International Publishers, 2008.
2. M.N. Avadhanulu & P.G. Kshirsagar, "Engineering Physics", 1st edition, Chand and Company Ltd., 1992.
3. Sukhatme S.P., "Solar Energy", 2nd edition, TMH publication, 2005.
4. Dr. Arumugam "Materials Science", 3rd edition, Anuradha Publications, 2002.

ACTIVITIES:

- *Estimation of acoustic impedance of a given material.*
- *Measurement of distances using ultrasonic range finder.*
- *Study of linear density of yarn/ fibre using Melde's experiment.*
- *Determination of refractive index of a given liquid using laser.*
- *Find the height of a room using laser.*
- *Identify the type of semi-conductor using Hall effect.*
- *Study of numerical aperture of optical fibres made of different materials.*
- *Design of solar panel to obtain required voltage.*
- *Evaluation of thermal conductivity of materials.*
- *Measure the temperature using thermo couple.*

16HS105 TECHNICAL ENGLISH COMMUNICATION

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P
45	-	30

WA/RA	SSH/HSH	CS	SA	S	BS
10	15	5	6	4	5

Course Description and Objectives :

To introduce students the specific use of English for the purpose of Technical Communication that would strengthen their skills in the areas of writing and speaking and thereby enable them to function effectively in their professional sphere. The objective of this course is to direct the students towards developing their technical writing skills in particular and overall language proficiency in general. It will be done by making students peruse good samples of technical writing covering a wide range of contemporary issues relevant to the engineering profession. Students will, also be revisiting, the fundamentals of grammar to get trained on use of standard English.

Course Outcomes:

The student will be able to:

- acquire an understanding of the rules of grammar.
- strengthen their reading and listening comprehension skills to follow the academic discourse in the engineering classroom.
- have a command of basic vocabulary related to different subject areas.
- have a grasp on the mechanics of writing and express their ideas through construction of simple texts.
- attain language proficiency to participate in the classroom discussions.

SKILLS:

- ✓ *Apply different sub skills like skimming, scanning, reading for information, reading for inference etc to understand different kinds of text.*
- ✓ *Apply different sub skills like top down, bottom up approaches to listening, and understand phonetic and phonological features of the English language to deconstruct long spoken discourses.*
- ✓ *Use functional vocabulary relevant to subject areas like environment, tourism, engineering, technology and media to express ideas lucidly.*
- ✓ *Use appropriate sentence structure, cohesive devices and diction to construct simple text in writing and regular correspondence like e-mails, letters etc.*
- ✓ *Capture and understand key points during class room discourses through applying sub skills of writing like note-making, paraphrasing and summarizing.*

UNIT - 1 **L-9**

- Text : **ENVIRONMENTAL CONSCIOUSNESS**
  (Climate Change, Green Cover, Pollution, Renewable vs. Non renewable energy sources (from Energy Unit)
- Grammar : Articles, Prepositions, Sentence types and construction
- Vocabulary : Root, Prefixes, Suffixes
- Composition : Paragraph writing (Descriptive and narrative)
- Laboratory
  Practice : Introduction to phonetics (Organs of Speech, Consonants, Vowels and Diphthongs, Syllable, Stress and Intonation)

UNIT - 2 **L-9**

- Text : **EMERGING TECHNOLOGIES**
  (Solar power, Cloud computing, Nanotechnology, Wind energy (to be covered from Energy unit))
- Grammar : Time and tense (Present-past-future; Helping verbs, Modals)
- Vocabulary : Synonyms, Antonyms
- Composition : Letter writing (Informal)
- Laboratory
  Practice : Grammar Practice (Speaking of past, present and future)

UNIT - 3 **L-9**

- Text : **TRAVEL AND TOURISM**
  (Advantages and disadvantages of travel-tourism, Atithi devo bhava, Tourism in India)
- Grammar : Subject-Verb agreement, Sentence construction
- Vocabulary : Idioms and phrases
- Composition : Letter writing (Formal)
- Laboratory
  Practice : Situational conversations – Role - Plays (Introducing, Greeting, Enquiring, Informing, Requesting, Inviting)

UNIT - 4 **L-9**

- Text : **ENGINEERING ETHICS**
  (Challenger disaster, Biotechnology, Genetic engineering, Protection from natural calamities, How pertinent is the nuclear option? An environment of energy (from Energy Unit)) Avoiding sexist language (Gender Sensitization)
- Grammar : Sentence transformation (Degrees, Voice, Speech and Synthesis)
- Vocabulary : Phrasal verbs
- Composition : Note-making, Text, Nandan Nilekani's In Search of Our Energy Solutions (from Energy Unit) Summarizing, Text on "Flight from conversation" (New York Times)
- Laboratory
  Practice : Situational conversations, Role-Plays (Emotions, Directions, Descriptions, Agreements, Refusals, Suggestions)

ACTIVITIES:

- *Doing phonetic transcription of selected words from the list provided using talking dictionaries of AHD and CALD.*
- *Completing graded grammar exercises in Rosetta Stone.*
- *Completing graded listening and reading comprehension exercises in Rosetta Stone.*
- *Watching TED videos and making notes.*
- *Watching TED videos to paraphrase and summarize.*
- *Ad- making.*
- *Preparing brochure.*
- *Dialogue writing followed by role play.*
- *Poster designing.*
- *Team presentation with PPTs and Group Discussion.*

UNIT - 5 **L-9**

- Text : **MEDIA MATTERS**
  (History of media, Language and media, Milestones in media, Manipulation by Media, Thousands march against nuclear power in Tokyo (from Energy Unit), Entertainment media, Interviews)
- Grammar : Common errors
- Vocabulary : One-word substitutes
- Composition : E-mail – Short message service (SMS), Writing advertisements, Reporting; Social media - Blogging, Facebook, Twitter (acceptable and non acceptable content)
- Laboratory Practice : Group discussions – (Topics from Energy Unit), Dumping of nuclear wastes, Exploration of eco-friendly energy options, Lifting of subsidies on petrol, Diesel, LPG etc)

TEXT BOOK:

1 *"Mindscapes* - English for Technologists and Engineers", Orient Black Swan, 2012.

REFERENCE BOOKS:

1. V. R. Narayana Swamy, "Strengthen Your Writing", 1st edition, Orient Longman, 2003.
2. Thomas Elliott Berry, "The Most Common Mistakes in English Usage", 1st edition, Tata McGraw Hill, 2004.
3. T. Balasubramanian, "A Textbook of English Phonetics for Indian Students", Macmillan Ltd., 2000.
4. Sasikumar.V and P.V. Dhamija,. "Spoken English: A Self-Learning Guide to Conversation Practice", 34th Reprint, Tata McGraw Hill, New Delhi, 1993.
5. Margaret M Maison, "Examine Your English", 1st edition, Orient Longman, 1999.
6. Ashraf Rizwi, "Effective Technical Communication", Tata McGraw Hill, 2005.

16CS101 BASICS OF COMPUTERS AND INTERNET

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P
45	-	30

WA/RA	SSH/HSH	CS	SA	S	BS
5	40	-	8	5	-

Course Description and Objectives:

This course provides students with a working knowledge of the terminology, processes, and components associated with Computers and Internet. Students will get exposure to Building blocks of Computers, Operating Systems, Application software, Networking, Internet, World Wide Web, Security, Maintenance, Information Systems, and the application development processes.

Course Outcomes:

The student will be able to:

- understand the terms and concepts of Computer Science and Information Technology (hardware, software, networking, security, Internet/Web, and Technologies).
- use the products and services of computers.
- use Internet/Web services as a resource for developing shared applications.
- install different operating systems and application software.

SKILLS:

- ✓ *Assemble and disassemble the personal computer system.*
- ✓ *Install different desktop operating systems.*
- ✓ *Use the basic text processing, simple data analysis and data presentation tools.*
- ✓ *Configure network parameters.*
- ✓ *Secure the personal computer and information from various external threats.*

ACTIVITIES:

- *Prepare a report on various generations of computers and its peripherals.*
- *Disassembling and assembling of a personal computer system.*
- *Install the Linux operating system and other software required in a personal computer system.*
- *Connect the system to an Ethernet and configure the same.*
- *Prepare an MS Word Document.*
- *Prepare a spread sheet with various mathematical operations, charts and sorting etc.*
- *Make a report on power point presentation for the given topic.*

UNIT - 1 **L-10**

COMPUTING SYSTEMS: Introduction to computer, Computers for individuals, Importance of computers, Parts of computer system, Memory devices, Input and output devices, Types of monitors, Types of printers, Number systems, Bits and bytes, Text codes and types of processors.

UNIT - 2 **L-10**

OPERATING SYSTEMS: Types of operating systems, User interfaces, PC operating systems, Network operating systems, Types of software, Programming languages, Compiler and interpreter, Program control flow and algorithm.

UNIT - 3 **L-8**

NETWORKS AND DATABASES: Networking basics, Uses of network, Types of networks, Network hardware, Introduction to data bases and database management systems.

UNIT - 4 **L-8**

INTERNET AND WWW: Internet's services, World wide web, Browser setups, Using search engine, Email and other internet applications.

UNIT - 5 **L-9**

CYBER SECURITY: The need of computer security, Basic security concepts, Threats of users, Online spying tools, Threats to data, Cybercrime, Protective measures.

LABORATORY EXPERIMENTS

Course Outcomes:

The student will be able to:

- know the usage of the computer systems.
- setup the IDEs for the computer programming languages.
- get exposure on office automation tools like Microsoft Word, Excel, and power point.
- identify the different computer system and data threats and also protect them by installing antivirus software.

LIST OF EXPERIMENTS Total hours-30

1. Demonstrate the Personal Computer Peripherals and get a report on each peripheral.
2. Demonstrate the Personal computer assembling procedure and do the same.
3. Install wide varieties of free and open source operating systems.
4. Demonstrate Network Interface Card (NIC) configuration and any internet browsers options setup.
5. Demonstrate the Java Development Kit (JDK) installation and environmental variable (PATH) setup.
6. Demonstrate the following experiments using Office automation tools.
   a. Text formatting and table.
   b. Mathematical equations.
   c. Watermarking using Analysis tool.
   d. Calculate student mark details.
   e. Create four types of charts.
   f. Import external data, sort & filter using Power Point tool.
   g. Create text and images with effects.
   h. Create animation and sound effects.
7. Demonstrate the installation of anti-virus software to detect different types of virus programs.

TEXT BOOK :

1. Peter Norton, “Introduction to Computers”, 7th edition, Tata-McGrawHill, 2010.

REFERENCE BOOKS:

1. ITL Education Solution Limited, “Introduction to Computer Science”, 2nd edition, Pearson Education, 2011.
2. Eric Maiwald, “Fundamentals of Network Security”, 3rd edition, Tata-McGrawHill, 2004.

16CS102 COMPUTER PROGRAMMING

Hours Per Week :

L	T	P	C
3	1	2	5

Total Hours :

L	T	P
48	15	30

WA/RA	SSH/HSH	CS	SA	S	BS
5	40	5	8	5	5

Course Description and Objectives:

This course is aimed at offering fundamental concepts of programming language to the students. It starts with the basics of C-programming and deals with the structure and various attributes required for writing a 'C' program. It also introduces various operators and control statements used in programming. Then it switches to functions and arrays. It goes on with strings, pointers, files & the user defined data types. As a first-level course in computer science, it forms the basis to understand usage of various attributes in writing a program.

Course Outcomes:

The student will be able to :

- understand the basic terminology used in computer programming to write, compile & debug programs in 'C' language.
- use different data types to design programs involving decisions, loops and functions.
- understand the allocation and Usage of dynamic memory.
- understand the usage of files & structures.

SKILLS:

- ✓ *Identify suitable data types for an application.*
- ✓ *Apply control statements for decision making problems.*
- ✓ *Use multidimension array for matrix application.*
- ✓ *Design a program to calculate average of a class.*
- ✓ *Analyze the difference between static & dynamic memory allocation.*

UNIT - 1 **L-10, T-3**

INTRODUCTION TO C PROGRAMMING: Structure of C program - Comments, Processor statement, Function header statement, Variable declaration statement and Executable statement; C character set, Constants, Identifiers, Operators, Punctuations, Keywords, Modifiers, Identifiers, Variables, C scopes, Basic data types, Type qualifiers, Storage classes, Reading and writing characters, Formatted I/O.

UNIT - 2 **L-9, T-3**

OPERATORS AND CONTROL STATEMENTS: Operators - Assignment, Arithmetic, Relational, Logical, Bitwise, Ternary, Address, Indirection, Sizeof, Dot, Arrow, Parentheses operators; Expressions - Operator precedence, Associative rules; Control statements - Category of statements, Selection, Iteration, Jump, Label, Expression and Block.

UNIT - 3 **L-9, T-3**

FUNCTIONS AND ARRAYS: Function - Declaration, Prototype, Definition, Calling by value and call by address, Standard library functions and Recursive functions; Array - Declaration, Initialization, Reading, Writing, Accessing and Passing as a parameter to functions, 2D-arrays, Multidimensional arrays.

UNIT - 4 **L-9, T-3**

STRINGS AND POINTERS: Strings - Declaration, String library functions, Array of strings, Command line arguments; Pointers - Declaration, Initializing pointers, Multiple indirection, Relationship between arrays and pointers; Scaling up - Array of arrays, Array of pointers, Pointer to a pointer, Pointer to an array; Pointer to functions, Dynamic memory allocation functions.

UNIT - 5 **L-8, T-3**

STRUCTURES AND FILES: Structures - Declaration, Initialization and accessing, Array of structures and passing structures to functions, Structure pointers, Arrays and structures within structures, Unions, Bit-fields, Types and enumerations; Files - I/O and processing operations on text and binary files; Pre-processor directives.

ACTIVITIES:

- *Implement matrix operations.*
- *Implement malloc and calloc functions.*
- *Copy the content of one file into the other.*
- *Implement string manipulations functions.*

LABORATORY EXPERIMENTS

Course Outcomes:

Upon successful completion of this course, the student will be able to:

- write, compile and debug programs in C language.
- formulate problems and implement algorithms in C.
- develop programming components that efficiently solve computing problems in real-world.

LIST OF EXPERIMENTS Total hours-30

1. Compute the factors of a number.
2. Compute the average of ‘n’ numbers.
3. Find whether a number is palindrome or not.
4. Find whether a number is a power of 2 or not.
5. Compute the factorial of a number.
6. Implement any kind of operation (+,-,*,/,%) using a switch case.
7. Swap two values useing call by value and call by reference.

8. Using structure of arrays.
9. Find the reversal of a number.
10. Find the frequency of each number in the array.
11. Which takes 0's & 1's as input and the array should consist of all 0's first and then 1's.
12. Copy the first 10 words of a file into the other file.
13. Count the number of words in a file.
14. Create a structure which stores the student's information in a class.
15. Reverse the contents of the array.
16. Implement pointer of pointers.
17. Give n^{th} term of the Fibonacci number.
18. Find the factorial of a number using recursion.
19. Find the number of vowels in a file.
20. Access the structure and union members.

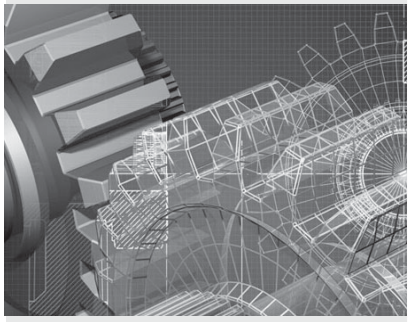
TEXT BOOK:

1. Ajay Mittal, "Programming in C - A practical Approach", 1^{st} edition, Pearson Education, India, 2015.

REFERENCE BOOKS:

1. Reema Thareja, "Introduction to C Programming", 2^{nd} edition, Oxford University Press India, 2015.
2. Herbert Schildt, C, "The Complete Reference", 4^{th} edition, Tata McGraw-Hill, 2000.
3. E. Balagurusamy, "Programming in ANSI C", 4^{th} edition, Tata McGraw- Hill, 2008.

16EE101 BASICS OF ENGINEERING PRODUCTS



Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P
45	-	30

WA/RA	SSH/HSH	CS	SA	S	BS
5	40	-	8	5	-

Course Description and Objectives:

This course enables the students to understand the basics of civil, mechanical, electrical and electronics systems and components used in day-to-day life. It deals with construction materials, power generation principles and working of a few commonly used household appliances. Besides, the student will be able to identify/appreciate various concepts, service and maintainance of engineering products.

Course Outcomes:

The student will be able to:

- gain knowledge and hands-on experience on various engineering products.
- install, operate, maintain and troubleshoot basic mechanical, electrical and electronic appliances.
- understand the concept of conservation of energy.
- gain awareness on choosing appropriate construction materials.

SKILLS:

- ✓ *Identify UPS requirements for a given load.*
- ✓ *Provide a Lighting scheme for specific working environment.*
- ✓ *Design a composition of Heating element for a particular application.*
- ✓ *Trouble shoot issues relating to Immersion Heater and Induction Heater.*
- ✓ *Provide an earthing for Domestic Outlet.*
- ✓ *Select, Configure and maintain a few engineering appliances. Such as TV, Radio, Telephone, Mobile phone, Wifi Router, Micro oven, PA system etc.*

ACTIVITIES:

- *Trouble shooting of immersion heater and induction heaters.*
- *Disassembe and Assembe the Domestic Appliances such as Mixer Grinder, Fan etc.,*
- *Provide Earthing for Domestic Outlet.*
- *Design the Electric Wiring system for a prototype house.*
- *Design the UPS for a defined load.*
- *Practice assembly of a FM radio.*
- *Configure a Wifi Router for required number of users.*

UNIT - 1 **L-9**

WORKING PRINCIPLE OF AC, REFRIGERATOR, PUMPS, IC ENGINES AND SCREW JACK: Working principle of Air - Conditioner and Refrigerator, Components, Assembly and disassembly; Working principle of Centrifugal and Reciprocating pumps - Types, Parts and applications, Working principle of Screw jack and its components, Working principle of IC engines- 2 stroke and 4 stroke.

UNIT - 2 **L-10**

BRICKS: General, Qualities and Classification of bricks, Tests for bricks, Size and Weight of bricks,

Timber - Definition, Qualities of good timber, Decay of timber and Advantages of timber in construction.

CEMENTS: Types and composition of Cement, Setting of cement, Tests for physical properties of

cement, Different grades of cement.

AGGREGATES: Classification of aggregates, Source, Size and Shape of aggregates, Tests for aggregates.

STEEL: Types of steel, Physical properties and Mechanical properties of steel, Simple layout design, Paints, Tiles, fittings, Ventilation, Furniture and green house aspects.

UNIT - 3 **L-8**

ELECTRIC ENERGY SYSTEMS: Overview of Power System Structure, Conventional and Non Conventional Generations, Types of Turbines, Generators, Substations, Towers, Earthing procedure, Protection schemes, Single Phase and Three Phase Systems, Methods of Electrical Wiring Systems, Wiring procedure and calculations, Wiring methods, Un-Interruptible Power Supply (UPS), Components in UPS, Its functionality, Calculation of ratings for UPS components to a specific load.

UNIT - 4 **L-10**

LIGHT: Light Energy, Evolution of Light sources, Working of Incandescent, Fluorescent, MV, SV and LED Lamps, Comparison and Applications.

HEAT: Heat Energy, Modes of Heat Transfer, Resistance and Induction Heating, Comparison and applications.

MOTOR: Electric Motors, Classification, Construction and working principles of motors used in Domestic applications, Mixer grinder, Ceiling and exhaust fan, Hair dryer, Washing machine, Water pump, Air coolers, Vacum cleaner, Computer cooling motor, Electric bike.

UNIT - 5 **L-8**

HOUSE HOLD ELECTRONIC APPLIANCES: Working principles of television, Radio, Remote control, Telephone, Microwave oven, Cell phone, PA system, Induction stove, WiFi router and DTH.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS Total hours-30

Demonstration of Modelling / functioning / disassembly / assembly / fault rectification / understanding of the following.

1. Air-conditioners and Refrigerators
2. 2 Stroke and 4 Stroke Engines
3. Reciprocating Pumps
4. Power Screw Jack
5. Size and Water absorption capacity of Bricks
6. Initial and final setting time of Cement
7. Toughness value of coarse aggregates
8. Bulking of Sand
9. Earthing Schemes
10. Electric Wiring
11. UPS system
12. Immersion Heater, Induction Heater and Iron Box
13. Ceiling Fan and Mixer
14. Television
15 Radio
16. Remote Control
17. Telephone
18. Fax Machine
19. Mobile Phone
20. PA System

TEXT BOOKS:

1. M.S.Shetty, “Concrete Technology”, 1st edition, S.Chand and Co, 2005.
2. S. C. Rangwala, “Engineering Materials”, 36th edition, Charotar Publishing House, Anad, 2009.
3. Govindasamy and A Ramesh, “Electrical engineering - Electrical machines and Appliances Theory, 1 st edition, Tamilnadu text book corporation, 2010.
4. Janakaraj, A Sumathi et al, “Electrical engineering - Electrical machines and Appliances Theory”, 1 st edition, Tamilnadu text book corporation, 2011.
5. Marshall Brain, “How Stuff Works”, 1 st edition, John Wiley&Sons, 2001.
6. Pravin Kumar, “Basic Mechanical Engineering”, 1 st edition, Pearson Publishers, 2013.

16HS104 ENGLISH PROFICIENCY AND COMMUNICATION SKILLS

Hours Per Week :

L	T	P	C
0	-	2	1

Total Hours :

L	T	P
0	-	30

WA/RA	SSH/HSH	CS	SA	S	BS
-	-	-	-	-	-

Course Description and Objectives:

To equip the students with Functional English by exposing them to a wide range of language use in different contexts and thereby encourage them to use the language comfortably in real life situations. The objective of this course is to strengthen the comprehension skills of listening and reading by acquiring adequate vocabulary through perusing authentic materials gathered from news papers, journals and other mass communication media.

Course Outcomes:

The student will be able to:

- use functional English to speak and express themselves in different social contexts
- write simple letters, narratives, factual reports and descriptive passages for both academic and non-academic purposes in English.
- gain proficiency to undergo Preliminary English Test (PET), an Intermediate Level English Certification Test administered by Cambridge English Language Assessment, UK.

SKILLS:

- ✓ *Use appropriate words in right order for effective sentence formation, and writing short texts.*
- ✓ *Read and extract information from different texts and draw inferences by understanding elements like tone and transitional words.*
- ✓ *Understand short and long spoken discourses through analysis of elements like stress and intonation.*
- ✓ *Articulate clearly thoughts and ideas on simple every day topics.*

UNIT - 1 **P-6**

FUNCTIONS: Introducing Self/Others, Expressing needs/feelings/opinions (SWOT Analysis)

SKILL FOCUS:

Reading – Understanding factual information

Writing – Word order and sentence formation

Listening – Decoding for meaning following elements of stress, Intonation and accent

Speaking – Articulating syllables clearly, Speaking fluently with correct pronunciation

Vocabulary – Discerning to use right word for the given context

Grammar – Spellings, Use of Nouns, Adjectives, Verbs, Prepositions in the sentence structure

PRACTICE: Objective PET Units 1 - 6

UNIT - 2 **P-6**

FUNCTIONS: Defining; Describing People, Places, Things and Process.

SKILL FOCUS:

Reading – Inferences from sentences and short messages, True or False

Writing – Rewording, Sentence transformation, Convincing

Listening – Understanding the short messages and conversations

Speaking – Role-plays, Short conversations

Vocabulary / Grammar – Use of Adjectives/Adverbs, Comparatives and Superlatives

PRACTICE: Objective PET Units 7 – 12

UNIT - 3 **P-6**

FUNCTIONS: Describing Spatial and Temporal Relations, Giving Directions/Instructions

SKILL FOCUS:

Reading – Reading between the lines, Inferences, True/False

Writing – Developing hints, Writing short messages/paragraphs

Listening – Searching for factual information, Gap filling

Speaking – Snap Talks, JAM, Elocution

Vocabulary / Grammar – Prepositions, Phrasal Verbs, PET word list

PRACTICE: Objective PET Units 13 - 18

UNIT - 4 **P-6**

FUNCTIONS: Narrating, Predicting, Negotiating, Planning

SKILL FOCUS:

Reading – Reading for evaluation and appreciation, Comprehension

Writing – Letters, e-mails, 7 C's

ACTIVITIES:

- *SWOT Analysis.*
- *Snap talks.*
- *Spell Bee.*
- *Short conversations.*
- *Role play.*
- *Quiz.*
- *Elocution.*
- *JAM.*
- *Group. Discussion Debate.*
- *Team presentations.*

Listening – Following long conversations / Interviews

Speaking – Discussions, Debate, Descriptions

Vocabulary / Grammar – Modals, Conditionals, Verb forms (Time and Tense)

PRACTICE: Objective PET Units 19 – 24

UNIT - 5 **P-6**

FUNCTIONS: Requesting, Denying, Suggesting, Persuading

SKILL FOCUS:

Reading – Understanding factual information

Writing – Short Stories, Explanatory Paragraphs

Listening – Inferences from long speeches/conversations

Speaking – Announcements, Presentations

Vocabulary / Grammar - Punctuation, Cloze tests

PRACTICE: Objective PET Units 25 – 30

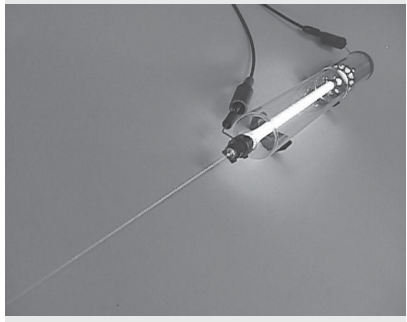
TEXT BOOK:

1. Louise Hashemi and Barbara Thomas, “Objective PET”, Student’s Book with Answers, 2nd edition, Cambridge University Press, 2015.

REFERENCE BOOKS :

1. Cambridge Preliminary English Test Without Answers 8.
2. Annette Capel and Rosemary Nixon, “Introduction to PET”, Oxford University Press.

16HS110 ENGINEERING PHYSICS LABORATORY



Hours Per Week :

L	T	P	C
-	-	3	2

Total Hours :

L	T	P
-	-	45

Course objectives and Description:

This lab is intended to make the students realize the theoretical concepts of physics having hands on experience in conducting the experiments.The students have to perform at least ten from the list of experiments.

Course Outcomes:

The student will be able to:

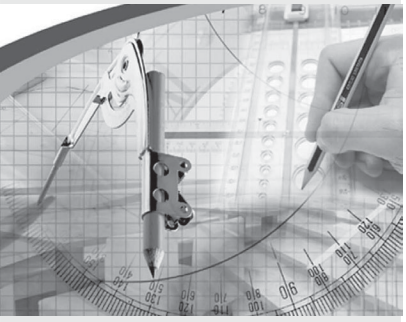
- realize the concept of resonance by conducting the experiments of AC sonometer and Melde's experiment.
- acquire the knowledge on magnetic field theory and thermal conductivity by conducting experiments, field along the axis of a circular coil and thermal conductivity of bad conductor
- understand the concepts of light by conducting the experiments of determination of wave length, numerical aperture of an optical fibre and also from V–I characteristics of Solar cell and LED.

LIST OF EXPERIMENTS

1. Determination of Velocity of ultrasonic waves in liquids.
2. Melde's Experiment - Transverse and Longitudinal modes.
3. Determination of wave length – Helium - Neon laser.
4. Determination of Planck's constant.
5. Determination of Frequency of Alternating current.
6. Field along the axis of a circular coil – Stewart and Gee's apparatus.
7. Band gap of semiconductor.
8. Determination of Hall coefficient.
9. Thermal conductivity of bad conductor - Lee's method.
10. Optical Fibre – Determination of numerical aperture.
11. Solar Cell – Efficiency.
12. Study of V – I characteristics of LED.
13. Seebeck effect - Determination of Seebeck coefficient of a thermo couple.

REFERENCE BOOKS:

1. Jayaraman, "Engineering Physics Laboratory manual", 1st edition, Pearson Education, 2014.
2. Engineering Physics laboratory Manual – Department of Physics, VFSTR University, 2016.



16HS108 ENGINEERING MATHEMATICS – II

Hours Per Week :

L	T	P	C
3	1	2	5

Total Hours :

L	T	P
45	15	30

WA/RA	SSH/HSH	CS	SA	S	BS
10	45	-	-	-	-

Course Description and Objectives:

It is aimed to offer different methods for finding rank of a matrix, solving linear equations using matrices, to compute Eigen values and Eigen vectors, to verify C.H.T and apply it to find power of a matrix. Also, to make the students familiarize with double and triple integrals, to make the student acquainted with the concepts of vector differentiation and integration. To make the student to use different mathematical tools of MATLAB related to above concepts.

Course Outcomes:

The student will be able to:

- carry out the basic operations of matrix algebra.
- use row operations to reduce a matrix to echelon form, normal form.
- determine consistency of a system linear equations.
- compute eigen values and eigen vectors.
- evaluate double integrals and triple integrals.
- evaluate double integrals in polar coordinates.
- utilize Cartesian and polar coordinates to find area.
- understand the concept of gradient, divergance and curl.
- apply vector integral theorems in finding surface and volume integrals.

SKILLS:

- ✓ *Appreciate various methods to find the rank of a matrix.*
- ✓ *Solve given system of linear equations.*
- ✓ *Compute Eigen values and Eigen vectors of a matrix.*
- ✓ *Compute the power of a matrix by suitable method.*
- ✓ *Evaluate Multiple integrals.*
- ✓ *Evaluate surface and volume integrals through vector integral theorems.*

UNIT - 1 **L-9, T-3**

RANK OF MATRIX AND LINEAR EQUATIONS: Rank of a matrix, Normal form, Triangular form, Echelon from, Consistency of system of linear equations, Gauss-Jordan method, Gauss elimination method, Gauss-Siedal method.

UNIT - 2 **L-9, T-3**

EIGEN VALUES AND EIGEN VECTORS: Eigen values, Eigen vectors, Properties (without proofs), Cayley-Hamilton theorem (without proof), Power of a matrix, Diagonalisation of a matrix.

UNIT - 3 **L-9, T-3**

MULTIPLE INTEGRALS: Double integrals, Evaluation, Evaluation in polar coordinates, Change of order of integration, Change of variables, Applications to area in cartesian coordinates and polar coordinates, Triple integrals, Fundamentals, Evaluation of triple integrals.

UNIT - 4 **L-9, T-3**

VECTOR DIFFERENTIATION: Vector function, Differentiation, Scalar and vector point function, Gradient, Normal, Divergence, Directional derivative, Curl, Vector identities.

UNIT - 5 **L-9, T-3**

VECTOR INTEGRATION: Line integral, Surface integral, Volume integral, Green's theorem, Stoke's theorem, Gauss theorem of divesergence (without proofs).

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS Total hours-30

1. Matrix Algebra.
2. Rank of a matrix.
3. System of equations (Direct method).
4. System of equations (Cramer's Rule).
5. System of equations (matrix inversion method).
6. Eigen values and Eigen vectors of a matrix.
7. Powers of matrix & Cayley-Hamilton Theorem.
8. Vector algebra.
9. Gradient.
10. Divergence.
11. Curl.
12. Multiple Integrals (Area etc).
13. Interpolation.

TEXT BOOKS:

1. H. K. Dass and Er. Rajanish Verma, "Higher Engineering Mathematics", 3rd edition, S. Chand & Co., 2014.
2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 44th edition, 2014.
3. Rudra Pratap, "Getting started with Matlab", Oxford University Press, 2009.

REFERENCE BOOKS:

1. Srimanta Pal and Subodh C. Bhunia, "Engineering Mathematics", Oxford Publications, 2015.
2. B. V. Ramana, "Advanced Engineering Mathematics", 25th reprint, McGraw Hill Education, 2015.
3. R K Jain and S R K Iyengar, "Advanced Engineering Mathematics", 2nd edition, Narosa Publishing House, 2007.
4. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th edition, John Wiley & Sons (Asia) Pvt. Ltd., 2001.

ACTIVITIES:

- *Differentiate the methods to find the rank of a matrix.*
- *Solve given system of linear equations and compare with MATLAB output.*
- *Compute Eigen values and Eigen vectors of a matrix and compare with MATLAB output.*
- *Compute the power of a matrix by suitable method.*
- *Evaluate multiple integrals and compare with MATLAB output.*
- *Evaluate surface and volume integrals through vector integral theorems.*

16HS107 ENGINEERING CHEMISTRY

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
20	45	-	10	-	-

Course Description and Objectives:

This course aims to develop fundamental knowledge on new engineering materials and their significance in science and engineering applications. In addition, characterization of materials using basic and advanced experimental techniques is also offered. Besides, analysis of water sample and treatment method for domestic, commercial and industrial applications are also covered.

Course Outcomes:

The student will be able to:

- understand the limitations of using hard water for domestic and industrial purposes.
- choose and apply suitable methods to soften the hard water for industrial and domestic applications.
- understand electrochemistry and its importance for applications such as fuel cells, modern lithium ion batteries etc.
- understand the types of corrosion and their implications followed by their control and prevention methods.
- familiarize the preparation, properties and applications of various polymers.

SKILLS:

- ✓ *Analyse the total hardness of water sample.*
- ✓ *Understand the basic principles involved in various batteries.*
- ✓ *Understand the mechanisms of corrosion and various controlling methods.*
- ✓ *Synthesize various polymers.*
- ✓ *Identify the functional groups present in chemical compounds using Infrared and Ultraviolet instruments.*

UNIT - 1 **L-9**

WATER TECHNOLOGY: Introduction, WHO, BIS standards of water, Hardness of water, Determination of hardness by EDTA (Numerical Problems), Disadvantages of hard water, Scales and sludges, Caustic embrittlement, Boiler corrosion, Priming and foaming, Softening methods - Zeolite process, Ion Exchange process; Desalination of brackish water - Reverse osmosis, Electrodialysis.

UNIT - 2 **L-9**

ELECTRO CHEMISTRY: Electrode potential, Electrochemical series, Nernst equation, Reference electrodes, Calomel and standard hydrogen electrode, Ion selective electrode, Glass electrode, Determination of pH using glass electrode; Primary cell, Secondary cell - Lead-acid storage cell, Lithium ion battery; Fuel cells - Hydrogen oxygen, Methanol oxygen.

UNIT - 3 **L-9**

SCIENCE OF CORROSION: Introduction, Dry corrosion, Wet corrosion, Mechanisms of wet corrosion, Bimetallic corrosion, Concentration cell corrosion, Factors influencing the rate of corrosion; Corrosion control methods - Cathodic protection, Electroplating, Electrolessplating, Corrosion inhibitors.

UNIT - 4 **L-9**

POLYMERS: Introduction, Types of polymerization - Preparation, Properties and applications of polyethylene, PVC, Teflon, Bakelite, Urea formaldehyde, Silicones; Rubber, Vulcanization, Synthetic rubbers - Buna-S, Buna-N, Neoprene; Introduction to conducting polymers; Poly thiophene.

UNIT - 5 **L-9**

INSTRUMENTAL TECHNIQUES: Interaction of radiation with matter, UV-Visible spectroscopy - Beer, Lambert's law, Qualitative and quantitative analysis, Block diagram of UV-Visible spectrophotometer, IR spectroscopy - Types of vibrations, Block diagram of IR spectrophotometer.

TEXT BOOKS:

1. P. C. Jain and Monica Jain, "Engineering Chemistry", 17th edition, Dhanpat Rai Publications, 2010.
2. Shashi Chavala, "A Text book of Engineering Chemistry Engineering Materials and Applications", 3rd edition, Dhanpat Rai Publications, 2015.

REFERENCE BOOKS:

1. K. S. Maheswaramma and Mridula chugh, "Engineering Chemistry", 1st edition, Pearson publication, 2015.
2. M. R. Senapati, "Advanced Engineering Chemistry", 2nd edition, Lakshmi Publications, 2006.
3. H. W. Wilard and Demerit, "Instrumental methods of Analysis", 7th edition, CBS Publications,1986.
4. Gurudeep Raj and Chatwal Anand, "Instrumental Methods of Analysis", 5th edition, Himalaya Publications, 2007.

ACTIVITIES:

- *Collect water samples from different villages near VFSTR University and determine the total hardness, and total alkalinity.*
- *Present the water analysis report to the villagers and suggest proper measures to be taken.*
- *Measure the rate of corrosion of iron objects by weight loss method.*
- *Identify some of the functional groups like carboxylicacid, aldehyde and ketones by I.R. Spectroscopy.*
- *Collect water sample from different villages and estimate the fluoride present in the raw water and suggest some steps for the removal of fluoride.*

16ME101 ENGINEERING GRAPHICS

Hours Per Week :

L	T	P	C
1	-	3	3

Total Hours :

L	T	P
15		45

WA/RA	SSH/HSH	CS	SA	S	BS
6	15	-	5	-	-

Course Description and Objectives:

The main aim of this course is to familiarize the students with the conventional concepts of engineering drawing and computer aided applications in various fields. Engineering graphics is an “International language of Engineers”. It is the most effective method of communicating technical ideas in a 2D and 3D format.

Course Outcomes:

The student will be able to:

- sketch engineering objects in the freehand mode.
- create geometric construction with hand tools.
- create dimensions of objects.
- prepare plan and elevation of any pictorial view.
- draw freehand lettering.
- make isometric sketches using graphics.
- draw orthographic multi-view sketches using graphics.

SKILLS:

- ✓ *Draw free hand sketches, layouts, circuit diagrams, plan and elevations.*
- ✓ *Draw geometrical objects like polygons, solids of different types.*
- ✓ *Visualize the objects in real time situations.*
- ✓ *Develop 3D views (isometric views).*

UNIT - 1 **L-3, P-10**

INTRODUCTION TO ENGINEERING DRAWING: Types of lines, Lettering, Dimensioning, Construction of polygon and conics (Ellipse, Parabola and Hyperbola by general method), Ellipse by oblong method.

UNIT - 2 **L-3, P-8**

ORTHOGRAPHIC PROJECTIONS: Principle of projection, Planes of projections, Projections of points, Projection of straight lines, Inclined to one plane and both the planes, Projections of planes, Simple planes, Planes inclined to one reference planes.

UNIT - 3 **L-3, P-8**

PROJECTIONS OF SOLIDS: Projections of prisms, Pyramids, Cylinders, Cones, Solid axis inclined to one plane.

UNIT - 4 **L-3, P-10**

AUTOCAD: Introduction to AutoCAD

ISOMETRIC VIEWS: Isometric drawing of simple objects, Isometric view of prisms, Pyramids, Cone and cylinder, Simple orthographic views into isometric views through AutoCAD.

UNIT - 5 **L-3, P-9**

ORTHOGRAPHIC VIEWS: Conversion of pictorial views into orthographic views through AutoCAD.

TEXT BOOKS:

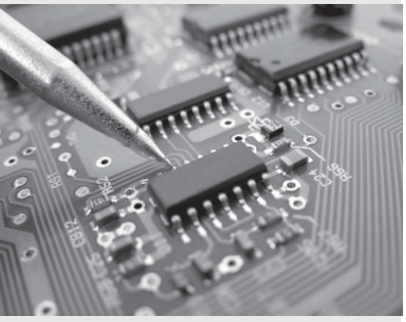
1. N.D.Bhatt, “Engineering Drawing”, 53rd edition, Charotar Publication, 2014.
2. Basant Agrawal , C.M.Agrawal “Engineering Drawing” , 2nd edition., Tata McGraw Hill,2014.

REFERENCE BOOKS:

1. J. hole, “Engineering Drawing”, 2nd edition, Tata McGraw Hill, 2008.
2. K.L. Narayana, “Engineering drawing”, 2nd edition, Scitech Publications, 2008.

ACTIVITIES:

- *Draw line diagram of different machineries.*
- *Draw plan and elevations of buildings and engineering products.*
- *Understand, visualize 3-D components/ products and develop drawings.*
- *Draw different curves used in several engineering applications such as bridges, dams etc.*



16EE102 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P
45	-	30

WA/RA	SSH/HSH	CS	SA	S	BS
5	40	-	8	5	5

Course Description and Objectives:

This course provides an in-sight into the functioning of basic electrical components like resistor, inductor and capacitor. It deals with the constructional and operational details of both D.C & A.C machines. It also deals with the basic electronic components like P-N Junction Diode, Zener diode, Transistor and their characteristics.

Course Outcomes:

The student will be able to:

- understand the notation and usage of components in electric circuits.
- analyze AC (single and three phase) and DC, AC circuits using different methods and laws.
- operate various electrical machines.
- understand the concepts of semiconductor devices and their operation.

SKILLS:

- ✓ *Distinguish between linear and nonlinear elements by looking at VI characteristics.*
- ✓ *Develop a simple loop generator.*
- ✓ *Design a voltage regulator using Zener diode.*
- ✓ *Design a half wave rectifier using PN junction diode.*
- ✓ *Design a full wave rectifier using PN junction diodes.*

UNIT - 1 **L-9**

FUNDAMENTALS OF DC CIRCUITS: Circuit concepts, Concepts of network, Active and passive elements, Voltage and current sources, Concept of linearity and linear network, Unilateral and bilateral elements, R, L and C as linear elements, Ohm's Law, Kirchhoff's Laws - Application to simple series, Parallel circuits, Mesh and nodal analysis of simple resistive circuits (Simple numerical problems).

UNIT - 2 **L-9**

FUNDAMENTALS OF A.C. CIRCUITS: Generation of A.C. voltage - Frequency, Average value, R.M.S. value, Form factor, Peak factor for sinusoidal only, Phasor representation of alternating quantities, Analysis of simple series and parallel A.C. circuits (simple numerical problems).

BALANCED THREE PHASE SYSTEMS: Relation between phase and line quantities of voltages and currents in star and delta connected systems (Elementary treatment only).

UNIT - 3 **L-9**

FUNDAMENTALS OF ELECTROMAGNETISM: Concepts of Magneto motive force, Reluctance, Flux and flux density, Concept of self Inductance and mutual Inductance, Coefficient of coupling (only elementary treatment and Simple numerical problems).

TRANSFORMERS: Principle of operation of single phase transformer, Constructional features, EMF equation (simple numerical problems).

UNIT - 4 **L-9**

DC MACHINES: Constructional details of a D.C. Machine, D.C. Generator, Principle of operation, EMF equation, Types of D.C. generators (simple numerical problems), D.C. Motor, Principle of operation, Torque equation, Types of D.C. motors (simple numerical problems).

A.C MACHINES: Principle of operation of three phase induction motors, Slip ring and squirrel cage motors, Torque equation, Constructional details of synchronous machine.

UNIT - 5 **L-9**

SEMICONDUCTOR DEVICES: Classification of solids based on energy band theory, Intrinsic and Extrinsic semiconductors, P-type and N-type semiconductors, P-N junction diode and its characteristics, Half and Full wave rectifiers, Zener diode and its characteristics, Voltage regulator, Bi polar junction transistor, Operation, Types, Applications.

ACTIVITIES:

- *Decoding the value of resistors.*
- *Design and fabricate a simple loop permanent magnet generator.*
- *Design and fabricate a simple air cored transformer.*
- *Fabricate full and half wave rectifiers using PN junction diodes.*
- *Fabricate a voltage regulator using Zener diode.*

LABORATORY EXPERIMENTS

Course Outcomes:

The student will be able to:

- apply the ohm's law, KVL and KCL laws to different circuits.
- calculate the power and energy in electric circuits.
- operate and find the transformation ratio of transformer at different loads.
- study and verify the characteristics of semiconductor devices.
- calculate the efficiency of both HWR and FWR.

LIST OF EXPERIMENTS Total hours-30

1. Verification of Ohm's law.
2. Verification of Kirchhoff's current law.
3. Verification of Kirchhoff's voltage law.
4. Measurement of Energy in single phase resistive load circuit.
5. Measurement of Power in single phase resistive load circuit.
6. Transformation ratio of a single phase transformer at different loads.
7. Verification of PN junction diode characteristics under both forward and reverse bias.
8. Verification of Zener diode characteristics under both forward and reverse bias.
9. Implementation of Half Wave Rectifier without filter.
10. Implementation of Full Wave Rectifier without filter.

TEXT BOOKS:

1. V. K. Mehta, "Principles of Electrical Engineering and Electronics", 3rd edition, S. Chand Publications, New Delhi, 2010.
2. D. P Kothari, "Basic Electrical and Electronics Engineering", 1st edition., TMH, New Delhi, 2014.

REFERENCE BOOKS:

1. Millman & Halkias, "Integrated Electronics", McGraw Hill, 1979.
2. A. K. Thereja and B.L. Thereja, "Electrical Technology", Vol.– II, S Chand Publications, 2007.
3. U. Bakshi & A.Bakshi, "Basic Electrical Engineering", 1st edition., Technical Publications, Pune, 2005.

WEB LINKS:

1. http:// nptel.ac.in/courses/108108076/
2. https:// books.google.co.in/books/about Basic_Electrical_Engineering.html?id=xN8qZFRkLpYC

16HS111 ENGINEERING CHEMISTRY LABORATORY

Hours Per Week :

L	T	P	C
-	-	3	2

Total Hours :

L	T	P
-	-	45

Course description and Objectives:

This course is aimed at enlightening the importance of theoretical concepts of chemistry and experimental techniques for characterization of materials.

Course Outcomes:

The student will be able to:

- analyse the total hardness present in water samples.
- determine the total alkalinity of water used in industries.
- acquire the knowledge on polymers used as insulators.
- familiarize advanced techniques in chemical analysis using conductometer and pH meter.

LIST OF EXPERIMENTS

1. Determination of Total Alkalinity of water.
2. Estimation of Total hardness of water.
3. Find the percentage of available chlorine in Bleaching powder.
4. Estimation of Fe (II) by Dichrometry method.
5. Preparation of Phenol - Formaldehyde Resin.
6. Synthesis of Urea- Formaldehyde Resin.
7. Estimation of Concentration of acid by pH metry.
8. Determination of Strength of acid by Conductometry.
9. Measurement of Mn^{+7} by Colorimetry.
10. Determination of concentration of a salt by ion exchange method.
11. Find the concentration of Mn^{+7} and Cr^{+6} by UV-Visible Spectrophotometry.
12. Find the rate of corrosion by weight loss method.

TEXT BOOKS:

1. J.Mendham, R.C.Denney, J.D. Bares, M.Thomas and B.Siva Sankar, “Vogel’s Text book of qualitative Chemical Analysis”, Pearson Publications - Volume I, 2009.
2. Dr.Sunita Rattan “Experiments in Applied Chemistry”, S.K. Kataria & Sons Publications, 2008.

16HS109 ENVIRONMENTAL SCIENCE AND TECHNOLOGY

Hours Per Week :

L	T	P	C
2	-	-	2

Total Hours :

L	T	P
30	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
10	20	4	-	4	-

Course Description and Objectives:

Environmental Science and Technology offers technological aspects of environmental science and in maintaining environmental integrity in relation to human development. It helps every engineer to plan appropriate strategies for addressing environmental issues and also contribute to the development of innovative technologies for solving such issues. It produces professionals who will ensure sustainable development of the nation in general and environmental in particular.

Course Outcomes:

The student will be able to:

- observe and integrate the diverse information from sources outside the classroom.
- think critically, creatively, resourcefully and strategically, including identifying steps needed to reach goals, manage projects, evaluate progress, and adapt approaches, developing both self reliance, and civic mindedness.
- adapt eco-friendly technologies in order to maintain hygienic conditions.
- understand the human activities that are detrimental to environment.
- collaborate across diverse disciplines to identify and create solutions that conserve and help maintain biodiversity in the long term.
- discuss the issues involved in the generation of renewable energy resources.

SKILLS:

- ✓ *Understand structural relationships, abstract models, symbolic languages and deductive reasoning.*
- ✓ *Gain perspectives to adrress the challenges, improvise and devise solutions.*
- ✓ *Identify solutions to environment and development issues, using planning, analysis, modeling, and new approaches.*
- ✓ *Acquire fieldwork techniques to study, observe and prepare documents, charts, PPTs, Models etc.*
- ✓ *Understand how natural resources should be used judiciously, to protect biodiversity and maintain ecosystem.*

UNIT - 1 **L-6**

NATURAL RESOURCES: Environmental studies - Definition scope and its importance, Need for public awareness; Natural resources - Forest resources, Deforestation, Water resources, Properties and conflicts, Mineral resources, Extraction and impacts, Food resources, Modern agriculture methods, Fertilizer pesticide problems, Water logging, Salinity, Energy resources, Renewable and non-renewable energy resources, Harness technology, Solar energy technologies, Land resources, Land degradation, Soil erosion; Role of an individual in conservation of natural resources.

UNIT - 2 **L-6**

ECOSYSTEMS AND BIODIVERSITY: Ecosystem - Concept, Structure and functions of an ecosystem, Food chains, Food webs, Ecological pyramids, Energy flow, Energy regulation, Succession, Biogeochemical cycles, Aquatic ecosystems; Biodiversity - Introduction, Bio-geographical classification, Values of biodiversity, Biodiversity at global, National and local levels, Hot-spots of biodiversity, Threats to biodiversity, Endangered and endemic species of India, Conservation of biodiversity.

UNIT - 3 **L-6**

WASTE MANAGEMENT AND GREEN TECHNOLOGY: Solid waste management - Causes, Effects and control measures of municipal and Industrial wastes; Pollution - Air, Water, Thermal, Soil and noise pollutions, Role of an individual in prevention of pollution; Remote sensing / GIS - Introduction, definitions, Applications of the remote sensing; Innovative practices - Objectives, Innovative practices in agriculture and forest community, Bio-villages; Green technology for sustainable development; Life cycle assessment and its concept.

UNIT - 4 **L-6**

SOCIAL ISSUES AND EIA: Sustainable development, Water conservation, Cloud seeding, Rainwater harvesting methods watershed management, Global warming, Acid rain, Ozone layer depletion, Environmental legislation - Wildlife protection act, Water act, Forest conservation act, Air act, Environmental protection act; Environmental Impact Assssment (EIA) - Introduction, Definition of E.I.A and E.I.S, Scope and objectives, Importance of E.I.A in proposed projects / industry / developmental activity.

UNIT - 5 **L-6**

ENVIRONMENTAL SANITATION: Food sanitation - Food and drugs Act, Food preservations, Milk sanitation, Tests for milk, Pasteurization of the milk; Water, Air, Soil and food borne diseases, Maintenance of sanitary and hygienic conditions; Role of youth in the development, Promoting activities, Youth as initiators, Field work/environmental visit - Visit to a local area to document environmental assets river/ forest/ grassland / hill /mountain, Study of local environment, Common plants, Insects, Birds; Study of simple ecosystems - Pond, River, Hill slopes etc., Visit to industries/water treatment plants/effluent treatment plants.

TEXT BOOKS:

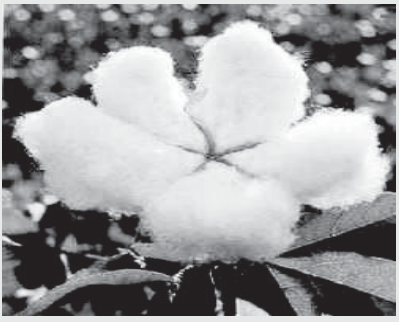
1. Anubha Kaushik and CP Kaushik, “Perspectives in Environmental Studies”, 5th edition, 2016
2. Benny Joseph, “Environmental studies”, 2nd edition, McGraw Hill Education, 2015.

REFERENCE BOOKS:

1. Dr. M. Chandrasekhar, “A Text book of Environmental Studies”, HI-TECH publications, 2006.
2. Dr. M. Anji Reddy, “A Text book of environmental science and Technology”, B S Publications, 2008.
3. Dr. K. Mukkanti, “A Text book of Environmental Studies”, S.CHAND and Company Ltd, 2009.
4. EHILRS and ST, “Text book of Municipal and Rural Sanitation”, M.S Hill, 1998.
5. C. S. Rao, Wiley Eastern Ltd, “Environmental Pollution Control Engineering”, New Age International Ltd, 2001.
6. Dr. M. Anji Reddy, “Introduction to Remote Sensing”, B S Publications, 2004.
7. Kurian Joseph and R. Nagendram, “Essentials of environmental studies”, Pearson Education Pt Ltd, Delhi, 2007.

ACTIVITIES:

- *Painting contests on environmental issues and themes.*
- *Models of energy resources, Pollution and Solid Waste Management-3R strategy.*
- *Quiz competition.*
- *Essay writing competition.*
- *Skit, JAM and debate.*
- *Field work and documentation.*
- *Assignments.*



16TF101 TEXTILE FIBERS

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P
45	-	30

WA/RA	SSH/HSH	CS	SA	S	BS
5		45	-	-	-

-

Course Description and Objectives:

This course provides an essential knowledge to study properties and applications of textile fibers. The objective of the course is to introduce stem and leaf fibres such as jute, hemp, flax, banana. It also includes the basic concept of fibre structure and principles of man-made fiber spinning.

Course Outcomes:

The student will be able to:

- define basic terminologies related to textiles.
- classify the textile fibers into different groups.
- understand the process of extraction of the natural fibers.
- understand the principles of spinning of man-made fibers.

SKILLS:

- ✓ *Examine the suitability of any fiber for textile applications.*
- ✓ *Identify a given natural textile fibers.*
- ✓ *Identify a given man made textile fibers.*
- ✓ *Find the application of given fiber based on its properties.*
- ✓ *Identify monomer required and type of polymerization for the given manmade fiber.*

UNIT - 1 **L-8**

INTRODUCTION TO TEXTILES : Textile elements defined Textile fibre, staple fibre, filament; yarn: spun, continuous filament, monofilament and multifilament, flat and textured yarn; single, ply and cabled yarns; thread; fabric: woven, knitted and non-woven with their classifications.

UNIT - 2 **L-8**

FLOW CHART FOR TEXTILE MANUFACTURING PROCESSES FROM FIBRE TO FABRIC : Detailed Classification of textile fibers – Distinction between Natural and Man Made Fibers , Properties expected of an ideal textile fibre: Essential and desirable properties

COTTON: Morphology, Physical & Chemical properties. A Brief note on Latest type of Cottons: Organic & Bt..

UNIT - 3 **L-9**

WOOL: Morphology, Physical and Chemical Properties –Brief study on frictional properties of wool, heat of wetting.

SILK : Types of Silk, Grianage Centers, Introduction to rearing of silk, cocoon, stifling (Methods), Storage, Sorting, cooking, brushing, reeling, degumming and weighting

JUTE AND FLAX : Retting methods, Structure and Properties, applications.

UNIT - 4 **L-10**

BASIC CONCEPTS OF FIBRE STRUCTURE : Definition of orientation, properties and schematic representations of highly, moderately and poorly-oriented fibres, examples of such fibres; definition of crystallinity, schematic representation of

fibre with crystalline and amorphous contents, outline of influence of crystallinity on fibre properties; crystallinity values of some common natural and man-made fibres Principles of fibre forming polymers– glass transition temperature Melting temperature.

PRINCIPLES OF SPINNING : Principles of wet-spinning, dry spinning and melt-spinning of man-made fibres, typical examples of fibres so spun, principle of drawing and its importance, outline of POY and FOY made fibres.

UNIT - 5 **L-10**

REGENERATED FIBRES : Polymer source, spinning method, physical and chemical properties and uses of natural-polymer fibres: Viscose rayon, modal, lyocell, acetate and bamboo fibre

SYNTHETIC FIBRES : Names of raw materials and spinning technique/s used, name of polymer, physical and chemical properties and uses of synthetic fibres: nylon 6, polyester, acrylic and polypropylene.

ACTIVITIES:

- *Choose a fibre and its blend for a shirting, suiting,upholstery and for various such applications.*
- *Identification of types of fiber in blended yarn like in p/c blend.*
- *Design of fabric for apparel use using flex and other stem fiber.*
- *Milling and felting of wool.*
- *Degumming and reeling of silk from silk cocoon.*

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS Total hours: 30

1. Microscopic test of fibers.
2. Burning test of fibers.
3. Chemical test of fibers.
4. Feel test of fibers.
5. Determination of fibres in blended yarn.
6. Classification of specific manmade fiber out of different manmade fibers.
7. Classification of specific natural fiber out of different natural fibers.
8. Determination of specific cellulosic fiber out of different cellulosic fibers.
9. Determination of specific protein fiber out of different protein e fibers.
10. Identification of fiber using UV spectrophotometer.

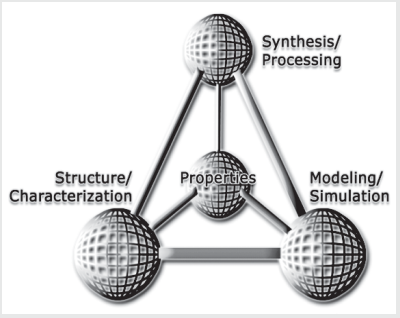
TEXT BOOKS:

1. J. Gordon Cook, “Hand Book of Textile Fibers”, Vol 1 & 2, 5th Edition, Wood Head Publishers, London, 2005.
2. Gohl, Vilensky, “Textile Science”, 2nd Edition, Mahajan Book Publishers, Ahemedabad, 2003.

REFERENCE BOOKS:

1. S. P. Mishra, “Fibre Science and Technology”, New Age International Publishers, New Delhi, 2000.
2. Tammanna & N. Sonwalkar, “Handbook of Silk Technology”, Wiley Easterrn Limited, New Delhi, 2002.
3. A. A. Vaidya, “Production of Synthetic Fibers”, Prentice Hall of India, New Delhi, 2005.

16CH102 MATERIALS SCIENCE AND TECHNOLOGY



Hours Per Week :

L	T	P	C
3	1	-	4

Total Hours :

L	T	P
45	15	-

WA/RA	SSH/HSH	CS	SA	S	BS
8		60	-	10	-

-

Course Description and Objectives:

This course will emphasize the structure-property relationships of engineering materials. The objective of this course is to provide knowledge in basic principles of material science and also to study structure of materials at all length scales.

Course Outcomes:

The student will be able to:

- understand crystal structure of various materials and techniques used for structure determination.
- understand the influence of defects on the properties of materials
- understand the fundamentals of equilibrium phase diagrams.
- gain knowledge on various fabrication techniques used for manufacturing common engineering materials.

SKILLS:

- ✓ *Identify the type of material: ceramic, polymer, metal or composite.*
- ✓ *Select materials with suitable properties for a given application.*
- ✓ *Predict the type of fracture/failure in a material.*
- ✓ *Read and draw conclusion from binary phase diagrams.*
- ✓ *Suggest manufacturing methods for metals, ceramics and polymeric materials.*
- ✓ *Determine basic mechanical properties of materials using universal testing machine.*

ACTIVITIES:

- *Testing the type of failures.*
- *"Gee Whiz": Wonder presentations.*
- *Analysis of load test results.*
- *Study of micro structures of materials.*
- *Segregation of the given materials.*
- *Identification of phases in the given phase diagram.*

UNIT - 1 **L-9**

BONDING IN SOLIDS: Inter atomic forces and potential energy, Types of bonds: primary and secondary, Variation in bonding character and resulting properties

CRYSTAL STRUCTURE : Classification of crystal systems – SC, BCC, FCC & HCP crystal structures with examples, Atomic packing factor, coordination number, determination of miller indices of planes & directions of cubic and hexagonal crystals, linear and planar densities, separation between successive planes, Crystal structure determination: Bragg law, powder method.

UNIT - 2 **L-10**

CRYSTAL DEFECTS: Point defects, Dislocations: edge, screw and mixed, burgers vectors, energy of dislocation, motion of dislocation, dislocation density. Grain boundary, stacking faults and twin boundary.

PHASE DIAGRAMS: Gibb's phase rule & terms involved – Reduced phase rule, tie line and lever rules, Two component systems–invariant reactions – Eutectic system & Iron-Carbon system.

UNIT - 3 **L-9**

MATERIALS FABRICATION TECHNIQUES: Fabrication of Metals: forming operations, casting, Fabrication of Ceramics: particulate forming processes, cementation. Forming techniques of Plastics: compression, transfer and injection molding, extrusion, blow molding.

MECHANICAL PROPERTIES: Stress-strain relations of various solids – Elastic, Anelastic, Visco-elastic and plastic deformations in solids, creep and fatigue, fracture: Brittle and Ductile, fracture toughness, ductile to brittle transitions.

UNIT - 4 **L-8**

ELECTRICAL & SEMICONDUCTING PROPERTIES: Ohm's Law, Electrical Conductivity, Electronic and Ionic Conduction, Energy Band Structures in Solids, Classification of solids based on band models, Electron Mobility, Electrical Resistivity of Metals, Intrinsic Semiconduction, Extrinsic Semiconduction, The temperature dependence of Carrier Concentration, Factors That Affect Carrier Mobility.

UNIT - 5 **L-8**

DIELECTRIC AND MAGNETIC PROPERTIES: Dielectric behavior: capacitance, polarization, frequency dependence of dielectric constant, dielectric strength. Types of magnetism, Ferromagnetism-Domain theory-hystersis behavior, ferrimagnetism, soft and hard magnets – application of magnetic materials.

TEXT BOOKS:

1. W. D. Callister, "Materials Science and Engineering: An Introduction," 8th ed., John Wiley & Sons Inc, 2009.
2. V.Raghavan, "Materials Science and Engineering:A First Course", 5th ed., PHI Learing Pvt. Ltd., 2013.

REFERENCE BOOKS:

1. L. H. VanVlack, Elements of Materials Science and Engineering, 6th ed., Addison Wesley, 1989.
2. W.F. Smith and J. Hashemi, Foundations of Materials Science and Engineering, 4th ed McGraw-Hill, 2005.
3. D. R. Askeland, Science and Engineering of Materials, 5th ed., Thomson Engineering, 2005.
4. J.F. Shackelford, Introduction to Materials Science for Engineers, 6th ed., Prentice Hall, 2004.
5. Kelly, G. W. Groves, and P. Kidd, Crystallography and Crystal Defects, Wiley, 2002.
6. N.W. Dowling, Mechanical Behavior of Materials, 3rd ed., Prentice Hall, 2006.
7. P. Haasen and B. L. Mordike, Physical Metallurgy, 3rd ed., Cambridge University Press, 1996.

II

YEAR

TEXTILE AND FASHION TECHNOLOGY

B.Tech.

I SEMESTER

- 16HS202 - Probability and Statistics
- 16EL102 - Softskills Laboratory
- 16TF201 - Technology of Manufactured Fibers
- 16TF202 - Yarn Manufacturing
- 16TF203 - Fabric Manufacturing
- 16TF204 - Fashion, Art, Design and Accessories
- 16TF205 - Pattern Engineering
- 16TF206 - Fashion Illustration Laboratory
- 16TF207 - Accessories Design and Surface Ornmentation Lab

II SEMESTER

- 16EL103 - Professional Communications Laboratory
- 16TF208 - Garment Construction Techniques
- 16TF209 - Technology of Knits and Design
- 16TF210 - Fabric Structure and Design
- 16TF211 - Textile Wet Processing
- - Department Electives
- - Department / Open Electives

COURSE CONTENTS

I SEM & II SEM

16HS202 PROBABILITY AND STATISTICS

Hours Per Week :

L	T	P	C
4	-	-	4

Total Hours :

L	T	P
60	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
20	35	4	10	2	-

Course Description and Objectives:

This course deals with descriptive statistics, correlation and regression and their applications, probability, theoritical distributions and testing of hypothesis.

The objective of this course is to enable the student to understand and apply statistical techniques, curve fitting, correlation and regression, probability and also to make the student familiar with discrete, continuous distributions and testing of hypothesis.

Course Outcomes:

The student will be able to:

- distinguish between quantitative and categorical data and represent the data in graphical and tabular forms.
- calculate and interpret measures for the centre and spread of a data set.
- decide how and when to use the normal model.
- calculate and interpret correlation coefficient and regression lines.
- understand the rules of probability and apply them.
- compute probabilities using theoritical distributions.
- test hypothesis for population parameters.

UNIT - 1 **L-9**

STATISTICS: Basic Definitions, Frequencies, Graphical Representation, Histogram, Ogive curves, Measures of Central tendency, Arithmetic mean, Median, Mode, mean deviation, standard deviation, Symmetry and Skewness, Karl Pearson's Coefficient of skewness.

UNIT - 2 **L-9**

CURVE FITTING, CORRELATION & REGRESSION : Least squares method, curve fitting (straight line and parabola only). Covariance, Correlation, Types, Pearson's Coefficient of correlation, Rank correlation, Spearman's rank correlation. Regression, Regression lines.

UNIT - 3 **L-8**

PROBABILITY : Introduction, Definition (Classical and Axiomatic approach), Addition theorem, Conditional probability, Multiplication theorem, Total probability, Bayes theorem.

UNIT - 4 **L-8**

DISTRIBUTIONS: Random variables, Discrete and Continuous variables, Introduction to Distributions.

BINOMIAL DISTRIBUTION : Definition, Mean and Standard deviation, Recurrence relation, Applications, Fitting of binomial distribution.

POISSON DISTRIBUTION : Definition, Mean and Standard deviation, Recurrence relation, Poisson Distribution is an approximation of Binomial distribution, Applications, Fitting of Poisson distribution.

NORMAL DISTRIBUTION : Definition, Normal curve, Mean and Standard deviation, Median, Mode, Normal Distribution applications.

UNIT - 5 **L-12**

SAMPLING METHODS : Population and Sampling, Parameters and Statistics, Types of sampling. Test of hypothesis and test of significance: Null hypothesis, Errors, Level of significance, Confidence Limits, Testing large samples, Sample distribution of proportion, T-distribution for small sample, difference between means of small sample, Chi square test for goodness of fit, Chi square test for test of independence.

TEXTBOOKS:

1. *Miller and Freund*, Probability and Statistics for engineers, 8th edition, Pearson publishers, 2013.

2. H. K. Dass & Er. Rajanish Verma, Higher Engineering Mathematics, S. Chand & Co., Third revised edition, 2014.

REFERENCE BOOK:

1. *S.C. Gupta* and *V.K. Kapoor*, "Fundamentals of Mathematical Statistics", Sultan Chand & Co., New Delhi, 2005.

16EL102 SOFT SKILLS LABORATORY

Hours Per Week :

L	T	P	C
-	-	2	1

Total Hours :

L	T	P
-	-	15

WA/RA	SSH/HSH	CS	SA	S	BS
-	-	-	-	-	-

Course Description and Objectives:

The Soft Skills Laboratory course is aimed at training undergraduate students on employability skills. Designed to impart work related skills, the course will enable trainees to develop interpersonal communication, leadership, Preparing Resume, Group Discussion, and Interview Skills. It will give them the required competence and confidence to handle professional tasks.

Course Outcomes:

The Student will be able to:

- formulate mathematical models of physical systems and represent them in block diagrams and signal flow graphs equip with requisite professional and inter-personal skills.
- they will possess the ability to think critically on issues for informed decision making and know how to communicate effectively through choice of appropriate language and speech, while dealing with others at the workplace.
- through identification and introspection on individual strengths and weaknesses.
- students will emerge with improved levels of self-awareness and self-worth, for greater efficacy at workplace.

SKILLS:

- ✓ *Communicate and understand the difference between soft skills and hard skills,*
- ✓ *Learn professionalism and Employability skills.*
- ✓ *Plan Career by drawing their SWOT, Setting the Goal, learn the importance of Time and Stress Management.*
- ✓ *Learn Vocabulary, Situational English, Group Discussion, Reading Comprehension and Listening Comprehension which are essential for all competitive examinations.*
- ✓ *Prepare Resume and learn how to face interview.*
- ✓ *Learn Gender sensitive language, Good manners, emotional intelligence and essential skills.*

ACTIVITIES:

- *Formal and informal communication…*
- *SWOT analysis,*
- *Stephen covey Time Management matrix*
- *Stress Management techniques*
- *Vocabulary flash cards*
- *Situational Dialogues*
- *Group Discussion*
- *Resume preparation*
- *Mock Interview.*
- *Reading comprehension activities*
- *Listening comprehension Activity by watching the American accent video*
- *Emotional intelligence, etiquette quiz*

UNIT - 1 **L-4. P-4**

A) COMMUNICATION:

Need for effective communication - the process of communication, levels of communication, flow of communication, choice of diction and style with reference to setting (formal, semi-formal or informal); communication networks, barriers to communication, miscommunication, noise and ways to overcome the barriers.

B) SOFT SKILLS:

Difference between soft and hard skills, need for soft skills, professionalism, employability skills

C) CAREER PLANNING:

Job vs. career, Goal setting, SWOT analysis, planning and prioritization, four quadrant time management system, self-management, stress-management.

ACTIVITY: Johari Window for SWOT analysis; Setting a SMART goal using the provided grid; Writing a Statement of Purpose (SOP).

UNIT - 2 **L-4. P-4**

A) VOCABULARY BUILDING:

Word etymology, roots, prefixes & suffixes, synonyms & antonyms, collocations, one-word substitutes, analogies, idioms and phrases, contextual guessing of unfamiliar words, task-oriented learning (50 words).

ACTIVITY: Making a flash card (one per day by each student) – vocabulary exercises with hand-outs – Vocabulary quiz (evaluation will be a combination of the 50 words provided by the instructor and the flash cards made by the student (one per day)

B) FUNCTIONAL ENGLISH:

Situational dialogues, Role plays (including small talk), Self introduction, Opening and closing a telephonic conversation, Making an appointment, Making a query, Offering/Passing on information, Communicating with superiors, Expressing agreement/objection, Opening bank account (combination of prepared and impromptu situations given to each student)

C) GROUP DISCUSSION:

Articulation and flow of oral presentation, dynamics of group discussion, intervention, summarizing and conclusion, voice modulation, content generation, Key Word Approach (KWA), Social, Political, Economic, Legal and Technical Approach (SPELT), View Point of Affected Part (VAP), language relevance, fluency and coherence.

ACTIVITY: Viewing a recorded video of GD & Mock sessions on different types of GD topics-controversial, knowledge, case study (including topics on current affairs)

UNIT - 3 **L-4. P-4**

A) RESUME-WRITING:

Structure and presentation, defining career objective, projecting one's strengths and skill-sets, summarizing, formats and styles and covering letter.

ACTIVITY: Appraising some samples of good and bad resumes, preparing the resume, writing an effective covering letter.

B) FACING INTERVIEWS:

Interview process, understanding employer expectations, pre-interview planning, opening strategies, impressive self-introduction, answering strategies, other critical aspects such as body language,

grooming, other types of interviews such as stress-based interviews, tele- interviews, video interviews, frequently asked questions (FAQs) including Behavioural and HR questions and the aspect looked at by corporate during interviews

ACTIVITY: Writing responses and practicing through role plays and mock interviews on the FAQs including feedback.

UNIT - 4 **L-4. P-4**

A) READING COMPREHENSION:

Reading as a skill, techniques for speed reading, understanding the tone, skimming and scanning, appreciating stylistics, impediments for speed reading, eye fixation, sub-vocalization, critical reading, reading based on purpose, reading for information, reading for inference.

ACTIVITY: Reading comprehension exercises with texts drawn from diverse subject areas. (Hand-outs). Newspaper activity with students divided into 4 groups. Each group looks at critical component of communication such as Listening, Speaking, Reading and Writing enabling them to be better communicators as well as be more aware about the current affairs, which help in Group Discussion.

B) LISTENING COMPREHENSION:

Listening as a skill, different types of listening, active and passive listening, top-down approach, bottom-up approach, understanding the non verbal cues of communication; intonation and stress.

ACTIVITY: Narration of a story, Speech excerpts with different accents (Indian, British, American), listening comprehension exercises with audio and video excerpts.

UNIT - 5 **L-4. P-4**

IMPACT OF LANGUAGE ON PERSONALITY:

Gender sensitive language in MNCs, cultural sensitivity, social awareness, emotional intelligence, good manners, self-grooming, positive body language, accepting and handling responsibility, assertiveness, problem solving, negotiating skills, networking and creating a good first impression.

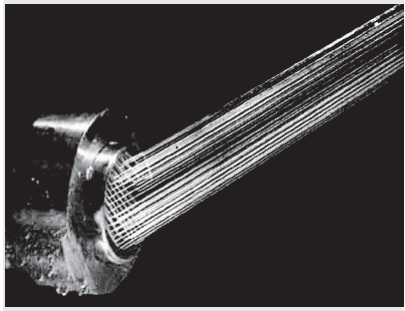
Seven essential skills for a team player; attentive listening, intelligent questioning, gently persuading, respecting other's views, assisting others, sharing, participating actively.

ACTIVITY: Johari Window, Games and Case studies.

REFERENCE BOOKS:

1. *Edward Holffman,* ***Ace the Corporate Personality****, McGraw Hill,2001*
2. Adrian Furnham, ***Personality and Intelligence at Work***, Psychology Press, 2008.
3. John Adair Kegan Page, "***Leadership for Innovation"*** 1st edition, Kogan, 2007.
4. M.Ashraf Rizvi, "***Effective Technical Communication",*** 1st edition, Tata McGraw Hill, 2005.
5. Krishna Mohan & NP Singh, "***Speaking English Effectively"*** 1st edition, Macmillan, 2008.
6. ***Soft Skills Material*** of **Infosys** Under the Academic Initiative of Campus Connect
7. Dr. S.P. Dhanvel***, English and Soft Skills,*** Orient Blackswan, 2011.
8. Rajiv K. Mishra, ***Personality Development***-, Rupa & Co. 2004.

16TF201 TECHNOLOGY OF MANUFACTURED FIBRES



Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
20	20	-	-	-	-

Course Description and Objectives:

This course offeres the knowledge of different principles of forming man made fibers. It also includes the concepts of micro fibers and texturising of man made fibers. Objective of this course is to enable the student to understand the concepts of manufacturing man made fibers, thier properties and applications.

Course Outcomes:

The student will be able to:

- find the structure property relation of synthetic fibres.
- understand the importance of synthetic fibres in textile industry.
- know the various types of spinning principles.
- understand the texturizing and its importance.
- describe about the various developments in man made fibers.

SKILLS:

- ✓ *Differentiate and identify various man made fibers.*
- ✓ *Analyze the structure of different fibers by using x-ray pattern.*
- ✓ *Analyze the texturisation of man made fibers.*

ACTIVITIES:

- *Collect different types of man made fibers.*
- *Find the different applications in which man made fibers are widely used.*
- *Analyze the fibers structure through SEM, optical microscope, FTIR.*
- *Selection of diffrerent routes for manufacturing of man made fibers.*

UNIT - 1 **L-10**

INTRODUCTION TO FIBER STRUCTURE : Micellar theory, Continuous theory, Fringed micelles theory, Fringed fibrils theory, Modified fringed micellar theory; Important operations in the production of synthetic fibres, Principles of fibre forming polymers, Parameters influencing the quality; Degree of order, Degree of localization of order, Length/ width ratio of localized units, Degree of orientation, Degree of polymerization; Methods of investigating fibers - X-Ray diffraction, IR, NMR, Thermal Analysis, Optical microscopy, Electron microscopy, Scanning Electron microscopy.

UNIT - 2 **L-8**

MELT SPINNING : Detailed note on elements of melt spin equipment, Polyester manufacture - Trans esterification, Polycondensation, Side reactions, Properties and Applications; Polyamides - Manufacture of Nylon 6, nylon 66, (manufacture monomers various routes for PET and nylon); Surface modification of polyester cause and effect, Recent developments in polyesters like CDP, EDP, CFDP, APP; Spin finishes - Ideal spin finish, Properties, Application and removal, Constitution of spin finish.

UNIT - 3 **L-8**

SOLUTION SPINNING : Introduction, Process variables for solution spinning, Dry spinning, Wet spinning, Salient features of solution spinning, Rheology of Wet & Dry Spinning, Development of fiber structure and morphology during solution spinning, Comparison, Brief note on dry jet wet spinning; Manufacture of Rayons - Viscose, Acetate and Cuprammonium – Physical and chemical properties, A brief note on recent developments in viscose manufacturing (Lyocell fibre).

UNIT - 4 **L-9**

MANUFACTURING : Properties and applications of of Acrylics, Mode acrylics, PVA, Poly Vinyl Chloride and Polyvinyl alchohol, Polypropylene fibres; Drawing - Condition, Phenomena of necking, Drawing behavior of thermoplastic polymer, Influence of drawing on structure and property; Micro fibres - Detailed study of production, Properties and applications of micro fibres, Problems in processing of micro fibres in weaving.

UNIT - 5 **L-10**

TEXTURISING : Draw backs of flat filament yarns, Definition and concept of texturising, Classification and characteristics of textured yarns, False Twist Texturising - Scientific principle in twist texturising, Methods of production of stretched(single heater) by conventional methods, Draw Texturising concept, Air Jet Texturising and its principle; Brief introduction about Other methods of texturising - BCF Processes and Yarns, Edge crimping, Stuffer box crimping, Knit-de-knit, Gear Crimping, Chemical Texturising.

TEXT BOOKS:

1. V. B. Gupta, “Technology of Manufactured Fibres”, 3rd edition, Chapmen and Hall, New York, 2004.
2. A. A. Vaidya, “Production of Synthetic Fibers”, Prentice Hall of India, New Delhi, 2005.

REFERENCE BOOKS:

1. S. P. Mishra, “Fibre Science and Technology”, New Age International Publishers, New Delhi, 2000.
2. H.V.Srinivasmurthy, “Textile Fibers”, Textile Association of India Publication, 1988.

16TF202 YARN MANUFACTURING

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
10	20	-	-	-	10

Course Description and Objectives:

This course deals with the concepts, production calculations, different types of available machines and various developments in yarn manufacturing process. This course is aimed to impart fundamental knowledge required to understand yarn manufactuing process.

Course Outcomes:

The student will be able to:

- select the different fiber properties required for spinning different counts.
- understand different types of yarn manufacturing machines and their principles.
- calculate production capacities of carding, comber and ring frame.

SKILLS:

- ✓ *Optimize the factors affecting yarn properties.*
- ✓ *Identify the various key factors in yarn manufacturing process.*
- ✓ *Set the parameters for the production of cotton, synthetic and blended yarns.*
- ✓ *Differentiate the carded, combed and core cover yarns.*

ACTIVITIES:

- *Collect technical specifications of yarn preparatory machines.*
- *Prepare spin plan for carded and combed yarns for a given count.*
- *Prepare flow chart for carded and combed yarn manufacturing process.*
- *Observe spinning parameters by visiting a spinning mill.*

UNIT - 1 **L-10**

GINNING AND BLOW ROOM : Ginning Objectives, pre and post ginning equipments and working principles of Gins, Factors affecting ginning performance, brief note on Pressing and baling of cotton. Need for Mixing and Blending, objectives, Fibres commonly blended (Different types of Blends) Introduction to Opening and Cleaning: Working principle of a typical blow room, Accessories in blow room.

UNIT - 2 **L-9**

CARDING AND DRAW FRAME : Chute feeding, Introduction to Carding - Objectives, Zones, Role of each element, Card settings, High production cards, Latest Developments in carding; Draw Frame - Objects, basic concepts of drawing, Principle of Roller drafting, Different drafting systems, Methods of roller weighing, Coiler mechanism, Study of Modern Draw frame, Auto levelling in carding & Draw frame (open loop and closed loop) Production calculations.

UNIT - 3 **L-8**

COMBER : Introduction to combing, Hooks theory, Combing preparatory requirements, passage of material through comber, Functions and setting of each part, Combing principle, cycle of combing Back ward and Forward combing, Working of modern combers, Production calculations, Combing efficiency.

UNIT - 4 **L-9**

SPEED FRAME : Objects, Need of speed frame, Detailed study of mechanisms (Drafting, Twisting and bobbin building) of speed frame, Constructional details, Driving arrangement, Calculation of draft, Twist & production, Recent Developments.

UNIT - 5 **L-9**

RING FRAME : Objects, Passage of material, Functions of parts, Specifications of R/F, Drafting, Twisting & winding, Brief study of spindles, Ring & travellers, Calculation of draft, Twist & production. Ring data/ ISM(Individual spindle Monitoring), Post spinning operations, Ring doubler, Two for one twister, Brief note on reeling.

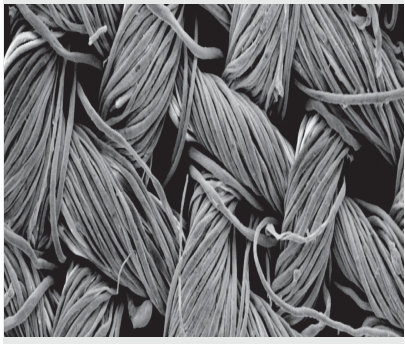
TEXT BOOKS:

1. W. Klein, “Series of Short Staple Spinning”, Wood head publishers, 2005.
2. T. K. Pattabhiraman, “Essential Facts of Practical Cotton Spinning”, Mahajan Publisher, Ahmedabad, 2005.

REFERENCE BOOKS:

1. Venkatsubramani, “Spun Yam Technology, Vol-III”, SSM Institute Publications. Komarapalyam, 2003.
2. T.V.Ananthan, “Tablets on Combing, Speed Frame, Ring Frame”, TAI Publications, 2003.
3. A. R. Khare. “Elements of Combing”, Mahajan Book Publishers, Ahmedabad, 2003.

16TF203 FABRIC MANUFACTURING



Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
10	20	-	-	5	10

Course Description and Objectives:

This course offers the basics of fabric manufacturing and their preparatory processes includes winding, warping, sizing and post sizing operations. The objective of this course is to make students familiar with the process of fabric manufacturing.

Course Outcomes:

The student will be able to:

- distinguish the needs of weaving preparatory processes such as winding, warping, sizing and post sizing operations.
- explain the formation of continuous length of fabric in shuttle looms.
- understand the basic concepts in shuttle-less weaving machines.

SKILLS:

- ✓ *Distinguish the weaving preparatory machines.*
- ✓ *Prepare size reciepe for given yarn.*
- ✓ *Optimize weaving process parameters.*
- ✓ *Identify yarn faults in yarn before and after winding.*
- ✓ *Distinguish sized and un-sized yarns.*
- ✓ *Selection of looms based on end product.*

ACTIVITIES:

- *Observing weaving parameters by vising weaving mill.*
- *Collection of technical specifications of winding, warping, sizing machines.*
- *Drawing and denting of warp in hand loom.*
- *Comparison of shuttle-less looms technical specifications.*
- *Preparation of peg plan for given design.*

UNIT - 1 **L-8**

WINDING & WARPING : Introduction to Fabric Manufacture - Need for Weaving preparatory process. Drum and precision Winding, Essentials features of drum winders, Tensioner, Yarn clearers, Splicing, Common package faults, Production calculations.

Warping - Classification, Working of beam and sectional warping machine, Calculations for production, Features of modern warping machines.

UNIT - 2 **L-9**

YARN SIZING - Objects, Types of sizing, Sizing materials, Size reciepes for different yarns, Size paste preparation, Multi-cylinder Sizing Machine, Different zones, Construction of Sow box, Concept of drying - Wet splitting, Brief note on Beam winding, Types of combs, Sizing faults and remedies; Calculations in sizing, Post sizing operations.

UNIT - 3 **L-9**

SHUTTLE WEAVING : Introduction to weaving, Classification of loom motions, Shedding, Picking - Cone under pick, Over pick; Beat-up mechanism, 7 wheel Take-up, Negative and positive Let-off, Auxillary motions - Warp stop motions, Temples, Weft stop motion; Introduction to dobby and jacquard shedding, Loom production calculations.

UNIT - 4 **L-10**

PROJECTILE & RAPIER WEAVING : Limitations of ordinary looms, Classification of shuttle-less weaving machines. Projectile picking motion , picking phases, Torsion rod details, Receiving unit , Selvedge weaves, Sley drive, Multi color weft insertion.

Principle of rapier weft insertion through various mechanisms such as single rapier, Double rapier, rigid and flexible, Rapier heads, Rapier drive, Selvedge formation, Field of application & commercial viability.

UNIT - 5 **L-9**

JET & NARROW WEAVING : Air Jet weft Insertion, Stages of weft insertion, Main nozzles designs, Relay nozzle designs, Quality of Air, Water Jet Weft Insertion - Picking mechanism, Weft insertion elements, Loom settings, Influence of yarn characteristics, Features of water jet looms, Comparison with air jet. Introduction to Multiphase Weaving, Fabric defects & remedies; Introduction to narrow fabric weaving.

TEXT BOOKS:

1. A.T.C Marks, Robinson, “Principles of Weaving”, The Textile Institute, 2011.
2. M. K. Talukdar, D. B. Ajgonkar, “Weaving Machines, Materials & Methods”, Textile Institute, 1998.

REFERENCE BOOKS:

1. S.C Adanur, “Handbook of Weaving”, CRC publications, 2008.
2. A. Ormerod, “Modern Preparation & Weaving Machines”, BWE Publications, 1983.
3. K. T. Aswani, “Plain Weaving Motions”, M/S Mahajan book publishers, Ahmedabad, Gujarat, 2007.

16TF204 FASHION, ART, DESIGN AND ACCESSORIES

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
-	10	-	10	5	5

Course Description and Objectives:

This course offers introduction to fashion, art and design, consists of basic definition of fashion, classification and its type, types of design, elements of designing, traditional textiles of India and role of garment accessories. The objective of this course is to provide insights into fashion designing and technology.

Course Outcomes:

The student will be able to:

- define and discuss fashion, art and design related terms.
- understand the classification and types of fashion.
- describe different types of traditional textiles of India.
- explain the aesthetic and functional purpose of commonly used garment accessories.
- discuss key factors in the design of typical leather and ornamental fashion accessories.

SKILLS:

- ✓ *Trace origin of any clothing and costume.*
- ✓ *Identify the nature of fashion for the leading fashion brands.*
- ✓ *Give the styling techniques and material requirement for the traditional costume.*
- ✓ *Identify the different textile techniques of traditional India.*
- ✓ *Select material for garment accessories based on aesthetic and functional requirements.*
- ✓ *Select material for leather accessories based on aesthetic and functional requirements.*

ACTIVITIES:

- *Making of mood board for particular theme.*
- *Selection of design and color from mood board.*
- *Design of clothing based on mood board.*
- *Accessories designing using ribbons, braids, laces, appliqués, buttons, zippers, snap fasteners etc.*
- *Showcase of ornamental accessories as per specific theme.*

UNIT - 1 **L-10**

INTRODUCTION TO FASHION, ART AND DESIGN : Definition of fashion, art, design, Costume and clothing, Origin and history ; Importance of clothing, Factors to be considered in the selection of clothing; Evolution of dress from paintings, Cuttings, Sculpture and wood carvings.

Classification and Types of Fashion - Factors effecting fashion, Business of fashion, Theories of fashion; Study of leading fashion designers – French, Italian, American, Indian and English.

UNIT - 2 **L-9**

DEFINITION OF FASHION DESIGNING : Concepts of design, Types of design, Elements of design, Principle of designing, Role of fashion designers.

COSTUMES OF ANCIENT CIVILIZATIONS: History of Indian costumes – Mughal and post-Mughal periods; Traditional costumes of different states of India; Costumes of ancient civilizations - Egypt, Greek, Roman, English, French empires during Renaissance 1500 –1600 AD; Overview of costumes of Pakistan, Sri Lanka, Burma, China, Japan and Africa.

UNIT - 3 **L-9**

TRADITIONAL TEXTILES OF INDIA : History of embroidered, hand-woven, dyed, printed and painted textiles of India; Floor coverings: Carpets and durries; Colored textiles – Bandhani, Patola, Ikkat, Pocchampalli; Woven textiles Brocades, Jamavar, Paithani, Jamdani, Chanderi, Maheshwari, Kanjivaram, Kota, Baluchari, Dacca Muslin, Himrus and Amrus; Printed textiles – Chintz, Sanganeri; Painted textiles – Kalamkari; Shawls of Kashmir.

UNIT - 4 **L-8**

GARMENT ACCESSORIES : Introduction to fashion accessories – classification of various accessories; Selection of materials, Design, Functional and aesthetic performance and their advantages; Ribbons, Braids, Laces, Appliqués, Buttons, Zippers, Snap fasteners, Hooks and eyes, Hook and loop tape; Eyelets, Neck tie, Scarves, Stoles, Umbrella, Socks, Stockings, Veils.

UNIT - 5 **L-9**

LEATHER ACCESSORIES : Selection of materials, Design, Functional and aesthetic performance and their advantages; Various styles of footwear, Belts, Gloves, Hand bags, Hats, Wallets, and other personal leather goods; Concepts of patternmaking techniques and the production process of these accessories.

ORNAMENTAL ACCESSORIES : Selection of materials, Design, Functional and aesthetic performance and their advantages; The various styles: Pendants, Waist bands, Wrist bands, Necklaces, Head bands, Bows, Sunglass, Wrist watches, Rings, Ear rings, Bangles, Bracelets and anklets.

TEXT BOOKS:

1. G.Russel, B.Nicholas, “Traditional Indian Textiles”, Thames and Hudson, London, 1991.
2. J. Peacock, “Fashion Accessories – The Complete 20th Century Source Book”, Thames and Hudson Publication, 2000.

REFERENCE BOOKS:

1. G.S Churye, “Indian Costume”, Prakashan Pvt. Ltd., Bombay, 1995.
2. R. Bhargav, “Design Ideas and Accessories” Jain Publications Pvt. Ltd., 2005.
3. P. Tortora, “Encyclopedia of Fashion Accessories”, Om Books Publication, 2003.
4. Elaine Stone, “Fashion Merchandising – An Introduction”, 5th edition, McGraw-Hill, 1990.

16TF205 PATTERN ENGINEERING

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P
45	-	30

WA/RA	SSH/HSH	CS	SA	S	BS
10	10	-	20	-	-

Course Description & Objectives:

This course offers concepts of pattern making for a specific garment. It starts with workroom practices that form the basis for garment cutting, making of basic body slopers with dart manipulation, sleeves and collars. The objective of this course is to impart the knowledge and skill of converting designs, sketching into a product.

Course outcomes:

The student will be able to:

- understand various pattern making tools in the workroom.
- perform the drafting of basic body slopers and dart manipulation.
- understand the pattern drafting for sleeves, collars, yokes and cuffs.
- use these basic the principles and styles of grading for men's and women's garments.

SKILLS:

- ✓ *Selection of measurements for a given design.*
- ✓ *Design the bodice blocks for skirt, torso and sleeves.*
- ✓ *The dart manipulation for the particular fit.*
- ✓ *Draft standard size block patterns for men, women.*
- ✓ *Grading of shirt, trousers, jacket, waistcoat.*

ACTIVITIES:

- *Taking measurements using flat pattern methods.*
- *Design darts using slash and spread, pivotal methods for apparel.*
- *Pattern making for plain, puff and bell types of sleeves.*
- *Pattern making for peter pan, cape roller and sailor collars.*
- *Grading of basic bodice.*

UNIT - 1 **L-10**

WORKROOM PRACTICES : Patternmaking tools, Pattern paper, Workroom terms and definitions, Industrial form and pattern production terms; Figure Analysis - Head theory, Seven and a half and eight; Measuring Techniques - Introduction, Measurement charts, Tools required for measuring process, Measuring the form, Pin marking the armhole, Circumference measurement, Horizontal balance line (HBL), Strap measurement, Vertical measurements, Horizontal measurements, Standard measurement chart; Flat pattern methods - Bespoke method and industrial method.

UNIT - 2 **L-8**

MAKING BASIC BODY SLOPERS (PAPER PATTERNS) : Bodice blocks, Skirt blocks, Torso blocks and sleeves; Dart Manipulation - Slash and spread, Pivotal methods, Designing with darts, Tuck darts, Pleats, Flares, Gathers and style lines.

SLEEVES: SET–IN–SLEEVES : Plain, Puff, Bell, Bishop, Circular and leg-o-mutton; Sleeves combined with bodice, Kimono, Dolman and Raglan.

UNIT - 3 **L-9**

COLLARS: Peter pan, Partial roll, Cape collar, Scalloped, Sailor, Square, Full roll convertible, Shawl and Shakespeare collars.

CUFF: Shirt cuff, Self-faced cuff, French cuff and contoured cuff.

UNIT - 4 **L-9**

YOKES : Preparing patterns for yokes - Partial, Yoke without fullness, Yoke with fullness and yoke supporting or releasing fullness.

GARMENT DRAFTS : Basic principles and methodologies used to draft standard size block patterns for men, Women, Namely for shirts, Trousers, Skirts, Blouses, Nightwear, Jackets and special dresses, etc.

UNIT - 5 **L-9**

PRINCIPLES OF GRADING : Master and basic grades - Basic back, Basic front, Basic sleeve, Basic collar, Basic cuff and basic facing; Styles of Grading - Men's size chart, Grading of shirt, Trousers, jacket, Waistcoat, Displacement of bust dart to side seam, Armhole and neck, Women's size chart, Multi-track grading.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS Total hours: 30

Preparation of patterns for making of

1. Baba suit
2. Baby frock
3. Round Neck T- Shirt
4. Romper
5. Salwar and Kameez
6. Blouse
7. Skirt and Top
8. Brassier and Panties
9. Nighty
10. Men's Shorts
11. Men's Formal Shirts
12. Men's Formal Trousers
13. Jeans

TEXT BOOKS:

1. J Helen Armstrong, "Pattern Making for Fashion Designers" 4th edition, Prentice-Hall, New Jersey, 2006
2. C Schaeffer, "The Complete Book of Sewing Shortcuts", Sterling Publishing (NY), 1981.

REFERENCE BOOK:

1. G. Cooklin, "Master Patterns and Grading for Women's Outsize", Blackwell Scientific Publications,1995.

16TF206 FASHION ILLUSTRATION LAB

Hours Per Week :

L	T	P	C
-	-	3	2

Total Hours :

L	T	P
-	-	30

WA/RA	SSH/HSH	CS	SA	S	BS
-	-	20	10	-	-

Course Objectives:

The objective of this course is to develop among the students the basic creative and manipulative skills necessary for fashion design through various shading techniques.

Course Outcomes:

The student will be able to:

- sketch the various elements and principles of designing.
- examine the human body structure (anthropametry) to design clothing.
- draw fashion figures and visually communicate apparel design details.
- demonstrate an understanding of the colour theory using various colour schemes.
- illustrate different styles of garment components and reproduce them to fit on to fashion figures.

LIST OF EXPERIMENTS Total hours: 30

Illustration of the following:

1. Lines and strokes using pencil shading techniques; lettering and numbering styles.
2. Elements of design.
3. Principles of design.
4. Different postures of human head, hand, leg and feet.
5. Different hair styles.
6. Sketching of lay figure using head theory.
7. Preparation of Prang's colour wheel.
8. Preparation of different colour schemes.
9. Rendering different fabric textures.
10. Sleeves, cuffs, and necklines.
11. Skirts, pockets, trousers, and skirt tops

16TF207 ACCESSORIES DESIGN AND SURFACE ORNMENTATION LAB

Hours Per Week :

L	T	P	C
-	-	3	2

Total Hours :

L	T	P
-	-	30

WA/RA	SSH/HSH	CS	SA	S	BS
-	10	10	10	-	5

Course Objectives:

The objective of this course is to Illustrate and construct different styles of various fashion accessories using different materials.

Course Outcomes:

The student will be able to:

- demonstrate the basic embroidery stitches
- explain and embellish the fabric surface using decorative embroidery works, applique work and patch work.
- learn the basics of paint brush strokes and color mixing techniques and demonstrate fabric painting through various techniques.

LIST OF EXPERIMENTS Total hours: 30

1. Designing and production of Earrings, bracelets, necklaces using materials like colored papers, buttons, fabric scraps, coloured beads and stones.
2. Designing and Construction of handbags, purses and gloves.
3. Designing and Construction of headband, bows, cap and waistband
4. Basic Embroidery stitches:

   Running, satin, long and short, chain, stem, herringbone, cross stitch, knotted stitch, fishbone, wheat, couching, buttonhole
5. Special embroidery stitches:

   Bead work, sequin work, zardosi, aari work, badla worK.
6. Decorative surface embellishment:

   Cutwork, drawn thread work, eyelet and mirror work, shadow work, ribbon work and Kundan work.
7. Appliqué work and Patch work.
8. Fabric Painting:

   Colour theory, mixing techniques, basic paint brush strokes
9. Fabric Painting:

   Stencil painting, spray fabric paint, sponges and stamp painting
10. Tie and Dye and Batik Work.
11. Illustration of skirts, pockets, trousers, and skirt tops.

16EL103 PROFESSIONAL COMMUNICATION LABORATORY

Hours Per Week :

L	T	P	C
3	1	-	4

Total Hours :

L	T	P
45	15	-

WA/RA	SSH/HSH	CS	SA	S	BS
20	42	6	12	3	2

Course Description and Objectives:

The Professional Communication Laboratory course is aimed at improving professional communication skills (LSRW – Listening, Speaking, Reading and Writing) of undergraduate students and preparing them for their profession as engineers and managers. This course will help students to understand professional communication and personality as two interlinked spheres of influence, and provide them with exposure to conventions of corporate communication involved in the functioning of the business world.

Course Outcomes:

Students will be able to:

- having gone through the course, students would be equipped to clear industry recognized certification such as BEC Vantage by the University of Cambridge.
- this will equip them to stand out both in the professional setting as well as for further pursuits in the academic world.
- Since this certification looks at LSRW (Listening, Speaking, Reading and Writing) components in great detail, we hope to equip students to confidently and successfully attempt all the 4 critical components.

SKILLS:

- ✓ *Understand and use grammar rules in writing; sentences, paragraphs, paraphrasing,*
- ✓ *Write business emails, memos, letters, reports and proposals*
- ✓ *Comprehend business articles, and documents*
- ✓ *Expressions in Professional context, and acquire presentation skills like one minute talk and pair discussion in professional context*
- ✓ *Familiarize and comprehend British accent by listening to recorded speeches and discussions.*

UNIT - 1 **L-3, P-3**

BUSINESS ENGLISH VOCABULARY: Glossary of most commonly used words (formal and informal usage) **Elements of Technical Writing**: Sentence structure, reducing verbosity, arranging ideas logically, building coherence, paragraph level and document level, topic sentence, cohesive devices, transitional words, paraphrasing and précis-writing. **Mechanics of Writing:** Stylistic elements, the rapporteur, the purpose, the reader's viewpoint (audience), elementary rules of grammar, choice of diction, elementary principles of composition, matters of form, punctuation, conventions of business communication, language and professional tone, weak links in business correspondence, ethical concerns in business writing, code of conduct (not sending illegal, offensive, disparaging personal remarks or comments) in written business communication

UNIT - 2 **L-5, P-5**

BUSINESS CORRESPONDENCE: E-mail: nature and scope, e-mail etiquette, clear call for action, common errors in composing e-mails, office communication such as meeting agenda and minutes of the meeting, notice, circular and memo

Letter-Writing: Formal and informal letters, structure of formal letters, expressions of salutations, different types of letters [such as sales letter, complaint letter, response to the complaint letter (dispute resolution), letter of permission, letter of enquiring, claim letter – letter of apology etc], introductory and concluding paragraphs and clear call for action.

PROFESSIONAL PROPOSAL/REPORT: Differentiating proposals and reports, Drafting formal business proposals, types of reports such as factual reports, feasibility reports and survey reports, parts ofa report (such as title page, declaration, acknowledgements, table of contents, abstract, introduction, findings, conclusion and recommendations, citations, references and appendices)

UNIT - 3 **L-2, P-6**

SPEAKING: Speaking in business context, assertiveness, politeness, making requests, queries and questions, negotiations, asking for information, offering suggestions, conflict resolution, contacting clients, initiating, addressing delegates (in public), features of a good power point presentation (making the PPT), delivering the presentation effectively, telephone etiquettes, delivering seminar/proposal/ report effectively, team meeting etiquettes (face to face and conference call), making effective one minute presentations

UNIT - 4 **L-4, P-10**

READING: Reading and comprehending business documents, learning business register, regularizing the habit of reading business news, suitable vocabulary, skimming and scanning text for effective and speedy reading and dealing with ideas from different sectors of corporate world in different business contexts.

UNIT - 5 **L-2, P-5**

LISTENING: Specific information in business context, listening to telephonic conversations/messages and understanding the correct intended meaning, understanding the questions asked in interviews or in professional settings, summarizing speaker's opinion or suggestion, enable active listening

TEXT BOOKS: BEC

1. Guy Brook Hart (2014): Cambridge English Business Bench Mark: Upper Intermediate, Second Edition: CUP.
2. CUP (2002) Cambridge: BEC VANTAGE: Practice Tests, CUP

ONLINE REFERENCE BOOKS:

1. http://www.cambridgeenglish.org/exams/business-certificates/business vantage/preparation/
2. https://www.youtube.com/watch?v=qxFtn9pGaTI.

ACTIVITIES:

- *Basic grammar practice, Framing paragraphs on topics allocated,*
- *Paraphrasing an article or a video in your own words Finding topic sentences in newspaper articles*
- *Finding out new words from a professional viewpoint Understanding the meaning and its usage*
- *Perusing samples of well prepared proposals and reports*
- *Draft different proposals/ reports on topics assigned.*
- *Watching videos/listening to audios of business presentations*
- *Classroom activities of team and individual presentations*
- *Using PPTs, mock exercises for BEC speaking.*
- *Presenting (speaking) the written components completed in Unit-I.*

16TF208 GARMENT CONSTRUCTION TECHNIQUES

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P
45	-	30

WA/RA	SSH/HSH	CS	SA	S	BS
-	10	10	10	-	-

Course Description and Objectives:

This course offers the knowledge required for constructing garments by learning various types of seams, stitches and sewing threads, method of construction of different types of sleeves and collars. The objective of this course is to provide basic knowledge and skill required for construction of garment.

Course Outcomes:

The student will be able to:

- differntiate various types of seams, seam finishes, stitches and sewing threads.
- learn techniques involved in the construction of garment closures.
- perform the construction of garment yokes, fullness and hem etc.

SKILLS:

- ✓ *Design the stitching methods used for pockets, plackets, waist bands and cuffs.*
- ✓ *Construct pockets, yokes and collars for a given garment.*
- ✓ *Select the right accessories for construction of garment.*
- ✓ *Stitch different types of plackets to acceptable quality levels.*

UNIT - 1 **L-9**

SEAM AND STITCHES : Seams - Definition, Types of seams, Seam quality, Seam performance, Factors to be considered in the selection of seam, Seam finishes, Seam defects; Stitches - Definition, Stitch classes, Stitch parameters, Factors to be considered in the selection of stitches, Stitching defects.

UNIT - 2 **L-9**

SEWING THREAD, SLEEVES AND COLLARS : Sewing thread - Types, Construction, Sewing thread quality, Selection of sewing thread; Types of fabrics - plaid and napped fabrics.

Sleeves and collars - Types of sleeves, plain, puffs, gathered, bell, bishop, circular, leg-o-mutton, Magyar sleeves dolman, kimono; Collars – Classification, full, flat, roll, partial roll, puritan collar, sailor collar, square collar, rippled collar, scalloped collar, mandarin, convertible, tie, shawl reverse and notch collar.

UNIT - 3 **L-10**

YOKES AND FULLNESS : Yokes - Definition, Selection of yoke design, Different styles of yoke, Simple yoke, yokes with or without fullness, midriff yokes, Methods of attaching yokes.

Fullness - Definition types; Darts - single, double, pointed darts, tucks, pin tucks, cross tucks, piped tucks, shell tucks, Pleats - knife pleats, box pleats, invertible box pleats, kick pleats, flare, godets, gathers, shirrings, single or double frills, ruffles; Hemming Techniques - Definition, Factors to be considered in the selection of hems, Types of machine stitched hem, Hand stitched hem; Neckline Finishes - Preparation and uses of True Bias, Facings, and Binding.

UNIT - 4 **L-9**

POCKETS AND PLACKETS : Plackets -Types, two piece plackets, continuous plackets, kurtha plackets, shirt cuff placket.

Pockets - Types, patch pocket, patch with lining / flap, front hip, set-in seam, slash pocket with flap-single lip, double lip. Waistband: one-piece, two-piece and tailor waistband, elastic applied; Cuffs - Types, square shape, round shape.

UNIT - 5 **L-8**

FASTENERS : Introduction and construction techniques of garment closures; Applications of zippers, Types of button and button holes and their applications, Types and applications of hooks and eye snaps; Velcro, Eyelets, Cords.

ACTIVITIES:

- *Draw and construct the yoke, collar and pockets.*
- *Prepare Various stitches used for making the garment.*
- *Collect sewing threads used for various garments.*

LABORATOTY EXPERIMENTS

Course Outcomes:

The student will be able to

- Construct different types of seams, seam finishes, darts, tucks and pleats to acceptable quality levels.
- Construct different neckline finishes such as bias binding, facing and collars to acceptable quality levels.
- Stitch various types of pockets to acceptable quality levels.
- Construct different types of sleeves to acceptable quality levels.

LIST OF EXPERIMENTS Total hours: 30

Preparing samples of

1. basic seams, seam finishes.
2. darts, tucks and pleats.
3. plackets - continuous bound placket, 2 piece placket.
4. plackets - fly opening and zipper.
5. necklines - bias facing, bias binding and shaped facing.
6. collars - peter pan collar, shirt collar.
7. collars - shawl collar, sailor collar.
8. pockets - patch, bound and front hip pocket.
9. sleeves - plain, raglan kimono.
10. sleeves - puff, bell sleeve.

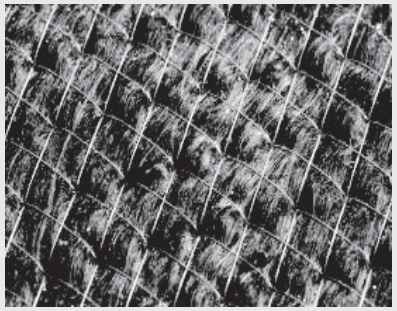
TEXT BOOK:

1. C. B. Shaeffer, “The Complete Book of Sewing Shortcuts”, Sterling Publishing Company, 1981.

REFERENCE BOOKS:

1. C. Gerry, “Garment Technology for Fashion Designers”, Blackwell Science Ltd., 1997.
2. Laing, J Webster, “Stitches and Seams”, Woodhead Publishing Ltd., 1998.
3. L. Aitken, “Step by Step Dress Making Course”, BBC Books, 1992.

16TF209 TECHNOLOGY OF KNITS AND NON-WOVENS



Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
10	20	-	-	10	-

Course Description and Objectives:

This course provides an overview on knitting elements followed by warp knitting and weft knitting. Then it introduces manufacturing techniques of different types of nonwoven fabrics. It also includes the application of different types of knitted and nonwoven fabrics. This course is aimed at offering basic concepts required for manufacturing knitted and nonwoven fabrics.

Course Outcomes:

The student will be able to:

- understand the role of knitting machine elements in fabric manufacturing.
- differentiate between pain, rib and interlock types of basic knitted structure.
- understand the role of cam setting and hence the patterning in weft knitting.
- describe loop formation and lapping movements fro warp knitting.
- compare the different techniques of fiber web manufacturing.
- know the bonding of fibre web using different techniques.

SKILLS:

- ✓ *Identify different types of knitted structures and their applications.*
- ✓ *Selection of different types of nonwoven fabrics for specific applications.*
- ✓ *Prepare binder for chemical bonding applications.*
- ✓ *Select needle type and its specifications for needle punched fabric as per application.*
- ✓ *Analyse type of fibre suitable for thermal bonding.*

ACTIVITIES:

- *Identification of face, back side and type of knitted fabric by visual observation.*
- *Analysis of SMS non woven composite fabric for surgical mask.*
- *Identification and analysis of nonwoven fabric used in carry bags.*
- *Designing of needle punched fabric for filtration application.*
- *Selection of knitting machine gauge based on tightness factor.*

UNIT - 1 **L-9**

INTRODUCTION TO KNITTING : Comparison of woven, nonwoven and knitted fabrics, Fundamental terms of knitting technology, Elements of knitting machine, Various zones in knitting machine and their significance. Classification of weft knitting structures and machines,

WEFT KNIT STRUCTURES: Plain or single jersey, rib, interlock and purl, loop and needle diagrams to illustrate basic structures.

A brief note on straight bar and flat knitting machines.

UNIT - 2 **L-9**

PATTERNING IN WEFT KNITTING: Scope and need, Arrangements in cam for knit, miss stitch and tuck stitch, Requirements for hosiery yarn-a brief note on common defects, A brief note on straight bar and flat knitting machines knitting dynamics: A brief note on forces acting on the needle, linear and nonlinear cams, needle breakages.

INTRODUCTION TO WARP KNITTING: elements, a brief note on driving arrangements for guide-bars, needle bars and sinker bars, basic lapping movements in warp knitting, Loop formation in Tricot and Raschel knitting machines.

UNIT - 3 **L-9**

Classification and definition of Nonwoven, Nonwoven manufacturing techniques, Dry laid webs – fibre selection, fibre preparation, web formation, layering,

WET LAID NONWOVEN: Raw materials and fibre preparation, common defects, production process, hydro-former, cylinder mould machine, Roti-former, Special features and applications,

AIR LAID NONWOVEN: Raw materials, production process, Rando-webber, Cicopee web formation method, Applications.

POLYMER-LAID WEB FORMATION: Basic production process of spun-laid technique. Melt blown nonwovens - Melt blown fabric production –Characteristics and properties of melt blown Fabric.

UNIT - 4 **L-9**

MECHANICAL BONDED WEBS: Introduction to needle punching – Passage of material through needle loom – Feeding system, Batt formation, Drafting, Pre-needling and final needling;

compared specification of needle,Texturing needles- Application of needle punching.

STITCH BONDED NONWOVEN: stages of production –Maliwatt and Malivlies process-applications.

HYDRO ENTANGLED NONWOVENS: Principle, Specific energy coefficient– Hydro entanglement process technology: Pre-wetting, Support surface, Dewatering, Nozzles, Injector, Drying - Applications.

UNIT - 5 **L-9**

CHEMICAL BONDED NONWOVEN: Latex binder –Bonding technology – Saturation, Foam bonding, Spray bonding, Print bonding, Powder bonding, Application of chemical bonded nonwoven.

THERMAL BONDED NONWOVENS: Binder, Binding fibres, Binding powder, Binding webs, Methods of thermal bonding – Hot calendaring, Belt calendaring, Oven bonding, Ultrasonic bonding, Radiant heat bonding.

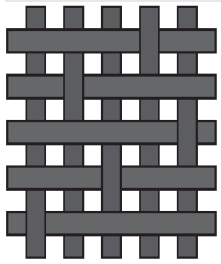
TEXT BOOKS:

1. S. J. Russel, “Handbook of Nonwovens”, 1st edition, Wood Head Publishing in Textiles, 2006.
2. D. J. Spencer, “Knitting Technology”, 2nd edition, Wood Head Publishing Company, England, 2008.

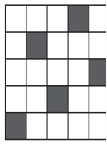
REFERENCE BOOKS:

1. Turbak, “Nonwoven Process Performance & Testing”, 2nd edition, Tappi Press, Woodhead Publishing, Cambridge, 1993.
2. W. Albrecht, “Nonwoven Fabric Construction Synthetic Fibres”, JWS Publications, 2007.
3 W B. Azagoankar, “Knitting Technology”, Mahajan Textile Publishers, 5th edition, 2006.

16TF210 FABRIC STRUCTURE AND DESIGN



(a) Flat view



(b) Weave design

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P
45	-	30

WA/RA	SSH/HSH	CS	SA	S	BS
-	20	-	20	-	-

Course Description and Objectives:

This course introduces the significance of basic elements of fabric designing, basic weaves with their derivatives and applications. It also includes the concepts of designing of compound weave structures. Objective of this course is to offer basic concepts of representation and drawing of fabric weaves.

Course Outcomes:

The student will be able to:

- draw the design elements viz. drafting, lifting and reed plan for given weave.
- analyze basic design parameters of different fabrics.
- interpret the design elements for a given structure
- understand the manufacturing techniques for a different weave structure
- describe the color and weave effect.

SKILLS:

- ✓ *Draw the weave notation for given fabric structure.*
- ✓ *Selection and arrangement of number of heald frame as per drafting plan.*
- ✓ *Measure and calculate designing parameters viz. thread density, crimp, count.*
- ✓ *Identify the manufacturing requirements for a given weave structure.*
- ✓ *Draw the color pattern from warp and weft color plan.*

ACTIVITIES:

- *Analysis and designing of weaves, drafting and lifting plan for shirting fabric, upholstery.*
- *Analysis and designing of weaves, drafting and lifting plan for any compound structured fabric .*
- *Manufacturing of woven fabric from drafting and lifting plan.*
- *Drawing weave notation for any weft knitted fabric.*
- *Manufacturing of warp knitted fabric based on design.*
- *Draw-in and denting operation for basic weaves.*

UNIT - 1 **L-9**

INTRODUCTION TO FABRIC STRUCTURE : Method of weave notation – Elements of fabric structure: design, draft, denting and peg plan and their interrelation - Warp faced,weft faced, equifaced weaves, – Classification of weaves .

PLAIN WEAVE : Modification of plain: as warp rib, weft rib, matt, fancy matte, stitched hopsack, Sateen and satin: Characteristics, Possible moves, Modification of floating weaves.

UNIT - 2 **L-9**

INTRODUCTION TO TWILLS : Characteristics of Twills, Twill angle, Twist and twill interaction, Twill modification: wavy, herringbone, combined, broken, steep, flat, skip twills.

FANCY WEAVES : Honey comb-Huck-A-Back-Mockleno: Basic designs, Distorted thread effects (warp and weft way). Colour and weave effects: Effect produced by simple colour and weave combinations.

UNIT - 3 **L-9**

ADVANCED FABRICS : Extra thread figuring – Bed fords and welts or piques – Backed cloths: reversible and wadded backed cloths.

DOUBLE CLOTHES : Principles of stitching, reversible, wadded, inter changeable double cloths Treble cloths: principle of stitching.

WEFT PILES : Plushes & corduroys, A brief note on Warp plies, Velvets.

UNIT - 4 **L-8**

TERRY PILES : Terry motion, Terry ornamentation, Dobby striped & Check effects in Terry.

GAUZE & LENO : Principle, Sheds formed in Leno, Designs for simple leno.

KNIT STRUCTURE NOTATION : Knit stitch, Float stitch, Tuck stitch, Symbolic (graph paper) representation of stitches, Diagrammatic representation of stitches.

UNIT - 5 **L-10**

DERIVATIVES OF PLAIN KNIT : Le Coste, Cross tuck, Satin, Knitted twill, Ornamentation of rib structure 2X2 rib structure, Half cardigan, Full cardigan, Derivatives of inter lock structures; Ponte-di-Roma, Ottoman rib, Bourrelet, TEXI-pique, Milano rib, Swiss Pique.

REPRESENTATION OF WARP KNIT STRUCTURES : Point paper, Chain-link notation, Single fabrics: Chain stitch, Tricot lap, Extension of 1-and-1 lapping, Full tricot, Lock knit, Reverse lock knit, Satin, Loop raided fabrics, Queen's cord, Sharkskin.

LABORATOTY EXPERIMENTS

LIST OF EXPERIMENTS Total hours: 30

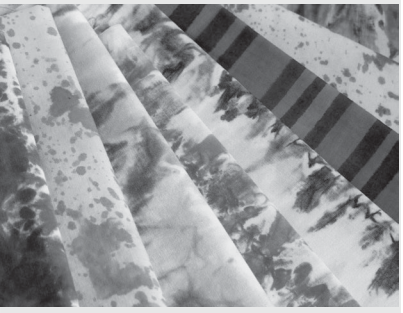
1. Identification of basic features of fabrics and Need for Analysis.
2. Analysis of different types of warp faced, weft faced and equifaced plain fabrics.
3. Analysis of different types of Twill fabrics.
4. Analysis of different types of Sateen fabrics.
5. Selection of Reed and Pick for different simple fabrics.
6. Preparation of stripes and checks using 2 or more colors with and with out plain weave.
7. Preparing of designs for shirting and Suiting from different blended materials.
8. Preparation of patterns for bed sheet, upholstery, furnishing fabrics.
9. Analysis of data for compound structures.
10. Analysis of extra warp and extra weft and other complex structures.
11. Planning of loom equipment to produce simple and complex fabrics.

TEXT BOOKS:

1. Z.J. Groscicki, “Watson’s Textile Design and Colour”, Newness – Butter & Worths, Mahajan Book Publishers, Ahmedabad, Gujarat, 4th Edition, 2006.
2. Z.J. Groscicki, “Watson’s Advanced Textile Design”, Mahajan Book Publishers, Ahmedabad, Gujarat, 4th Edition 2006.

REFERENCE BOOKS:

1. Robinson and Marks, “Woven Cloth Construction”, Mahajan Book Publishers, Ahmedabad, Gujarat, 2008.
2. John Reed, “Fabric Structure and Design”, Veritas Publications,Hong Kong, 2007.
3. Nisbeth, “Grammar of Textile Design”, Mahajan Book Publishers, Ahmedabad, Gujarat, 2007.
4. David J.Spencer, “Knitting Technology”, Wood Head Publishing, 2nd edition, 2008.



16TF211 TEXTILE WET PROCESSING

Hours Per Week :

L	T	P	C
3	-	3	5

Total Hours :

L	T	P
45	-	45

WA/RA	SSH/HSH	CS	SA	S	BS
15	15	-	-	-	10

Course Description and Objectives:

This course introduces the fundamental concepts in dyeing of various fibers and its bonding with different classes of dyes. It also includes methods and different styles of printing. Finally it deals with finishing of textile and need for effluent treatment plant . Objective of this course is to impart fundamental concepts of chemical processing of fabric.

Course Outcomes:

The student will be able to:

- understand grey fabric preparation for processing.
- know the dyeing of fabric using different classes of dyes.
- differentiate different methods and styles of printing.
- understand the importance of finishing and different types of finishes.
- aware of importance of effluent treatment plant.

SKILLS:

- ✓ *Select the preparatory process for grey fabric preparation.*
- ✓ *Identify suitable classes of dyes for the selected fibers.*
- ✓ *Printing of the different fabrics with suitable dyes as well as pigments.*
- ✓ *Compare the shade of original sample with dyed sample by using Computer Color Matching system.*
- ✓ *Find usefullness of particular finish for the specific application.*

UNIT - 1 **L-9**

GREY PREPARATION : Singeing, Desizing and its types, Scouring - Purpose and process, batch, semi-continuous and continuous methods of scouring. Bleaching of cotton goods with sodium hypochlorite, hydrogen peroxide and sodium chlorite. Mercerization - objects and principle of mercerization, yarn mercerization, fabric mercerization.

UNIT - 2 **L-9**

DYEING : Fundamentals, Classification of colorants, Difference between dye and pigment, Common terms used in textile coloration, Different kinds of dye-fibre bonds for common fibres, Dyeing of cotton with direct, reactive, vat dyes, Dyeing of wool and silk with acid and basic dyes, Dyeing of polyester with Disperse dyes, Principle of computer-aided color matching.

UNIT - 3 **L-9**

PRINTING : Methods of printing - Principles of block printing, roller printing, flat-bed and rotary-screen printing, and transfer printing techniques. Styles of printing - Principles of direct, discharge and resist styles of printing, printing with reactive dyes, Printing with pigments, study of chest and rotary screen printing machines for knitted goods.

UNIT - 4 **L-8**

FINISHING : Classification of textile finishes - Mechanical finishes: calendaring and its types, mechanical shrinking (Sanforising), Compacting of knitted fabric. Outline of functional and aesthetic finishes - wrinkle-free finishing of cotton fabric (resin finishing), UV-protective finish, antimicrobial finish, flame-retardant finish, water-repellent finish, soil release finish.

UNIT - 5 **L-10**

PROCESS HOUSE EFFLUENT AND ITS TREATMENT : Nature of effluents in chemical processing, Effect of waste water discharge on the environment, Government standards for textile chemical process effluent discharges, Treatment of dye house effluent, operations in an ETP and methods for removal of color in dye house effluent, azo dyes and major banned amines, guidelines for eco-friendly processing.

ACTIVITIES:

- *Interpretaion of of computer colour matching data.*
- Dyeing of fabric with natural dye using different mordants.
- *Identification of various defects within the dyed and printed fabrics.*
- *Collection of different finished samples in regular use.*
- *Analysis of tirupur case study for ETP.*

LABORATORY EXPERIMENTS

Course Outcomes:

Upon completion of this course, the student will be able to

- Perform the grey fabric preparation for processing.
- Perform the dyeing and different classes of dyes used.
- understand different methods of printing, styles of printing.
- understand the importance of computer color matching.

LIST OF EXPERIMENTS Total hours: 45

1. Scouring of cotton using alkali-boiling method.
2. Bleaching of cotton using hydrogen peroxide.
3. Dyeing of cotton with direct dyes & Reactive cold brand dyes.
4. Dyeing of cotton with Hot brand reactive dyes.
5. Dyeing of cotton with vat dyes.
6. Dyeing of silk, wool or nylon fabric with acid dyes.
7. Determination of color fastness to washing, Light and rubbing.
8. Printing of cotton with reactive dyes using blocks and screens.
9. Direct printing of cotton with pigment colors using screens.
10. Discharge and resist styles of printing on cotton.
11. Printing of polyester with disperse dyes.
12. Dyeing of cotton fabric with pigments using padding method and the dyeing of cotton fabric with vat dyes by the pad-jig method.
13. Dyeing of polyester using a lab-scale HTHP machine and dyeing of knitted fabric in a lab-model winch machine.
14. Computer-aided color matching.

TEXT BOOKS:

1. C. V. Koushik and A. I. Josico, “Chemical Processing of Textiles – Grey Preparation and Dyeing”, NCUTE Publication, New Delhi, 2004.
2. V. A. Shenai, “Technology of Finishing”, Sevak Publications, Mumbai, Nitra, 1995.

REFERENCE BOOKS:

1. V. A Shenai, “Technology of Textile Processing – Vol. III, IV, V, VII and VIII”, Sevak Publications, Mumbai, 1995.
2. J. W. Palmer, Textile Processing and Finishing Aids: Recent Advances, Mahajan Book Distributors, 1996.

III

YEAR

TEXTILE AND FASHION TECHNOLOGY

B.Tech.

I SEMESTER

- 16TF301 - Testing of Fibres and Yarns
- 16TF302 - Apparel Production,Planning and Control
- 16TF303 - Garment Dyeing, Printing and Embroidery
- 16TF304 - Textile Mathematics
- \- Department Electives
- \- Department / Open Electives
- \- Employability and Life Skills*

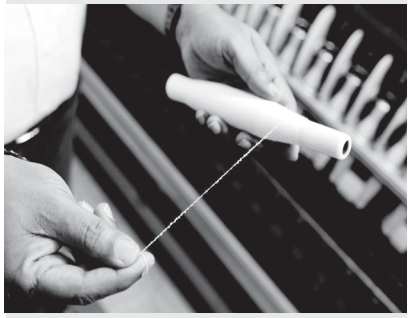
II SEMESTER

- 16HS301 - Professional Ethics
- 16TF305 - Garment Machinery
- 16TF306 - Testing of Fabrics and Garments
- 16TF307 - Apparel Merchandising
- 16TF308 - Textile and Fashion CAD Laboratory
- \- Department Electives
- \- Department / Open Electives
- \- Employability and Life Skills*

COURSE CONTENTS

I SEM & II SEM

16TF301 TESTING OF FIBRES AND YARNS



Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P
45	-	30

WA/RA	SSH/HSH	CS	SA	S	BS
10	20	-	-	5	5

Course Description and Objectives:

This course offers testing procedures for measurement of essential fibre properties, measurement principle and techniques for yarn dimensions and essential yarn properties. The ojective of this course is to impart skill required for testing of fibres and yarns.

Course Outcomes:

The student will be able to:

- understand importance of selection of fibers and yarn samples.
- explain the principles of testing for the measurement of fibre and yarn properties.
- analyze test results of fibers and yarns by using statistical tool.
- know the working principle of advance instrument like AFIS, HVI.

SKILLS:

- ✓ *Determine sample size base on deviation and sample error.*
- ✓ *Apply significance test viz. Z test and ANOVA*
- ✓ *Measure fibre length, strength, fineness and maturity.*
- ✓ *Measure yarn count strength, twist.*
- ✓ *Analyze and correlate the testing report of AFIS, HVI, spectrograph and USTER tester.*

ACTIVITIES:

- *Apply zoning technique for sampling of cotton from a bales.*
- *Analyze test results using ANOVA.*
- *Test cotton fiber under bear sorter for any veriety.*
- *Comparison of strength of two different sample using Z-test.*

UNIT - 1 **L-8**

INTRODUCTION TO TEXTILE TESTING AND QUALITY CONTROL : Objectives of testing, determination of sample size for testing & selection of samples for testing, Sampling errors, Point estimations of mean and variance, Interval estimation of mean and variance, Number of tests, Significance test: t-test , z-test and ANOVA with application to textile; Random and biased sample, Length and extent biased samples, zoning technique for raw cotton.

UNIT - 2 **L-9**

MEASUREMENT OF REGAIN AND MOISTURE CONTENT : Corrections for regains, Numerical examples; Hygrometers: Hair and digital hygrometer, Factors affecting the regain, Effect of moisture on fibre properties, Drying oven, Shirley moisture meter.

FIBRE DIMENSIONS: Fibre length measurement, Fibre sorter methods, Analysis of Sorter diagrams, span length, Fibro-graph and uniformity index, Fibre fineness, important of fineness, measurement by air flow principle; Micronare value; relation between fineness and maturity.

UNIT - 3 **L-9**

MATURITY AND STRENGTH: Maturity ratio, Maturity count, Measurement of maturity of cotton fibres, Terminology related to Tensile properties of Textiles, Measurement principles CRL CRE and CRT, Measurement of Fibre strength, Pendulum lever principle, Stelometer, strain gauge principle, Instron Tensile Tester.

Latest Testing instruments like AFIS, HVI and their use, Measurement principle and different modules with data analysis.

UNIT - 4 **L-9**

YARN DIMENSIONS AND STRENGTH : Yarn numbering system, Measurement Linear density by skein gauge, wrap reel Beesley's yarn balance, Twist factor, Effect of twist on yarn and fabric properties, Measurement of Twist by direct, continuous, take-up twist and twist to break methods, Measurement of yarn strength by Single yarn test and lea test, CSP and RKM, Effect of yarn friction in textile industry, Measurement of friction, By Yarn-on-Yarn Friction, Uster Zweigle Friction Tester.

UNIT - 5 **L-10**

MEASUREMENT OF HAIRINESS : Measurement of hairiness by Shirley yarn hairiness tester, Zweigle G565 and Uster tester 3 hairiness meter; Evenness testing of silvers - roving and yarns; Analysis of periodic variations in mass per unit length, Index of irregularity, limit irregularity, addition of irregularities, Evenness Tester (Uster evenness test), Random occurring faults (Uster classimat), Spectrogram, variance length curves analysis The causes and effects of irregularity.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS Total hours: 30

Determination of

1. regain of different fibers.
2. fiber maturity by NaOH swelling method and differential dyeing techniques.
3. fiber length by Bear Sorter and Interpretations by other methods.
4. fiber fineness by ATIRA fineness tester.
5. fiber strength by Stelometer.
6. yarn count by Beesley's yarn balance.
7. yarn count by Wrap reel.
8. single and plied yarn twists.
9. moisture content of cotton material.
10. single Yarn Strength.
11. CSP and CCSP of Yarns.

TEXT BOOKS:

1. J. E. Booth, "Principle of Textile Testing", Butterworths Publisher, London.
2. B. P. Saville, 'Physical Testing of Textiles', 1st Edition, Woodhead Publishing, Limited, 1999.

REFERENCE BOOKS:

1. Arindam Basu, "Textile Testing", Sitra Publishers, Coimbatore, 2004.
2. Grower and Hamby, "Hand Book of Textile Testing", Textile Institute,1 996.
3. Keshavan and Angappan, "Physical Testing", Vol- I & II, SSMITT Publications, Komarapalyam, 1993.
4. V. K. Kothari, "Developments in Textile Testing", I B Publishers, New Delhi.

13TF302 APPAREL PRODUCTION, PLANNING AND CONTROL

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
10	20	5	-	-	-

Course Description and Objectives:

This course deals with the functions and techniques involved in production, pre-production activities, marker planning and spreading techniques in apparel production. Objective of this course is to impart insight knowledge in planning techniques and control measures used in apparel production.

Course Outcomes:

The student will be able to:

- calculate the capacity and line balancing in cutting, sewing and finishing.
- learn techniques involved in the construction of garment closures to meet costumer requirement.

SKILLS:

- ✓ *Improve managerial capacity in the garment production department.*
- ✓ *Prepare the operation bulliten for given style.*
- ✓ *Improve utilization of raw materials.*
- ✓ *Control the lines to get good quality of garment.*

UNIT - 1 **L-9**

INTRODUCTION: Production - Definition, Terminology, Functions of production department, Duties and responsibilities of a production manager / supervisor. Pre-production activities, Lead time, Product development steps from prototype to production model, Product data management, Understanding and interpretation of specification sheets.

UNIT - 2 **L-9**

MARKER AND LAY PLANNING: Marker planning - Plain, Striped and checked, Directional, Non directional fabrics, Spreading techniques - One way, Two way, Biased grain; Step lay, Splicing, Marker making, Lay lot planning, Numerical exercises on lay lot planning, shrinkage allowance.

UNIT - 3 **L-9**

BUNDLE TICKETS AND OPERATION SEQUENCE : Bundle Tickets - Importance and guideline, Sorting and bundling, move ticket, Operation breakdown - T-shirt, Men's full sleeve shirt, Trousers, Jeans, Ladies night dress, Shorts; Machine and attachment details.

UNIT - 4 **L-10**

PRODUCTION PLANNING AND CONTROL : Capacity calculation - Cutting, Sewing and finishing; Determination of machine requirements For a given target, Allocation of man power and machines, Line balancing - Importance, Techniques and line balancing matrix, Takt Time analysis.

UNIT - 5 **L-8**

QUALITY IN PRODUCT DEVELOPMENT : Quality Assurance - Fabric, Pattern making, Cutting and garment construction, Inspection procedure - Product development, Components inspection for men's and women's wear.

TEXT BOOKS:

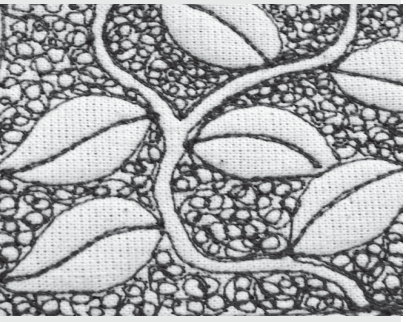
1. A. J. Chuter, "Introduction to Clothing Production Management", Blackwell Science Publishing, 1995.
2. H. Carr, B Latham, "The Technology of Clothing Manufacture", Om Book Service, New Delhi, 1995.

REFERENCE BOOKS:

1. R. E. Glock and G. I. Kunz, "Apparel Manufacturing: Sewn Product Analysis", 4th edition, Pearson Education, New Delhi, 1994, ISBN: 8177580760.
2. J. Solinger, "Apparel Production Handbook", Van Nostrand Reinhold Publications, New York, 1998.

ACTIVITIES:

- *Case study on apparel production planning.*
- *calculation of marker efficiency through mini marker.*
- *Preparation of operation bulliten for given garment style.*
- *Optimising line balancing through hourly adjustment.*
- *Performing takt time analysis.*
- *Inspection of garments and finding A, B & C category faults.*



16TF303 GARMENT DYEING, PRINTING AND EMBROIDERY

Hours Per Week :

L	T	P	C
3	-	3	5

Total Hours :

L	T	P
45	-	45

WA/RA	SSH/HSH	CS	SA	S	BS
10	20	-	-	-	-

Course Description and Objectives:

This course offers the concepts of garment dyeing, printing, finishing, embroidery and various machines used for it. Objective of this course is to impart knowlege on garment value addition processes.

Course Outcomes:

The student will be able to:

- differentiate garment dyeing techniques
- differentiate garment printing styles.
- know the different types of garment finishes.
- understand the concepts of garment embroidering.

SKILLS:

- ✓ *Perform the dyeing of garments.*
- ✓ *Perform the printing of garments.*
- ✓ *Carryout the garment finishing.*
- ✓ *Carry out the garment embroidery.*

UNIT - 1 **L-8**

GARMENT DYEING : Importance of garment processing, Concepts of garment stage and pre garment stage dyeing, flow chart for garment dyeing, Various machinery used for Garment dyeing like paddle dyeing machine, drum dyeing machine, Drying of garment dyed goods – Various drying machinery like Hydro-extractor, Tumble dryer, RF dryer. Problems in garment dyeing and its remedies.

UNIT - 2 **L-10**

GARMENT PRINTING : Special print recipes for garments – Khadi, Metallic, Flock, Plastisol, Reflective, Pear, Fluorescent, High density printing, Puff Printing, Foil Printing, Plastic Printing. Printing of Garments with Photo chromatic and Thermo chromatic dyes, Garment Printing Machinery - Table printing, Multi arm flat bed printing machine for Garments, Digital printing, Transfer printing.

UNIT - 3 **L-9**

GARMENT FINISHING : Classification, Fragrance finish, UV protection finish, Cool finish, thermo cat finish, water resistant breathable finishes. Functional Finishes - Wrinkle free, durable press, Feather touch finish, Rubbery touch finish, Stain Resistant Teflon finish, Moisture management finish; Bio Polishing – Mechanism involved, problems and it's remedies.

UNIT - 4 **L-9**

GARMENT WASHING : Introduction – Various wash down effect, Flow chart, Stone washing – Various stone less stone washing effects like enzyme wash, Mud wash, Ion wash, Chalk wash and Monkey wash; Other novel wash down effects - Acid wash, Antique wash, Denim Hand Sand /Scraping, Sand Blasting, Ball Blasting, Whiskering, Ozone Fading, Back Staining-It's causes and remedies.

UNIT - 5 **L-9**

GARMENT EMBROIDERY : Introduction to embroidery, hand embroidery, origin of embroidery, threads and fabrics for hand embroidery, machine embroidery - eyelet work, lace work, stone work, bead and sequins work, bobbin thread embroidery; computerised embroidery machines, types and purpose of frames and backing material, cost estimation of embroidery articles.

LABORATORY EXPERIMENTS

Course Outcomes:

The student will be able to:

- perform the garment dyeing using different machineries.
- perform the printing of garment with different types.
- perform the finishing of garment.
- perform the embroidery work on the garment.

ACTIVITIES:

- *Flow chart preparation for list of parameters to be considered during garment dyeing and printing.*
- *collection of different dyed, printed and finished samples.*
- *Identify the types of wash suitable for the particular garment.*
- *Plan for the particular finish required for the garment based on the end use.*

LIST OF EXPERIMENTS Total hours: 45

1. Dyeing of garment with reactive dyes using paddle dyeing machine.
2. Study of Problems in garment dyeing and its remedies.
3. Direct style of printing with reactive dyes.
4. Direct style of printing with pigment.
5. Discharge style of printing with reactive dye.
6. Resist style of printing with reactive dye.
7. Bio-polishing treatment on garment.
8. Stone wash on garment.
9. Acid wash on garment.
10. Plastizol printing on garment.
11. Khadi printing on garments.
12. Pearl Metallic Printing on garments.
13. Hand embroidery work on T- shirt.

TEXT BOOKS:

1. J.N. Etters, “Influence of Fabric Surface Effects on Colour Depth and Hue of Garment Dyed Textiles”, American Dyestuff Reporter, 1997.
2. J.M. Murphy, “Improving Preparation Techniques for Garment Dyeing”, American Dyestuff Reporter, 1987.

REFERENCE BOOK:

1. D. Mahajan, “Know All About Denim”, Mahajan Publishers Private Limited, Ahmadabad.

16TF304 TEXTILE MATHEMATICS

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
20	20	-	10	-	-

Course Description and Objectives:

This course offer introduction of basic units, elements of trigonometry, analysis of fiber dimensions, basic kinematics, weaving preparatory mathematical calculations and fabric structural calculations. Objective of this course is to impart basic knowledge and skill required to analyse fibre, yarn and fabric structural aspects.

Course Outcomes:

The student will be able to:

- know basic units and their conversions.
- understand the evaluation of fiber dimensional properties.
- describe basic kinematics used in textile applications.
- analyze winding, warping and weaving mechanics.

SKILLS:

- ✓ *Analyse fiber dimensions by using basic conversions.*
- ✓ *Interpret data by using graphical representation.*
- ✓ *Calculate the equation of motion and motion in circle in carding and draw frame.*
- ✓ *Calculate traverse motion and yarn tension in cone winding process.*
- ✓ *Identify fabric dimensional characteristics.*

ACTIVITIES:

- *Collect unit conversions used in textiles.*
- *Calculate velocity and time using equations of motion and motion in circle.*
- *Calculate production of carding, draw frame, simplex, ring frame and loom.*
- *Calculate yarn diameter by using different formulae.*

UNIT - 1 **L-9**

INTRODUCTION: Definitions of basic units, Conversion of units from one system to another; Revision of basic mathematics - Symbols and formulae, Areas and perimeters, Ratio, Proportions, Percentages; Elements of trigonometry; Averages; Graphs and other forms of graphical representation.

UNIT - 2 **L-9**

FIBRES: Fibre dimensions- Fibre length and fibre diameter, Fibre bundle strength, Work of rupture, Trash and lint content of cotton, Quantitative analysis of fibre mixtures, Fibre quality index (FQI) measurement.

UNIT - 3 **L-9**

BASIC KINEMATICS: Equations of motions, Motion in a circle.

YARNS: Bale density, Lap density, Lap uniformity, Tuft size at the cleaning points, Calculations of the card mechanism, Twist factor, Irregularity yarn diameter, Drafting wave, Packing density of fibers and yarns.

UNIT - 4 **L-9**

WEAVING PREPARATORY: Winding rate, Wind and traverse ratio, Yarn tension and tension devices, Yarn clearing and clearing devices, Sectional building calculations in warping, Efficiency calculations, Production calculations.

UNIT - 5 **L-9**

FABRIC CALCULATION: Woven Fabric structure, Crimp percentage in woven fabric, Fabric areal density, Fabric cover and cover factor (Peirce), Loom calculations, Picking and beat-up calculations, Knitted fabric calculations - spirality, loop length, production calculations.

TEXT BOOK:

1. J. E. Booth, “Textile Mathematics,” Volume-I, II & III, The Textile Institute, Manchester, 1975

REFERENCE BOOKS:

1. N. Gokarneshan, B. Varadarajan, C. B. Senthil Kumar, “Mechanics and Calculations of Textile Machines” Woodhead Publishing INDIA PVT LTD, 2013.
2. R. Marks and A. T. C. Robinson, “Principles of weaving”, The Textile Institute, Manchester, 1976.
3. Hearle, Grosberg and Backer, “Structural Mechanics of Fibers, Yarns and Fabrics”, Vol-I, Wiley-Inter-Science, New York, 1987.
4. B.C.Goswami, “Textile Yarns”, John Wiley & Sons, New York, 1987.

16HS301 PROFESSIONAL ETHICS

Hours Per Week :

L	T	P	C
2	-	-	2

Total Hours :

L	T	P
30	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
-	30	-	10	-	-

Course Description and Objectives:

This course offers insight into workplace rights of people, their safety concerns and more importantly the ethics that are to be followed by professionals and corporates. The objective of the course is to bring in awareness among the students about human values, social responsibility and the ethics to be followed by engineering professionals.

Course Outcomes:

The student will be able to:

- understand professional responsibilities and ethics in the workplace.
- have knowledge of contemporary issues related to personal and professional interactions at the workplace.
- understand the impact of engineering solutions in global and societal context.

SKILLS:

- ✓ *Analyze the issues faced by society and business world related to safe technologies/ practices, employee rights, resource sharing and allocation, team work, organizational dynamics, legislations related to business and technology, discrimination.*
- ✓ *Appreciate the need for workplace etiquette and proper code of conduct.*
- ✓ *Construct and evaluate arguments during decision making by considering viewpoints of all the stakeholders.*
- ✓ *Analyze one's own beliefs and values during interpersonal and intra-organizational conflicts.*
- ✓ *Detect inconsistencies and common errors in reasoning during discussions and practices.*

ACTIVITIES:

- *Discuss a typical case study on workers strike and analyze the conflict of interest among different stakeholders.*
- *Reading and analyzing a prisoner's narrative of police abuse in custody.*
- *Watching and discussing a video report on mishaps such as space shuttle mishap.*
- *Analyze and comment on disasters such as Chernobyl, Bhopal etc.*
- *Analyzing the HR policies documents of a typical company on issues such as working hours, employee security and health care.*

UNIT - 1 **L-6**

HUMAN VALUES : Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – Caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

UNIT - 2 **L-6**

ENGINEERING ETHICS & **ENGINEERING AS SOCIAL EXPERIMENTATION :** Engineering Ethics - Variety of moral issues – types of inquiry moral dilemmas – moral autonomy – The problems of Many Hands – Kohlburg's theory – Gilligan's theory Impediments to Responsible Action.

Engineering as social experimentation - Codes of ethics - a balanced outlook on law - the challenger case study.

UNIT - 3 **L-6**

ENGINEER'S RESPONSIBILITY FOR SAFETY : Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk - Chernobyl Case Studies and Bhopal.

UNIT - 4 **L-6**

WORKPLACE RIGHTS AND RESPONSIBILITIES & WORK ENVIRONMENT : Workplace Rights and Responsibilities : Engineers and Managers. Oganizational complaint procedures. Government agencies. Resolving Employee concerns. Limits on acceptable behaviour in large corporation. Work Environment : Ethical and legal considerations, Organizational responses to offensive behaviour and harassment. Ethics in a Global Context.

UNIT - 5 **L-6**

GLOBAL ISSUES : Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct

TEXT BOOK:

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, New York, 2005

REFERENCE BOOKS:

1. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi, 2004
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Learning, United States, 2000.
3. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.

16TF305 GARMENT MACHINERY

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P
45	-	30

WA/RA	SSH/HSH	CS	SA	S	BS
15	15	-	-	-	-

Course Description and Objectives:

This course offers basic knowledge of various types of fabric packages encountered in fabric spreading, functions of various fabric cutting machines, seams and stitches and discuss the basic parts of sewing Machines. Objective of this course is to provide the basic knowledge and skill for operating and utilizing the machinery used in garment making.

Course Outcomes:

The student will be able to:

- know the various types of fabric packages in fabric spreading.
- describe the types and functions of various fabric cutting machines.
- understand the various types of needles, sewing threads.
- compare the different seams and stitches and the basic parts of sewing machines.

SKILLS:

- ✓ *Operate the sewing machine*
- ✓ *Perform changes in different settings in sewing machine.*
- ✓ *Set the sewing machine parameters as per fabric.*
- ✓ *Operate specialized sewing machines.*

ACTIVITIES:

- *Collect Specifications of different sewing machines.*
- *List out the various parts in the different sewing machines.*
- *Collect various defects from cutting, sewing departemnts.*
- *Perform changes in the settings of different parts of sewing machine.*

UNIT - 1 **L-8**

SPREADING : Type of fabric packages received at garment industry, Manual spreading, Computerized spreaders, Spread relaxation, Types of spreads, NOW, NEW, NUD, Symmetrical and Asymmetrical patterns, effect on marker making, marker efficiency, factors affecting marker efficiency, marker duplicating methods, computer aided marker making.

UNIT - 2 **L-9**

CUTTING MACHINES : Introduction to cutting machines, types and functions of cutting machines, straight knife, round knife, band knife cutting machines, notches, drills, die cutting machines; computerized cutting machines, common defects in cutting and their remedies.

UNIT - 3 **L-9**

PARTS OF SEWING MACHINE : Types of needles, parts of needles and their function, needle size, sewing thread, properties of sewing threads, ticket number, fabric sewability, Basic parts of a sewing machine - needle, bobbin case/bobbin hook, loppers, loop spreader, threading fingers, throat plate, tongue chaining plates, take up devices, tensioner, feed dog, presser foot, folders and attachments.

UNIT - 4 **L-9**

SEWING MACHINE SETTINGS : Classification of sewing machines - basic SNLS machine, parts and their functions, adjustments, stand height, pedal, needle bar, presser foot, feed dog, differential feed ratio, reverse feed, stitch length selection, feed timing, needle and bobbin thread tension, stitch cycle timing diagram, Maintenance of SNLS machine, Common defects and remedies.

UNIT- 5 **L-10**

SPECIALIZED SEWING MACHINES : Special purpose sewing machines - Feed-off-the-arm, button-hole sewing, button-sewing, bar, tack, blind stitch machines, over-lock machine, double-needle lock stitch machine, elastic band attaching machine, multi-needle chain stitch machine, single-needle machine with under-bed trimmer. Automation in sewing machines - automatic pocket sewing machine. Unit production system, Computerized sewing machines.

LABORATORY EXPERIMENTS

Course Outcomes:

The student will be able to:

- perform the cutting of different patterns using different knives.
- understand the major parts of sewing machines.
- know working of single needle sewing machine.
- explain special sewing machines for working and construction.

List of Experiments: Total Hours-30

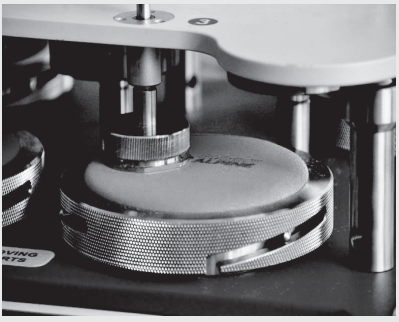
1. Study of various types of cutting machine for the working and construction.
2. Study of various types of cutting machine for the working and construction.
3. Study the various types of beds of the sewing machines.
4. Study the major parts of sewing machines.
5. Study of Needles for the sewing machine.
6. Study of sewing threads.
7. Study of single needle sewing machine for working and construction.
8. Study of overlock sewing machine for working and construction.
9. Study of special sewing machines for working and construction.
10. Study of feed off the arm machine for working and construction
11. Work aids and attachment for sewing machine.
12. Visit to garment unit.

TEXT BOOKS:

1. H. Carr and B. Latham, “The Technology of Clothing Manufacture”, Om Book Service, 1994.
2. R. M Laing, J Webster, “Stitches and Seams”, The Textile Institute, Manchester, UK,1998.

REFERENCE BOOKS:

1. S. Claire, “Sewing for the Apparel Industry”, Prentice Hall, New Jersey, 2001.
2. J. Solinger, “Apparel Manufacturing Handbook”, Reinhold Publications, 1998.



16TF306 TESTING OF FABRICS AND GARMENTS

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P
45	-	30

WA/RA	SSH/HSH	CS	SA	S	BS
15	15	-	-	15	10

Course Description and Objectives:

This course offers fabric testing and classification of fabric testing, garment testing, fabric dimensions and other essential fabric properties. Objective of this course is to impart basic knowledge and skill in fabric and garment testing domain.

Course Outcomes:

Tthe student will be able to:

- explain the importance of fabric testing and classification of fabric properties.
- understand the principles of testing for the measurement of fabric dimensions.
- perform testing for the measurement of mechanical properties of fabric.
- know the principles of testing for the measurement of fabric drape and handle.
- describe testing of fabric comfort properties.

SKILLS:

- ✓ *Analyze fabric dimensions.*
- ✓ *Identify the right method for the measurement of fabric strength.*
- ✓ *Assess the fabric abrasion and pilling test by subjective and objective analysis.*
- ✓ *Measure fabric permeability to air and water as per standards.*
- ✓ *Analyze and correlate the testing results of FAST and KESF.*

UNIT - 1 **L-10**

FABRIC DIMENSIONS : Scope of fabric testing – Importance of fabric testing – Standards for tests – classification of fabric properties, Properties of fabrics as Tailor made – Fabric dimensions like length, width, fabric weight, threads/inch (Densimeter) – crimp measurements– Measurement of thickness.

TENSILE TESTING OF FABRICS : classification of Tensile testers and working along with adjustments to suit the material under test – Automation in tensile testers –Methods for testing tensile strength of fabric – Tearing and factor affecting tearing strength– The Elmendorf tearing tester.

UNIT - 2 **L-9**

METHODS FOR TESTING : Methods for testing burst strength by Hydraulic diaphragm method, Factors affecting abrasion resistance – The Martindale abrasion tester– Pilling resistance of fabrics – ICI pilling box tester –pilling evaluation subjective and objective (by image capturing).

FABRIC STIFFNESS : Bending, shear and compression properties of fabrics –Methods for testing fabric shearing compression– Measurement of bending by Shirley stiffness tester and hanging loop method.

UNIT - 3 **L-9**

FABRIC DRAPE AND HANDLE : Measurement of Drape by drapameter– Crease and wrinkle behavior – Measurement of crease recovery - Air permeability – Air, water and water vapor transmission through fabrics – measurement of WVT by cup method and sweating guarded hot plate method – Wicking Test: longitudinal and traverse – Wettability of textile fabrics-Water repellency: spray rating– Bundesmann water repellency test –WIRA shower test.

UNIT - 4 **L-10**

THERMAL RESISTANCE OF FABRICS : Togmeter – Fabric Friction tester. Fabric Friction measurement by simple and inclined plane test– Flammability – Terminology related with flammability – Measurement of flammability by inclined plane method -Thermal insulation tester TIV –Limited Oxygen Index Tester -Assessment of color fastness – Measurement of Fastness to Washing, Light, Perspiration, Rubbing for dyed goods.

UNIT - 5 **L-10**

DIMENSIONAL STABILITY : Hygral expansion, relaxation shrinkage, swelling shrinkage, Felting shrinkage, Measurement of Dimensional stability.

BRIEF INTRODUCTION TO SPECIAL TESTS FOR TECHNICAL TEXTILES : moisture management tester – Wet Barrier Tester–Puncture Test–Cone Drop Tester–Tension creep–Radiant Heat Transmission Tester—Instrument for Run test–Surface Resistance Tester.

ACTIVITIES:

- Measure fabric thread crimp theoretically and practically
- Compare crease recovery of cotton and polyester fabric.
- Draw fabric drape diagram for stiff and limp fabric.
- Collect and compare test procedures under different standards.
- Assessment of color fastness test for different class of dyes.

LABORATY EXPERIMENTS

LIST OF EXPERIMENTS Total hours: 30

1. Testing the fabrics for bursting strength.
2. Determination of crease recovery angle of cotton, man-made and silk fabrics.
3. Determination of Drape co-efficient for textile fabrics.
4. Determination of fabric Tensile strength and elongation.
5. Determination of fabric Tear strength.
6. Determination of Ballistic strength of fabrics.
7. Testing of fabrics for pilling.
8. Determination of stiffness parameters of fabrics.
9. Study of dimensional stability of woven fabrics.
10. Determination of Air permeability of woven fabrics.
11. Wash fastness for different dyed and printed fabrics.
12. Determination of abrasion resistance of fabrics.
13. Blend analysis of fabric by chemical methods.

TEXT BOOKS:

1. J. E .Booth, “Principle of Textile Testing”, Butterworths Publisher, London, 1975.
2. B. P. Saville, “Physical Testing of Textiles”, Woodhead Publishing, Limited, 1999.

REFERENCE BOOK:

1. J. HU, “Fabric testing”, The Textile Institute, Woodhead Publishing Limited, 2008.
2. Grower and Hamby, “Hand Book of Textile Testing”, Textile Institute, 1996.
3. V. K. Kothari, “Developments in Textile Testing”, I B Publishers, New Delhi.

16TF307 APPAREL MERCHANDISING

Hours Per Week :

L	T	P	C
3	1	-	4

Total Hours :

L	T	P
45	15	-

WA/RA	SSH/HSH	CS	SA	S	BS
20	15	-	-	-	-

Course Description and Objectives:

This course provides the fundamental concepts of market and advertising techniques involved in merchandising. It discusses the types and functions of merchandising. Objective of this course is to impart knowledge and skills in apparel merchandising.

Course Outcomes:

The student will be able to:

- know marketing techniques in apparel merchandising.
- describe the various types of merchandising in apparel industry.
- understand the role and responsibilities of merchandiser.
- analyze the importance of sourcing activities.
- explain the importance of time management in merchandising.

SKILLS:

- ✓ *Identify the marketing activities in garment industry.*
- ✓ *Analyse different roles and responsibilities of merchandiser.*
- ✓ *Set the souring process for different trims and accessories required.*
- ✓ *Acquire the time management skills for merchandising.*

ACTIVITIES:

- *Collect different marketing activities followed by garment industry.*
- *Prepare flow chart of various activities done by merchandiser.*
- *Collect the lead time for different trims and accessories.*
- *Prepare a TNA calender.*

UNIT - 1 **L-9, T-3**

MARKETING : Apparel marketing - Definition, Scope, Functions and strategies of marketing. Market Research, International market, Retail and wholesale market and domestic market. fashion marketing planning. fashion market sourcing- domestic, export manufacturing, retailers/wholesalers/ cooperative, Buying agencies/Offices, Direct exporting.

UNIT - 2 **L-10, T-4**

MERCHANDISING : Apparel merchandising - Definition, Functions of merchandising division, Roles and responsibilities of merchandiser, Types of merchandising. Principles and techniques of apparel merchandising, Retail merchandising, Visual merchandising. Buying cycles and tools of merchandising - buying cycle, time and action plan, range planning, critical path and product development. Interfacing merchandising with production.

UNIT - 3 **L-9, T-3**

FASHION MERCHANDISING : Fashion merchandising - Principles and techniques of fashion merchandising, Components of fashion, principles of fashion, Leaders of fashion; Foreign fashion markets, Fashion shows, Fashion retailing trends.

UNIT - 4 **L-9, T-3**

PRICING AND SOURCING : Pricing - Pricing theory, Factors affecting price structure in apparel. Sourcing - Definition, Need and important factors in sourcing, Methods of sourcing, sourcing of accessories. Manufacturing resource planning, JIT technology.

UNIT - 5 **L-8, T-2**

TIME MANAGEMENT : Time management in merchandising, Production scheduling, Route card format, Accessories follow – up, Practical check points, Computer applications in marketing and merchandising.

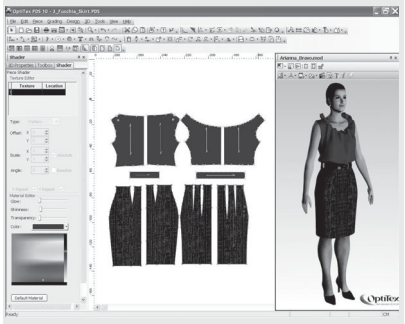
TEXT BOOKS:

1. E. C. Moore, “Path for Merchandising- A Step by Step Approach”, Thames and Hudson Ltd., London, 2001.
2. V. Barotia, “Marketing Management’’**,** Mangal Deep Publication, New Delhi, 2001.

REFERENCE BOOKS:

1. J. Jarnow and K. G. Dickerson, “Inside the Fashion Business”, Prentice Hall, New Delhi, 1997.
2. L. Stone, “Fashion Merchandising” ,McGraw Hill Books, Singapore, 1985.

16TF308 TEXTILE AND FASHION CAD LABORATARY



Hours Per Week :

L	T	P	C
-	-	3	2

Total Hours :

L	T	P
-	-	45

WA/RA	SSH/HSH	CS	SA	S	BS
-	-	-	20	-	-

Course Outcomes:

The student will be able to:

- prepare the design in CAD software.
- do the calculations of warp and weft yarn by changing various parameters.

LABORATY EXPERIMENTS

LIST OF EXPERIMENTS Total hours: 45

1. To make cutting plan using textile CAD for Mans shirt.
2. To make cutting plan using textile CAD for Women's wear.
3. To make cutting plan using textile CAD for Children wear.
4. To make drafting and lifting plan for given design using textile CAD.
5. To make drafting and lifting plan for given design using textile CAD by changing yarn count and twist.
6. To make stripe pattern with miss dent design by using textile CAD with changing yarn color.
7. To make checks pattern using textile CAD by changing yarn color.
8. To make stripe pattern using textile CAD by changing weave and yarn color.
9. To make checks pattern using textile CAD by changing weave and yarn color.
10. To make garment for summer wear using fashion CAD.
11. To make garment for party wear using fashion CAD.

IV

YEAR

TEXTILE AND FASHION TECHNOLOGY

B.Tech.

I SEMESTER

- 16MS201 - Management Science
- 16TF401 - Clothing Comfort
- 16TF402 - Industrial Engg. for Textiles & Apparels
- 16TF403 - Apparel Costing and Export Documents
- 16TF404 - Technical Textiles
- 16TF405 - Men, Women, Children Wear Construction Lab
- - Department Elective
- - Department / Open Elective
- - Employability and Life Skills Elective

II SEMESTER

- 16TF406 - Project work
- 16TF407 - Internship

COURSE CONTENTS

I SEM & II SEM

16MS201 MANAGEMENT SCIENCE

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
-	45	-	-	-	-

Course Description and Objectives:

This course provides an introduction to the evolution of management along with the framework of managerial functions related to organization structure, production, operations, marketing, human resource management, strategy etc. The objective of the course is to introduce the students and make them well versed with the operational functions of management.

Course Outcomes:

The student will be able to

- understand the nature, importance and evolution of management.
- identify the significance of Operations Management.
- carry out production operations through work study.
- understand the markets, customers and competition.
- plan and control the HR function.

SKILLS:

- ✓ *Analyze and improve productivity.*
- ✓ *Analyze the customer needs, wants and demand.*
- ✓ *Recognize the need of different types/qualities of Human Resources.*
- ✓ *Analyze the reasons for the evolution of management.*
- ✓ *Analyze the philosophies of different management thinkers.*

ACTIVITIES:

- *Solve a test case to identify the various operational functions of management .*
- *Solve a test case to know the importance of marketing.*
- *Solve a test case to know the importance of human resources.*
- *Solve a test case to know the importance and evolution of management discipline.*

UNIT - 1 **L-9**

INTRODUCTION TO MANAGEMENT: Concepts of Management and organization; nature, importance and Functions of Management; Systems approach to Management; Taylor's Scientific Management Theory, Fayol's Principles of Management, Mayo's Hawthorne Experiments, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, Leadership Styles, Social responsibilities of Management.

UNIT - 2 **L-9**

OPERATIONS MANAGEMENT: Principles and Types of Plant Layout; Methods of production (Job, Batch and Mass Production), Work Study - Basic procedure involved in Method Study and Work Measurement

UNIT - 3 **L-9**

MATERIALS MANAGEMENT: Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records; **Statistical Quality Control**: control charts for variables and attributes (simple Problems), Acceptance Sampling

UNIT - 4 **L-9**

HUMAN RESOURCES MANAGEMENT (HRM): Concepts of HRM, Basic functions of HR Manager; Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating.

UNIT - 5 **L-9**

MARKETING MANAGEMENT: Evolution of Marketing, Functions of Marketing Selling Vs Marketing; 4 P's of Marketing – Product Mix, Product Life Cycle, Place Mix – Channels of Distribution, Price Mix – Pricing Methods, Promotion Mix, Tools of Promotions.

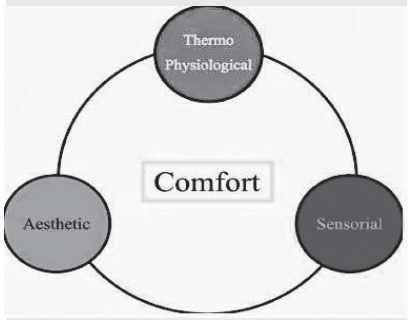
TEXT BOOKS:

1. P. Vijay Kumar, N. Appa Rao, Ashnab and Chnalill, "Introduction to Management Science", 6th edition, Cengage Learning India, 2012.
2. Stoner, Freeman and Gilbert, "Management", 6th edition, Pearson Education, New Delhi, 2004.

REFERENCE BOOKS:

1. Kotler Philip and Keller Kevin Lane, "Marketing Mangement" 12th edition, PHI, 2005.
2. Koontz and Weihrich, "Essentials of Management", 6th edition, TMH, 2005.

16TF401 CLOTHING COMFORT



Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
15	15	-	-	-	10

Course Description and Objectives:

This course offers the importance of comfort for selection of clothing and its measurement techniques and principles, physics of human comfort and related permeability tests to water and air. Objective of this course is to sensitize the required comfort properties for human clothing intern useful for designing clothing for specific applications.

Course Outcomes:

The student will be able to:

- know the clothing comfort and its types.
- describe the test methods related to thermal comfort.
- compare fabric parameters affecting tactile comfort sensation.
- understand physics of human thermal comfort.
- explain the concepts related to physiological aspects of clothing comfort.

SKILLS:

- ✓ *Analyze and correlate the testing results of FAST and KESF to comfort.*
- ✓ *Identify the tests required to understand thermal, tactile and physiological comfort.*
- ✓ *Correlate garment fitting according to comfort.*
- ✓ *Select the clothing for specific person at specific condition.*

ACTIVITIES:

- *List out comfort aspect of clothing used for swim wear/ ski wear/ military wear.*
- *Collect specifications of clothing for swim wear/ ski wear/military wear.*
- *Designing a garment by considering thermal comfort for specific conditions.*
- *Designing a garment by considering tailorability and drapability for normal wear.*
- *Survey on physiological comfort and its relation with comfort and garment design.*

UNIT - 1 **L-9**

CLOTHING COMFORT : Comfort - Introduction to clothing comfort, types and definition, human clothing system, comfort perception and preferences, Need and selection of clothing, Components of clothing comfort, Clothing Comfort and wearer's attitude.

UNIT - 2 **L-9**

THERMAL COMFORT : Physics of human thermal comfort - Physical phenomena affecting thermal comfort, Effect of fabric properties of heat transfer, Moisture vapor permeability, Liquid moisture permeability – Absorbency, Wettability, Waterproof, Contact angle, Moisture management; Air permeability – Factors influencing air permeability.

UNIT - 3 **L-10**

TACTILE COMFORT : Human tactile responses, Fabric parameter affecting tactile comfort sensations, Fabric handle attributes for expressing tactile comfort, Assessment of fabric handle characteristics using kawabata (KES) system and Fabric Assurance by Simple Testing (FAST).

UNIT - 4 **L-9**

PHYSIOLOGICAL AND FITTING COMFORT : Concept related to physiological aspects of clothing comfort, Factors affecting garment fit and comfort – Air gap thickness, Garment ventilation, Fluctuating microclimate in loose-fit garment, Garment fit and pressure sensation.

UNIT - 5 **L-8**

PHYSIOLOGICAL COMFORT : Concept of physiological comfort, Neuro physiological comfort, Basis of sensory perceptions, Measurement techniques, Mechanical stimuli and thermal stimuli.

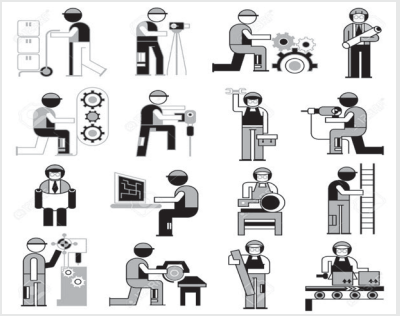
TEXT BOOKS:

1. A Das and E Alagiruamy, "Science in clothing comfort", 1st edition, Wood head Publishing Ltd., 2010.

REFERENCE BOOKS:

1. H. M. Behery, "Effect of Mechanical and Physical Properties on Fabric Hand" – Wood head Publishing Ltd., 1995.
2. Li .Y, "The science of Clothing Comfort", Textile Progress 31:1
3. R.M Laing and G.G. Sleivert, "Clothing, Textile and Human Performance", Textile Progress 31:1.

16TF402 INDUSTRIAL ENGINEERING FOR TEXTILES AND APPARELS



Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
20	-	20	-	-	-

Course Description and Objectives:

This course offers to understand the methods requred to set the targets, principles involved to set-up a manufacturing unit and best work practices to get better quality and higher production. Objective of this course is to impart designing skills to standardise the work practices.

Course Outcomes:

The student will be able to:

- know the different concepts and meaning of Industrial engineering.
- distinguish techniques in designing a workstation at bulk production.
- design a production system or work system.
- analyze the work place by using work study and method study.

SKILLS:

- ✓ *Prepare a project for small scale industry.*
- ✓ *Select plant location and machinery for project.*
- ✓ *Analyse best practices for material handling.*
- ✓ *Set standard operating procedures.*

ACTIVITIES:

- *Prepare standard work procedures for group of activities.*
- *Case study on plant layout.*
- *Collect the different types of material handling techniques used in garment industry.*
- *Compare WIP in different producition systems.*
- *Calculate the inventory cost for given conditions.*
- *Compare the advantages of outsourcing.*

UNIT - 1 **L-9**

CONCEPTS OF PRODUCTION AND PRODUCTIVITY: Introduction, Production, Productivity, Standard of living, Productivity measures. Role of apparel engineering - Introduction, Apparel engineering, Methodology, Benefits of engineering, Tools and techniques for apparel engineering, Role of industrial engineer, Pre-production activities of a supervisor.

METHOD ANALYSIS: Definition, Recording the method, Operation process chart, Flow process chart, Flow diagram, String diagram, Travel chart (From – To chart), Multiple activity chart (or) man–machine chart.

UNIT - 2 **L-10**

MOTION ECONOMY: Principles of motion economy, Two-handed process chart, Micro motion study, Study of method recorded, Methods improvement,

TYPES OF PRODUCTION SYSTEMS - Flow line, batch and job shop, Planning and Control for mass production, Characteristics, Design aspects, Problem of mass production, FMS, Batch production, EBQ; Supply Chain Management - Concept & tools, Make or buy & factors affecting out sourcing.

UNIT - 3 **L-9**

APPAREL PRODUCTION SYSTEMS AND FACTORY LAYOUT: Introduction, Garment production systems, Group system, Progressive bundle synchro straight line system – batch system, Unit production system (UPS), Quick response sewing system, Layout objectives, Designing the layout.

WORK MEASUREMENT: Definition of work measurement, Techniques of work measurement, Time study, Selecting the job, Standard allowed minute (SAM), Rating factor, Allowances, Other methods to set time standards.

UNIT - 4 **L-9**

APPLICATION OF IE TECHNIQUES IN GARMENT INDUSTRY: Capacity study, Operator performance, Follow-ups, Work in process (WIP), Operation bulletin

LINE BALANCING: Balancing, Steps to balance the line, Initial balance, Balance control (Operating a line), Efficiency, Cycle checks, Balancing tools.

UNIT - 5 **L-8**

SCIENTIFIC METHOD OF TRAINING: Scientific method of training, Methodology behind SMT, Selection test, Basic exercise, Paper exercise, Fabric exercise,

INDUSTRIAL ENGINEERING IN APPAREL QUALITY CONTROL: Introduction, Quality as a multi-dimensional aspect, Controlling quality, Steps to achieve good quality, Quality specifications sheet, Quality training

TEXT BOOKS:

1. V Ramesh Babu, “Industrial engineering in apparel production”, Woodhead Publishing India,2012.
2. Aswathappa, “Production & Operations Management”, Himalya Publishing House, New Delhi, 2006.

REFERENCE BOOKS:

1. O.P. Khanna, “Industrial Engneering & Management”, Dhanpat Rai & Sons, New Delhi, 2004.
2. B. Sharma, “Industrial Engineering & Management”, Khanna Publications, 1992.

16TF403 APPAREL COSTING AND EXPORT DOCUMENTATION

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
20	-	20	-	-	-

Course Description and Objectives:

This course offers fundamental concepts of costing and its various types of costing used in apparel industry. It discuss about factors that determine the price of garment and its components, different types and functions of packing and labeling cost. Objective of this course is to impart knowledge on costing and documents connected to exports and international codes for products and services.

Course Outcomes:

The student will be able to:

- know the fundamental concepts of costing and its various types.
- describe the factors that determine the price of garment and its components.
- understand the different types and functions of packing and labeling cost.
- compare the facilities available for garment exporters with regard to Govt. assistance and banks.
- learn the procedures involved to start up a garment unit and subsidies available export contracts.

SKILLS:

- ✓ *Optimize the costing of garments.*
- ✓ *Analyze the various factors determine the cost of garment.*
- ✓ *Set the procedure for packing and labeling of garment.*
- ✓ *Aware of export documentation prdocedures.*
- ✓ *Set up a new garment unit.*

ACTIVITIES:

- *Prepare standard TECHPACK work given garment.*
- *Calculate cost of garment from fiber stage*
- *Analysis of types of cost for making a garment*
- *Analyse various schemes available for garment exporters*
- *Calculate cost incurred in exporting to various countries*
- *Compare the advantages of EOU, Textile Parks SEZ etc.*

UNIT- 1 **L-10**

INTRODUCTION TO COST ACCOUNTING : Cost - Principles of cost; Types of cost - Fixed cost, Variable cost, Semi variable cost, Conversion cost, Differential cost; Elements of cost, Direct material cost, Direct expenses, Direct wages, Indirect materials, Indirect expenses, Indirect labour, Overheads, Production overhead, Administrative overhead, Selling overhead distribution overhead, Components of cost sheet.

UNIT - 2 **L-8**

MATERIAL AND CMT COST : Factors that determine the price of garments - Material cost, Cost of yarn, Cost of fabric production, Cost of processing width of fabric and design affecting cost, Lot size, cost of components, Cutting cost, Making and trim cost (CMT cost). Simple problems.

UNIT - 3 **L-9**

PREPARATION OF PRE-COST SHEET : Packing and labelling cost - Different types and functions. Uses of brand and size label, Cost of bought out components, Thread, Button, Zippers, Interlining, Shipment cost, Cost calculation of ladies, Men and children's wear - Woven and knitted. Simple problems.

UNIT - 4 **L-9**

FACILITIES FOR EXPORTERS : Facilities available for garment exporters – Govt. assistance to exporters, Cash compensatory support, duty drawback, Export finance through banks, Export credit, short term, Medium term and long term credits, Anticipatory letter of credit, Export credit guarantee corporation, Export import bank, Market development assistance, MDF(Marketing Development Fund).

UNIT - 5 **L-9**

EXPORT PROCEDURES AND DOCUMENTATION : 100 percent EOU (Export Oriented Unit), Foreign exchange market, Business environment, Role of Government policies, Procedures to start up a garment unit, Subsidies, export contracts, business ethics, Documents connected to exports, International codes for products and services, Principal documents, auxiliary documents, Documents for claiming export assistance ,Exchange control regulations relating to garment exports.

TEXT BOOKS:

1. Shivaramu S., "Export Marketing – A practical guide to exporters", Wheeler Publishing, 1996
2. Katherine McKelvey, "Fashion Source Book", Om Book Service, New Delhi, 2001

REFERENCE BOOKS:

1. Jeannette Jamow, Kitty G. Dickerson, "Inside the Fashion Business", Prentice Hall, 1997
2. Koshy Darlie O., "Effective Export Marketing of Apparel", Global Business Press, 1996
3. Johnson Maurice and Moore E., "Apparel Product Development", Om Book Service, New Delhi, 2001
4. Koshy Darlie O., "Effective Export Marketing of Apparel", Global Business Press, 1996
5. Hearle J. W. S., Hines T. and Suh. M. (Ed.), "Global Marketing of Textiles" JTI, 1999.

16TF404 TECHNICAL TEXTILES

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
10	-	-	-	20	-

Course Description and Objectives:

This course offer functional use of textile instead of aesthetic applications. It starts with the classification, manufacturing techniques and material used for the technical applications. Then it introduces the use of technical textiles in defense, medical and transportation applications. Objective of this course is to impart knowledge and skill in the application of technical textiles in various sectors.

Course Outcomes:

The student will be able to:

- know the properties and technical aspects of different types of yarn and fabric.
- understand the requirement of defense clothing and principles of camouflage fabric.
- learn the application of textiles in medical field, transportation and in construction.
- identify the type of fibre and arrangement of cord ply for different types of fibre.
- explain the manufacturing, properties and applications of high performance fibre.
- correlate the function and properties of geo-textiles for specific applications.

SKILLS:

- ✓ *Correlate properties of yarn, fabric and fabric structure to the end applications*
- ✓ *Identify fibre, chemical coating and printing for camouflage system*
- ✓ *Select textile materials and process for medical textiles.*
- ✓ *Identify the high performance fibre and its manufacturing parameters for particular use.*
- ✓ *Select fibre, fabric and resin in case of textile reinforced composite for specific application.*

ACTIVITIES:

- *Collection of fibres used for a mulch mat/ geo-textile/ sutures/for various applications..*
- *Design a fabric structure for a ballistic armor/ geo-textile/seat belt.*
- *Interpret the results of permittivity and transitivity to the fabric thickness.*
- *Analyse baby diaper/carry bag/tyre cord/ other technical textiles product.*
- *Analyse shed cover, its design, coating and related information.*

UNIT – 1 **L-10**

GENERAL TECHNICAL TEXTILES : Classification of textiles according to tailor made, Brief note on technical yarns, fabrics, and fabric structures, Scope of industrial textiles, Influence of man-made fibre, manufacturing techniques of industrial textiles, Industrial sewing threads and their manufacture, Nomenclature, Textiles in agriculture, diary and horticultural, Textiles in cigarettes, Paper machine clothing - structure and manufacture of former, drier and wet felts, requirements of these felts, Textiles in conveyor belting and power transmission.

UNIT - 2 **L-9**

TEXTILES FOR DEFENSE & SURVIVAL : Requirements, Canvas for defense, Combat clothing system, Water vapor permeable clothing, Breathable clothing, Camouflage systems, Colour and patterns, Camouflage for visible, UV, near IR, far IR, Deceptions, Decoys, Cut resistant textiles, Protective clothing for extremely cold region, Ballistic protective armours and accessories, Introduction to aerospace Textiles, Fabrics for nuclear, biological and chemical protection.

UNIT - 3 **L-8**

MEDICAL TEXTILES : Brief study of applications of textiles in medical field : Classification, Sutures, Surgical drapes, masks, Hospital textiles, Textiles for orthopedics.

TEXTILES IN TRANSPORTATION : Tyre cord ,Cross section of passenger tyre, Manufacture of tyre cords, Types of tyres, Textiles in parachute applications, hose canvas, duck fabrics. Introduction to textile in automobile, Seat belt, Airbag.

UNIT - 4 **L-9**

HIGH PERFORMANCE FIBRES : Manufacture, Properties and applications of Basalt, ultra high modulus fibres like aramid and carbon.

TEXTILES IN FILTRATION, SPORTS, ACOUSTICS : Textiles in filtration media, methods of filtration, selection of textiles for filtration, Coated fabrics and high performance coated fabrics, fabric structure for coated fabrics, coating materials and methods, Textiles in acoustical applications, Textile materials in sports and recreations.

UNIT - 5 **L-9**

TEXTILES IN CONSTRUCTION : Geo-textiles, Requirements, Properties, Functions, Applications, Testing of Geo-Textiles. Fabrics, Architectural fabrics, Building structure, Awnings and Canopies.

TEXTILES IN COMPOSITES : Textile Reinforced Composites, Woven, Knitted and Nonwoven fabric reinforcements - Properties, Mechanics; High performance PP composites, Hybrid yarns for composites.

TEXT BOOKS:

1. A. R Horrocks, S.C. Anand, “Handbook of Technical Textiles”, 2nd edition, Woodhead Publishing, Cambridge, 2000.
2. S. Adanur, “Handbook of Industrial Textiles”, 2nd edition, Technomic Publication, Lancaster, 2001.

REFERENCE BOOKS:

1. M.C. Kanna, “Design and Manufacture of Textile Composites”, Textile Progress”, Manchester, April 2004.
2. Shishoo, “Textile in sports”, Textile progress, Manchester, August 2005.
3. Fung W., Collins & Aikman, “Textiles in Automotive Engineering”, 2nd edition, Wood Head Publishing ltd., UK, 2000.

16TF405 MEN, WOMEN, CHILDREN WEAR CONSTRUCTION LAB

Hours Per Week :

L	T	P	C
-	-	3	2

Total Hours :

L	T	P
-	-	45

WA/RA	SSH/HSH	CS	SA	S	BS
-	-	-	20	-	-

Course Outcomes:

The student will be able to:

- construct Children's wear.
- construct Men's casual, formal and under garments.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS Total hours: 45

Construction of Children's wear:

1. Children's baba suit
2. Children's rompers
3. Childr en's frock

Construction of Men's casual wear:

4. Men's Bermudas
5. Men's' shorts
6. Men's T-Shirt

Construction of Men's formal wear

7. Men's formal shirt
8. Men's formal trousers
9. Men's casual trousers

Construction of Men's under garments:

10. Briefs
11. Vests

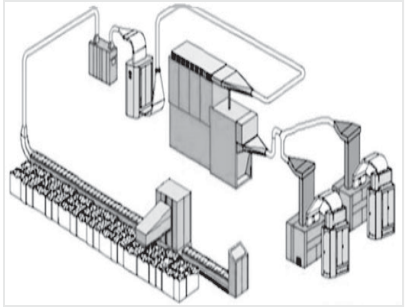
TEXTILE AND FASHION TECHNOLOGY

B.Tech.

DEPARTMENT ELECTIVE COURSES

- STREAM-1 - Yarn Manufacturing
- STREAM-2 - Woven Fabric Manufacturing
- STREAM-3 - Knitting Technology
- STREAM-4 - Textile Wet Processing

COURSE CONTENTS



16TF250 PRACTICAL ASPECTS IN BLOW ROOM AND CARDING

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
20	15	-	-	-	-

Course Description and Objectives:

This course provides the technical and technological aspects of the yarn production process between Blow room and carding. Objective of this course is to impart the knowledge and skill on conventional and modern machines involved in the blow room and carding.

Course Outcomes:

The student will be able to:

- understand different concepts in blow room and carding.
- explain the routes for differnt types of fibres.
- describe for modern carding machine.

SKILLS:

- ✓ *Analyse fiber opening and cleaning in Blow room.*
- ✓ *Calculate the productions of blow room and carding.*
- ✓ *Control of waste in blow room and carding.*
- ✓ *Set the parameters for processing of various fibers in carding.*

ACTIVITIES:

- *Collect the technical specifications of modern blow room line.*
- *Comparitive study on conventional and non-conventional carding machines.*
- *Collect the carding parameters for a given cotton.*
- *Case study on nep removel efficiency in conventional and non-conventional cards.*
- *Study of Rieter and Trumac blow room line.*

UNIT - 1 **L-9**

BLOW ROOM: Introduction, opening and cleaning – mechanical opening and cleaning, striking from a spike, beater and feed roller, use of air current. Estimating the effectiveness of opening and cleaning systems – Intensity of opening, openness value, cleaning efficiency. Rieter and Trumac blow room line.

UNIT - 2 **L-9**

PROCESS CONTROL IN BLOW ROOM : Requirements for preparation of lot size of Cotton, Calculation of lot size from Bales, planning of the settings in Blow room machines, Calculation of Individual and Overall Cleaning efficiency of Blow room, Waste calculation , Assessment of Productivity , Planning of Blow room lines with respect to the lot size prepared.

UNIT - 3 **L-9**

CARDING : Introduction, revolving flat card – Chute feed system, taker-in zone, developments in taker-in zone, cylinder carding zone, cylinder-doffer stripping zone, sliver formation, continuity of fiber mass flow, drafts equations, production equation. Waste extraction at card, Nep study & control, Snap Study card.

UNIT - 4 **L-9**

STRIPPING AND GRINDING : Frequency of Grinding and effect on Sliver quality, Card clothing, PPSI, Tooth geometry, Developments in card clothing, Card settings, Nep Study at Carding, brief note on Card Coiler mechanisms, High production cards, Tandem card , Auto leveling in card , Production calculations.

UNIT - 5 **L-9**

CALCULATION OF NUMBER OF CARDS : Setting of zones for Cotton, Blends and Synthetics, replacement analysis of spares of Card , Labor allotment , Productivity in Cards, Automation in Carding; Latest Developments in carding - C60 card,

TEXT BOOKS:

1. W. Klein, “Short Staple Spinning”, Vol 1, 3 & 4 Textile Institute Publishers, 1993.
2. Jayaprakasham, “Spun Yarn Technology”, SSM Institute Publications, Komarapalyam.

REFERENCE BOOKS:

1. Vekatsubrmani, “Spun Yarn Tehcnology”, SSM Institute Publications, Komarapalyam, Vol. III, 2003.
2. T.K.Pattabhiraman, “Essential Facts of Practical Cotton Spinning”, Mahajan Publisher, Ahmedabad, 2005.
3. K.R.Salhotra, “Recent Developments in Yarn Production”, Textile Association, Bombay, 1983

16TF350 PRACTICAL ASPECTS IN DRAWING, COMBER AND SIMPLEX

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
20	15	-	-	-	-

Course Description and Objectives:

This course offers the technical and technological aspects of the yarn production process machines such as draw frame, combing preparatory, combing and roving frame. Objective of this course is to transmit advanced concepts of yarn preparatory.

Course Outcomes:

The student will be able to:

- Know different concepts in Draw Frames, Comber and Simplex
- Describe different concepts relating to productivity and quality.
- understand different concepts for line balancing.
- learn various machine work practices.

SKILLS:

- ✓ *Analyse fiber parallelization in draw frame, combing and speed frame.*
- ✓ *Calculate the productions of yarn preparatory machines.*
- ✓ *Optimise waste in combing.*
- ✓ *Differentiate processing of various fibers in speed frame.*

ACTIVITIES:

- *Collect technical specifications of modern machines.*
- *Compare conventional and non-conventional lap formers.*
- *Perform production calculations of speed frame.*
- *Compare backward and forward feeding combers*

UNIT - 1 **L-9**

DRAWING : Introduction to drawing - Objects, basic concepts of drawing (ideal draft and real draft, Number of Doublings, Parallelization), Study of conventional Draw frame, Principle of Roller drafting, Different drafting systems, methods of roller weighing, Roller eccentricity, Coiler mechanism, Draw frame setting (bottom and top rollers and other settings like scanning rollers and coiler etc), Importance of Break draft, Study of Modern Draw frame, Auto leveling in Draw frame (open loop and closed loop), Production calculations.

UNIT - 2 **L-9**

COMBER PREPARATORY : Introduction to combing – Hook presentation, Hooks theory, combing preparatory machines, study of sliver lap, ribbon lap and super lap formers, importance of comber preparatory, calculations of sliver lap, ribbon lap and super lap formers, elements of lap formers and their importance, passage of material through comber, functions and setting of each part.

UNIT - 3 **L-9**

COMBING : Combing principle, cycle of combing (Back ward and Forward combing, Early and Late combings), working of modern combers, production calculations, Combing efficiency. Optimum level of comber waste, norms for improvement in mean length on combing, the need of routine check of comber waste, procedure for control of comber waste; modern developments and technical specifications of comber.

UNIT- 4 **L-9**

SPEED FRAME : Principles of speed frame, detailed study of mechanisms (Drafting, Twisting and bobbin building) of speed frame, study of different speed frames role of various drafts, processing of cotton, synthetic and regenerated fibers, developments in speed frame, technical specifications of various speed frames, Roving bobbin defects.

UNIT - 5 **L-9**

PRODUCTIVITY : Recent Developments, production calculations of speed frame, maintenance schedules; Measurement and analysis of productivity – definition of indices of productivity, measurement of productivity, analysis of shortfall in productivity, productivity and profitability, planning of machines in preparatory section for different counts.

TEXT BOOKS:

1. W. Klein, “Short Staple Spinning”, Vol 1, 3 & 4, Textile Institute Publishers, 1993.
2. A.R. Khare, “Cotton Combing”, Mahajan Book Publishers, Ahmedabad, 2003.

REFERENCE BOOKS :

1. Vekatsubrmani, “Spun Yarn Tehcnology”, SSM Institute Publications, Komarapalyam, Vol. III, 2003.
2. T. K. Pattabhiraman, “Essential Facts of Practical Cotton Spinning”, Mahajan Publisher, Ahmedabad, 2005.
3. K.R.Salhotra, “Recent Developments in Yarn Production”, Textile Association, Bombay, 1983.

16TF351 PRACTICAL ASPECTS IN YARN FORMATION MACHINERY

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
20	10	-	-	20	-

Course Description and Objectives:

This course deals with various yarn formation machineries consisting development of ring frame, rotor, air-jet and other high production spinning machineries. Objective of this course is to gain expertise in yarn formation technologies.

Course Outcomes:

The student will be able to:

- understand practical aspects of ring frame.
- describe rotor, airjet and other spinning systems.
- compare various spinning systems in view of production and quality.
- understand the need of friction spinning for production of technical yarns.

SKILLS:

- ✓ *Optimise twist level for ring spinning for different blends.*
- ✓ *Analyse twist factor and its relation with production.*
- ✓ *Identify twist and production for rotor spinning.*
- ✓ *Differentiate different spinning systems.*
- ✓ *Select yarn formation machineries for a yarn with desired properties.*

ACTIVITIES:

- *Collect ring and rotor yarn specifications for denim.*
- *Derivation for the twist factor in Ne and Tex mode.*
- *Comparison of ring, rotor, air-jet and friction yarn properties.*
- *Analyse ring spinning system as it is major producer of yarn formation.*

UNIT - 1 **L-9**

RING FRAME : Types of various drafting systems on Ring Frame – Drafting elements and their types- Selection of drafting system & elements – weighing of drafting rollers- Principle of Twisting – Types of Twists – Twist levels and their selection for 100% cotton, P/C, P/V & 100% Synthetics – Twist Factor and its importance – Twisting arrangement – Observed and calculated twist – Twist contraction -Principles of winding, Types of builds – builder motions – Labor allotment.

UNIT - 2

L-9

DEVELOPMENT OF RING FRAME & POST SPINNING : Developments in ring frame – Ring data/ ISM(Individual spindle Monitoring), Duoflex, Individual driving system, Auto doffing, Developments iin ring and traveller, Production calculations, Post spinning operations; Systems of doubling - Doubling twist, Two from one twister; Brief note on reeling, bundling and baling – machinery and process for waste spinning.

UNIT - 3 **L-9**

ROTOR SPINNING : Limitations of ring spinning – principles of open end spinning – principles of rotor spinning – opening roller specifications for cotton and synthetics – Tangential and radial feeding – back doubling concept - external and internal suction device – rotor groove geometry – their influence on design parameters and dimensions of rotor – spinning performance doffing tube and false twist effect – take up and package formation – auto piecing systems – rotor yarn properties – calculation of twist, machine constant and production.

UNIT - 4 **L-8**

TWIST-LESS, SELF TWIST & AIR-JET : Twist-less spinning, Tekja process, TNO, TWILO, Self twist spinning, Repcospinning, Vortex spinning, developments Air-jet / Vortex spinning – principle of formation of wild, core wild, wrapper, wrapper wild fibers – machinery details – yarn structure and properties.

UNIT - 5 **L-10**

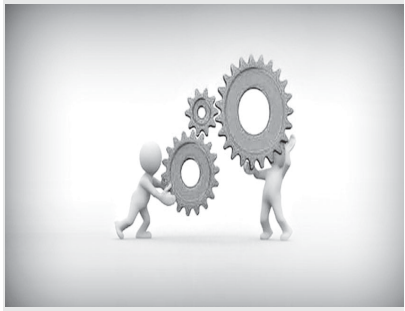
FRICTION, SIRO SPINNING : Introduction – frictional forces – mechanism of friction spinning – DREF-I, II , III, V, 2000 and 3000. Yarn structures, properties and end uses. Comparison between Ring, rotor and Air-jet yarns; SIRO SPINNING principle – comparison between SIRO yarn and double yarn. COMPACT SPINNING – methods – yarn structure and properties.

TEXT BOOKS:

1. J. C.W .Lawrence, “Technology of Yarn Production”, Wood Head Publishers, London, 2000.
2. P. R. Lord, Cherian Iype, “Theory of Yarn Production”, Wood Head Publishers, Wales, U.K, 2005.

REFERENCE BOOK:

1. W. Klein, “NEW SPINNING SYSTEMS”, Textile Institute Manchester, 1990.



16TF450 MAINTENANCE IN SPINNING

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
15	15	20	-	-	-

Course Description and Objectives:

This course offers basics of maintenance, various types of maintenances in spinning industry, inventory management technique, planning of maintenance activities, lubrication and different tools used in maintanence of spinning machinery . Objective of this course to impart knowledge and skill required to maintain effective running of machinery with special emphasis to spinning machinery.

Course Outcomes:

The student should be able to:

- know the importance of maintenance activities in spinning machinery
- understand the concepts behind the breakdown of machines
- describe different types of maintenance activities
- compare maintenance activities carried out in spinning
- analyse the control of inventory and SQC & Lubrication.

SKILLS:

- ✓ *Set the lubrication schedules in spinning industry.*
- ✓ *Design the maintenance schedules of carding, draw frame, simple and ring frame.*
- ✓ *Optimise the house keeping procedures.*
- ✓ *Trace the causes for accidents and preventive measures.*
- ✓ *Analyse machine audit reports.*

ACTIVITIES:

- *Collect the pictures of machine breakdown*
- *Collect standard maintencee schedules from SITRA, BTRA*
- *Design Maintenance schdules for a 30,000 spindilage spinning mill.*
- *Analyse the components replacements schedule.*
- *Prepare good house keeping practices in different department*

UNIT - 1 **L-9**

INTRODUCTION TO MAINTENANCE : Need of maintenance: Introduction, Modes of failure, , Planned maintenance, Unplanned maintenance, Quality-based maintenance, Role of maintenance department in spinning mill, Proactive maintenance, Preventive maintenance, Condition-based monitoring, Benefits of condition-based monitoring, Implementation of condition-based maintenance.

UNIT - 2 **L-9**

PLANNING AND SCHEDULING : General principles of planning, Procedure of planning, Scheduling, Principle of standardization of frequencies and jobs, Principle of cyclic schedule for the maintenance team Maintenance audit: Introduction, Methodology, Preparation of maintenance audit report. Role of manpower in maintenance: Introduction, Factors affecting manpower planning, Manpower norms, Maintenance organization structure, Concept of common gang, Responsibilities at various positions, Human error in maintenance, Crew size required for various activities in maintenance department.

UNIT - 3 **L-9**

MAINTENANCE REPAIR INVENTORY AND ITS CONTROL : Inventory, Types of inventory, Inventory carrying cost, Material and repair inventory, Different methods for controlling the inventory,

MAINTENANCE INFORMATION SYSTEMS : Computer-managed maintenance system, Benefits of CMMS, Components of CMMS.

SAFETY WHILE MAINTENANCE : Accident, Effects of an accident, Accidents and its related losses, Cause of accidents, Electrical safety, House keeping, Machine guarding, Safety in shifting material, Safety while unpacking and cleaning, Precautions for handling machine under maintenance, Precautions during spinning operation, Safety tags.

UNIT - 4 **L-9**

LUBRICANTS : Types of lubricants, Functions of lubricant, Liquid lubricants, Semisolid lubricants, Solid lubricants, Lubricant used in spinning mill, Lubricants handling and storage, Conservation of lubricants. Belt drives and its maintenance, Flat belt drives, Spindle tape, Flat pulley, V belts, V pulleys, Timing belts, Steel wire and chain, Steel wire rope, Wire pulley or sheave, Maintenance of chains.

UNIT - 5 **L-9**

GEARS : lubrication and its maintenance, Reasons for the failure of gear teeth. Bearing and its maintenance: Bearing, Types of bearing, Bearing characteristics, Lubrication of bearing.

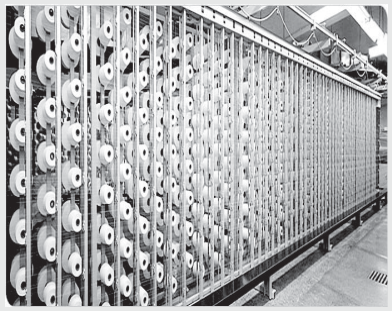
TOOLS USING IN SPINNING MAINTENANCE : Open-ended spanner, Ring spanner, Torque wrench sockets, Allen key, Try square, Steel rule, Feeler gauge, Hammers, Soft hammers, Dial gauge, Spirit level, Vernier caliper, Digital vernier caliper, File, Chisels, Screw driver, Vices, Grinding wheels, Pliers, Kit for mounting of bearing, Pullers, Drill, Oil cans, Grease gun, Plumb bob, Requirement of tool for erection, installation and maintenance.

TEXT BOOKS:

1. N, Niijjaawan and R. Niijjaawan, “Modern approach to Maintenance in Spinning” Woodhead publishing India in textiles, New Delhi, 2010.
2. BTRA, “Maintenance Manuals for Various Spinning & Weaving Machines”, 2nd edition, 1990.

REFERENCE BOOKS:

1. SITRA, “Spinning Machinery Maintenance”, 2nd edition, SITRA Publications, 1996.
2. SITRA, “Maintenance Manuals of Different Machinery Manufacturers of Spinning & Weaving Machines”, 2nd edition, SITRA Publications, 1996.



16TF251 PRACTICAL ASPECTS IN WEAVING PREPARATORY

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
15	15	-	-	-	-

Course Description and Objectives:

This course offers practical aspects related to fabric preparatory, which starts from winding followed by warping, yarn sizing required for fabric manufacturing by the shuttle looms or shuttle-less looms. Objective of this course is to provide practical exposure required in weaving preparatory process.

Course Outcomes:

The student will be able to:

- learn importance of weaving preparatory process.
- understand practical aspects in weaving preparatory.
- analyse each process and its control measures.

SKILLS:

- ✓ *Differentiate between the weaving preparatory machines.*
- ✓ *Control the various weaving preparatory machines without any change of quality.*
- ✓ *Identify the sized and un-sized yarns.*
- ✓ *Optimise the parameters in sizing.*

ACTIVITIES:

- *Collect technical parameters of winding machine.*
- *List out the requirements of yarn dyed packages.*
- *Calculate efficiency of prepatory processes.*
- *Simulate warping parameters and find efficiency.*
- *Collect reed, drop wire, heald wire specifications.*

UNIT - 1 **L-9**

WINDING : Fundamental aspects of winding, technical aspects of the winding process, technical features of a drum winding machine, knotting and splicing, yarn clearing, classification of yarn faults, technological developments in winding, modern automatic cone winding machine, defects in wound packages, winding of sewing threads, requirements of wound package for dyeing, winding on a two for one twister for spun yarns.

UNIT - 2 **L-9**

WARPING : Beam warping, sectional warping machine, modern developments in warping, end breaks and waste in warping, productivity at warping, quality of warping beams, process control in warping, causes of low productivity.

UNIT - 3 **L-9**

SIZING : Sizing and its importance, sizing ingredients, sizing paste preparation, techniques of sizing, types of drying, special devices in sizing, control systems in sizing machines, single end sizing, sizing of synthetic and blended yarns, process control in sizing and sizing faults, modern developments in sizing, Size pick-up, splitting, factors affecting the size yarn performance,

UNIT - 4 **L-9**

DRAWING-IN : Principles of various machines, warp tying machine manufacturers, yarn dressing, fully automatic warp tying machine manufacturers, commonly occurring defects in drawing-in process, process control in drawing-in; preparation of micro denier yarns, care in use and selection – healds, reeds; drop pins.

UNIT - 5 **L-9**

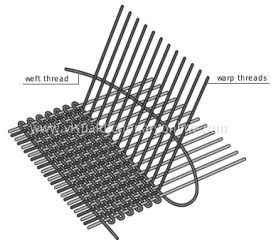
QUALITY AND PRODUCTIVITY IN PREPARATORY : Winding: Efficient removal of yarn faults in winding, Approach to control of productivity, Calculations of efficiency and productivity, Warping: Minimisation of end breaks in warping, Condition of beam flange,Stop motion and break, Density of beams, Calculation of efficiency adn productivity.Sizing: Control of yarn stretch - Mechanism and propagation of stretch, Control of stretch in creel, wet zone and head stock zone, Calculation of efficiency adn productivity. Care in dressing of the beam for reducing incidence of cross ends and extra ends.

TEXT BOOKS:

1. M. K. Singh, “Industrial Practices in Weaving Preparatory”, Woodhead publishing India in Textiles, 2014.
2. N. Gokarneshan, “Weaving Preparation Technology”, Abhishek Publications, Chandigarh, India, 2009.

REFERENCE BOOK:

1. N.C. Paliwal and P.D.Kimothi, “Process and Quality Control in Weaving”, ATIRA, 1983.



16TF352 PRINCIPLES OF WEAVING

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
15	15	-	-	-	-

Course Description and Objectives:

This course offer primary, secondary and auxiliary motions in weaving, It deals with different types of shedding mechanisms used in conventional and non-conventional weaving machines. Objective of this course is to provide the knowledge and skill required in shuttle weaving and retrofit mechanisms.

Course Outcomes:

The student will be able to:

- understand different driving mechanisms for various motions.
- compare various shedding mechanisms.
- analyse the settings for various mechansims.
- describe the need of dobby and jacquard shedding.

SKILLS:

- ✓ *Identify the negative and positive let-off/take-up motion.*
- ✓ *Perform pegging of pattern of the dobby lattice.*
- ✓ *Optimise various setting in feelers and weft replenishment mechanisms.*

ACTIVITIES:

- *Collect technical parameters of different jacquards.*
- *Practice on pegging for left and right handed dobby lattices by using various designs.*
- *Calculate casting-out for jacquard.*
- *Compare conventional jacquard and electronic jacquard.*

UNIT - 1 **L-10**

MOTIONS IN WEAVING : Primery motions- Shedding, Picking, Beat up; Secondary motions - Types of Take-Up Motion, anti-crack device, cloth wind-up systems, Let-Off Motions - Types, working of positive let-off, recent developments,

Auxiliary Motions -- Types, working of Warp protector motions (Fast & Loose Reed), Weft stop motions, warp stop mechanisms, Loom Temples - Types, construction of various types of Loom Temples and selection. Loom production calculations, control of productivity in loom shed, control of loom speed, control of loom efficiency, control of loom stops.

UNIT - 2 **L-9**

DOBBY SHEDDING : Introduction, need, types, selection and classification, Elements of dobby with respect to position, material of construction and function, Method of Pegging for Right and Left hand dobby; working of Keighly, Climax, Cam, Paper dobby (brief note on cross border dobby), Pick finding; Need and methods; Dobby setting - setting of T-Lever, Cylinder and Knives; defects of dobby woven fabrics and their remedies.

UNIT - 3 **L-9**

BOX MOTIONS & JACQUARD SHEDDING : Need & Types of box motions, selection – Working of 4 X 1 and 4 X 4 box motions, Preparations box motion pattern chain card, Card saving device, Defects in box motion.

Need, Types & Selection of Jacquard Shedding, Specifications and Classification, Principle of a Jacquard; Elements of Jacuqard shedding - Position, material of construction and functions Principle of shed formation and Working of SLJ, DLSC, DLDC & CBJ.

UNIT - 4 **L-9**

PREPARATIONS TO JACQUARD WEAVING : Harness building, setting of cylinder, griffe and knives, driving mechanism for cylinder and griffe, Card cradle, Transfer of design on to the point paper and preparations to Card cutting, Types of card cutting devices, Card less jacquard, Lacing ,Casting out: Harness tie ups – methods to increase figuring capacity (Working of split harness).

UNIT - 5 **L-8**

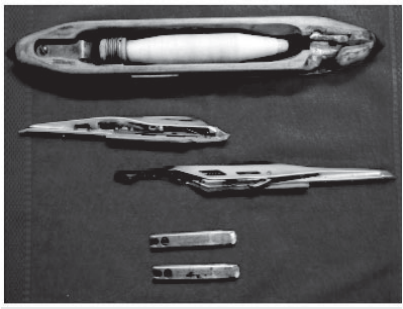
WEFT REPLENISHMENT : Weft replenishment – the work of the weaver, feelers, feeler position, types of feelers, single-shuttle automatic bobbin change, bobbin loaders, Loom drives – methods of driving the loom, loom control, fabric inspection - 4 point and 10point grading system. fabric packaging types.

TEXT BOOKS :

1. Robinson and Marks, “Principles of Weaving”, Textile Instt. Manchester, 2004.
2. K. T. Aswani, “Plain Weaving Motions”, M/s Mahajan Book Publishers, Ahmedabad, Gujarat, 2007.

REFERENCE BOOKS :

1. N. N. Bannerje, T.Banerjee, “Weaving Mechanism”, New Jute Mills Publications, Calcutta, Vol –I& II, 2002
2. P. R. Lord and Mohammed, “Conversion of Yarn to Fabric”, Butterworths Publications, Manchester, 2000.



16TF353 SHUTTLELESS WEAVING

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
15	15	-	-	-	-

Course Description & Objective :

This course offer different types of shuttle-less weaving technologies such as projectile, rapier, jet and multiphase etc., their productivity and quality improvements in view of shuttle weaving. Objective of this course is to impart necessary skill and knowledge to maitain shuttle-less looms.

Course Outcomes :

The student will be able to:

- know shuttle-less weaving technologies such as projectile, rapier, Jet and multiphase.
- compare their technological developments.
- explain the effect on productivity and quality.

SKILLS:

- ✓ *Differentiate technological aspects in between the machines.*
- ✓ *Set the technical parameters for given quality.*
- ✓ *Design suitability of loom for desired quality.*
- ✓ *Calculate the productivity of particular machine with changed parameters.*

ACTIVITIES:

- *Calculate production capacity of shuttle-less weaving machines.*
- *Collect and compare handloom fabric and shuttle-less loom fabrics.*
- *Collect technical specifications of shuttle-less weaving machines.*
- *Collection of various narrow fabric samples.*
- *Prepare weave plan for desired quality.*

UNIT - 1 **L-10**

INTRODUCTION TO SHUTTLE-LESS WEAVING : Introduction - Limitations of shuttle loom with respect to weaving process, engineering aspects & environmental aspects, Classification of shuttle-less weaving machines based on the weft insertion rate; selection of looms based on the sorts and quality required; conditions required for high speed weft insertion; requirements for shuttle-less weaving in Winding, Warping, Sizing and Post Sizing operations; Selvedges and their requirements (Different types of selvedges found on modern looms);Techno-economic aspects of modern weaving; Common types of shedding motions, let-off motions, take-up motions found on modern looms.

UNIT - 2 **L-9**

PROJECTILE & RAPIER WEAVING : Projectile Weaving Machine - Weft insertion stages, Projectile picking concept, picking motion, picking phases, Projectile acceleration & retardation, torsion rod details, Projectile preparation for picking, selvedge motion, Receiving unit, MIS, pick finding, Multi color weft insertion, weft stop, warp stop, whip roller, weft brake etc.

RAPIER WEAVING MACHINE: Classification of rapiers, Makes of rapiers; classification - Concept of Dewas & Gabler rapier systems; Principles of different single & double rapier weft insertion systems (Drives), their comparison, Study of rapier heads, Details of rapier tape, head, guiding elements, Gripper openers, cutters, stroke adjustment, Specifications of rapier & head for various applications; Fabric defects & remedies, weft waste during selvedge formation.

UNIT - 3 **L-10**

JET WEAVING : Air Jet weft Insertion - Introduction & history, Classification of air jet weft insertion, stages of weft insertion, main and relay nozzle designs, configurations, Loom settings, Air supply & energy consumption, Air flow in nozzles & guide channel, performance of yarns in air jet insertion, Influence of yarn characteristics on weft insertion, application of air jet weaving, Quality of Air.

WATER JET WEFT INSERTION: Introduction, Design, Requirements, Picking mechanism, weft insertion elements, loom settings, influence of yarn characteristics, applications of water jet weft insertion system; features of jet looms, Comparison with air jet.

UNIT - 4 **L-8**

MULTIPHASE WEAVING : Introduction to Multiphase Weaving, features of modern multiphase weaving machines e.g. M 8300; Introduction to Circular Weaving; Tri-axial Weaving, Properties & applications of tri-axial woven fabrics.

UNIT - 5 **L-8**

NARROW FABRIC WEAVING & LABELS : Technology of Narrow Fabric Weaving - Shuttle looms, needle looms, warp feed systems from beams, creel, for elastomeric yarns, shedding, weft insertion systems, take up Applications of narrow fabrics; Manufacture of Labels.

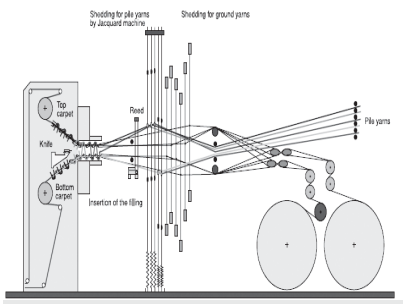
TEXTBOOKS :

1. Marks A.T.C., Robinson, “Principles of Weaving”, The Textile Institute, 1976.
2. M.K. Talukdar, D.B. Ajgaonkar, “Weaving Machines, Materials & Methods”, Textile Institute, 1998.

REFERENCE BOOKS :

1. S.C Adanur, “Handbook of Weaving”, CRC, Publications, 2008.
2. A. Ormerod, “Modern Preparation & Weaving Machines”, Butterworth Publications, 1983.

16TF451 MECHANICS OF WEAVING MACHINES



Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
20	10	-	-	-	-

Course Description and Objective:

This course offer mechanics of loom motions, driving mechanisms, design aspects of machinery involved in fabric manufacturing. Objective of this course is to impart knowledge and skill require in design of fabric forming machinery.

Course outcomes:

The student should be able to:

- know different concepts in machine design.
- understand different gearing mechanisms.
- design Cams and tappets for different applications.
- explain terminology and concepts in Humidification systems.

SKILLS:

- ✓ *Calculate the motion in circle for textile applications.*
- ✓ *Design a cam for shedding.*
- ✓ *Calculate the power for picking.*
- ✓ *Optimise picking velocity.*

ACTIVITIES:

- *Calculate velocity and time using equation of motion and motion in a circle.*
- *Design of cam for plain and twill weave.*
- *calculate depth of warp shed.*
- *Calculate power for picking in shuttle loom.*

UNIT - 1 **L-9**

INTRODUCTION : Introduction – equations of motion – motion in a circle – transmission of motion by wheel gearing Belt drives – Flat and V-belts comparison; belt slippage, effect of belt thickness, effect of initial tension, effect of centrifugal force, horsepower transmitted, rope and chain drives, brief note on fast and loose pulley, jockey or rider pulley, grooved pulleys etc.

UNIT - 2 **L-9**

WINDING & SHEDDING : Mechanics of yarn winding – study on breaks and clutches – Applications of clutch and break in textile production; kinetics of shedding, Power for picking, picking as an elastic mechanism and beat – up: eccentricity of slay , derivation for 'e', displacement, velocity and acceleration of slay;

UNIT - 3 **L-9**

PICKING : Analysis of shuttle movement in weaving machine; Kinetics of shuttle picking – introduction, shuttle acceleration, elastic properties of picking mechanism, intial and average shuttle speed during traverse, factors affecting initial shuttle speed, shuttle checking, rate of weft insertion, bumping condition.

UNIT - 4 **L-9**

CAMS : Introduction, methods of driving cams, cam followers, types of cams and followers, construction of cams and tappets – heart shaped, plain, twill tappets – derivation to show that the frictional force 'F' is directly Proportional to the distance of weight from the fulcrum in negative let off motion; Calculation of depth of shed, healed movement, geometry of warp shed.

UNIT - 5 **L-9**

LOOM DRIVES & HUMIDIFICATION : Loom tappet drives – introduction, different types of drives, drive without idler wheels, movement of hooks, knives and warp threads in jacquard shedding, Backrest mechanisms – angular velocity of warp beam.

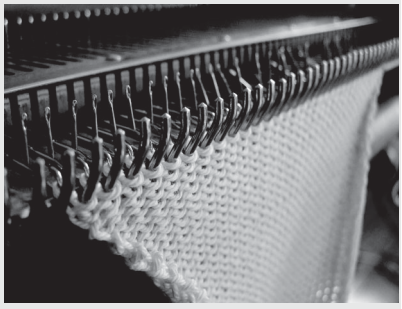
HUMIDIFICATION IN TEXTILE MILLS : Need for humidification in Textile Mills, Ambient conditions required in various departments of a textile mill, Psychometric - definition, use of psychometric charts, various psychometric processes like cooling, heating, humidification, dehumidification, etc.

TEXT BOOKS:

1. N. Gokerneshan, "Mechanics and Calculations of Textile Machinery", Woodhead Publishing India Pvt Ltd, 2013.
2. K. Slater, "Textile Mechanics", Vol – I & II, Ellis Horwood Limited, New York, 1978.

REFERENCE BOOKS:

1. W.A.Hanton, "Mechanisms of Textile Machinery", Ellis Horwood Limited, London 1976.
2. Sengupta, "Weaving Calculations", Mahajan Publishers, Ahemdabad, 1976.
3. P .Grosberg, "Textile Mechanics", T oranto Publishers, New Y ork, 1976



16TF252 HAND KNITTING AND FLAT KNITTING

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
15	15	-	15	-	-

Course Description & Objective:

This course offer fundamental knowledge about basic techniques in formation of stitch by hand knitting, stitch formation for the different part of a garment as well as knit formation by means of flat knitting and structures.Objective of this course is to provide fundamental concepts of hand knitting and flat knitting.

Course outcomes :

The student will be able to:

- know formation of basic stitch.
- describe the details for knits used for ribbing, edges and neckline.
- perform the finishing and techniques required at fabric edge or joint.
- understand basic principles of flat knitting.

SKILLS:

- ✓ *Differentiate various stitches made through hand knitting*
- ✓ *Identify basic tools and yarn requirement for a specific style.*
- ✓ *Modify and design the fabric by selecting an appropriate stitch.*
- ✓ *Set a cam of flat knitting machine as per knits.*

ACTIVITY:

- *Perform hand knitting for making fabric by basic and special knits.*
- *Collect various threads and needles used in hand knitting*
- *Design a round and square collar by hand knitting.*
- *Design pocket and button holes using hand knitting.*
- *Fabricate a shawl using at least two stitch length at flat knitting.*

UNIT - 1 **L-9**

Introduction, Needles and Tools, Yarns, Caring of Finished knits, Basic Techniques: Casting On, Casting On in Kichener Rib, Selvedges, Knit and Purl, Basic pattern and Color changes, Decreasing, Increasing, Binding Off, Binding Off in Kitchener Rib, Gauge.

UNIT - 2 **L-9**

Perfect Details: Bands, Hems, Ribbing, Knit-on Facing, Knit-in facing, Seam-on facing, crocheted Edges, Necklines: Round and Square, V-necks, Polo Collars, Shawl Collars, Pocket, Button holes, Zippers.

UNIT - 3 **L-9**

Finishing: Invisible Seams to join Selvedges, Sewing in sleeves, starting and Finishing Yarn ends, Blocking works.

Special Techniques: Shaker Knitting, cable Pattern, Jaquard Pattern, Embossing, Reversible pattern.

UNIT - 4 **L-9**

Measurement and Pattern, Converting pattern, Pattern Charts, Basic Patterns: Sweaters, socks, Gloves and Mittens.

Hand knitting to knitting frame: The principles of hand knitting using two pins, invention of the stocking hand frame, principles of frame knitting, The evolution of other weft knitting machines.

UNIT - 5 **L-9**

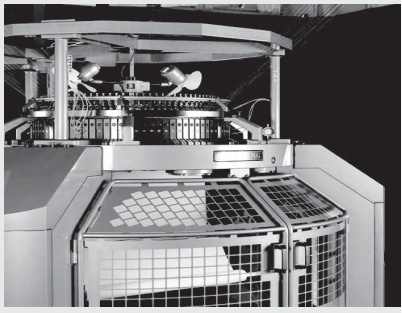
Flat knitting, basic principles and structures: History, The two types of flat machine, Flat machine gauges, Conversion from Cottons Patent to V-bed gauge, Knitting widths, Yarn counts, Simple hand-manipulated V-bed rib flat machines, Stitch cam settings, Spring-loaded cams, Two or more cam systems, Split cam-carriages, Direct and indirect yarn feed, Yarn carrier arrangement, Typical structures knitted on flat machines.

TEXT BOOK :

1. J. Katharina Buss, “Big Book of Knitting”, Sterling Publishing Company, 1999.

REFERENCE BOOKS :

1. D. J. Spencer, “Knitting Technology”, 2nd edition, Wood Head Publishing Company, England, 2008.
2. W. B .Azagoankar, “Knitting Technology”, 5th edition, Mahajan Textile Publishers, 2006.



16TF354 CIRCULAR KNITTING

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
15	15	-	-	-	-

Course Description and Objective:

This course offer indepth knowledge of main components required for circular knitting machine, its technical evolution, drives, control and monitoring systems with knitting cycles for some special cases. Objective of this course is to provide an expertise in circular knitting technology.

Course Outcomes:

The student will be able to:

- describe circular knitting machine classification
- know role of circular knitting machine components.
- understand the drives and control system of circular knitting machine.
- explain knitting formation cycles for jersey, terry and fleece knitting machines.
- differentiae the plain, rib and interlock knitting machines.

SKILLS:

- ✓ *Identify different components used in circular knittingmachine*
- ✓ *Select the correct components for different fabric specifications*
- ✓ *Optimise settings in circular knitting machines*
- ✓ *Diifferentiate single and double bed cylinders*
- ✓ *Analyse the drive system used ofr circular kniting machine*

ACTIVITY:

- *Determine needle gauge for a given stitch density of plain knitted fabric*
- *Compare the effect of tension level on stitch length*
- *Draw cam design for skip, float, tuck stitches.*
- *Analyse recent developments in circular knitting.*
- *Collect technical specifications by visiting a knitting unit.*

UNIT - 1 **L-9**

INTRODUCTION: Classification Criteria, Classification by Diameter, Classification by Number of Needle-beds, Basic Structure of a Large-diameter Circular Knitting Machine, The Yarn Feeding System, The Spool Holder, Yarn Feeders, The Thread Guide, Stitch Formation Motions, The Main Components of a Single-bed Machine.

UNIT - 2 **L-9**

MOTIONS: The Main Components of a Double-bed Machine, The Technical Evolution, Selection Systems, Selection by means of Needles with Multilevel Butts, Jacquard Selection, Mechanical Jacquard Selection System, Electronic Jacquard Selection System, Take-down and Winding Motions, Take-down Motion, Winding Motion.

UNIT - 3 **L-9**

DRIVES: Drives, Control and Monitoring Systems, Ancillary Systems, Lubrication System, Suction and Blowing Systems, Safety Systems, Large-diameter Circular Knitting Machines, Single-bed Circular Knitting Machines, Stitch Formation Cycle on Single-bed Knitting Machines, Jersey Knitting Machines, Terry Knitting Machines, Fleece Knitting Machines.

UNIT - 4 **L-9**

MACHINE TYPES: Double-bed Circular Knitting Machines, Dial-cylinder Knitting Machines, Stitch Formation on Dial-cylinder Knitting Machines, Rib-stitch Machines, Interlock Machines, Variable Needle-bed Machines, Double-cylinder Machines Stitch Formation and Needle Transfer.

UNIT - 5 **L-9**

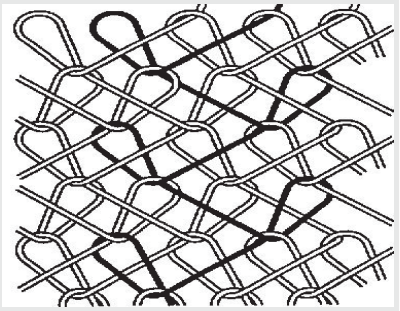
SPECIAL KNITTING MACHINES: Medium-diameter Knitting Machines, Medium-diameter Cloth-manufacturing Machines, Body size / Seam less wear Machines, Small-diameter Circular Knitting Machines, Single-cylinder Machines, Single-cylinder Machines with Needles in the Dial (Rib Stitch), Double-cylinder Machines, Full-fashioned Knitting Machines, Loop-wheel Circular Knitting Machines.

TEXT BOOK :

1. D. J. Spencer, “Knitting Technology”, 2nd edition, Wood Head Publishing Company, England, 2008.

REFERENCE BOOK :

1. W. B. Azagoankar, “Knitting Technology”, 5th edition, Mahajan Textile Publishers, 2006.



16TF355 WARP KNITTING

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
15	15	-	-	-	-

Course Description and Objectives :

This course offer basic knowledge of knitting component in formation of stitch for warp knitting machine, principles of loop formation, warp knit structure formation by single bar and multiple bar machine. Objective of this course is to provide detail knowledge in the field of warp knitting technology.

Course Outcomes :

The student will be able to:

- classify the warp knitting machines based on different criteria.
- compare Raschel and Tricot warp knitting machines.
- analyse rules governing for one and two guide bar structures.
- understand the principles of loop formations for a warp knitting.
- describe the formation of popular warp knit structures.

SKILLS:

- ✓ *Select the warp knitting machine out of Tricot and Raschel and other based on structure, application and productivity.*
- ✓ *Select basic knitting elements for a specific fabric.*
- ✓ *Set a pattern wheel as per required guide bar movement.*
- ✓ *Draw the basic lapping diagrams for simple and complex structures.*
- ✓ *Draw a fabric structure for lapping diagram.*

ACTIVITIES:

- *Analyse warp knitted fabric like seat cover/ nets.*
- *Collect various warp knitted fabrics.*
- *Design and construct single and double bar warp knit fabric through hand knitting*
- *Calculate Run-in ratio of given warp knitted fabric.*
- *identify the ares where warp knitted fabrics can be used.*

UNIT - 1 **L-9**

INTRODUCTION: Classification of warp knitting, comparison between warp and weft knitting.

WARP KNITTING MACHINES Types of warp knitting machines, comparison between Tricot and Raschel type warp knitting, line diagram of different elements and zones of warp knitting machine, knitting zones of Tricot and Raschel type warp knitting machines, Characteristics of tricot and Raschel machines.

UNIT - 2 **L-9**

KNITTING ELEMENTS : Brief introduction to Needles and needle bar, Pressure bar, latch guard or wire, sinkers and sinker bars, guides and guide bars, tricale plate and pattern wheel and chain links. Warp beam preparation for warp knitting.

PRINCIPLES OF LOOP FORMATION IN WARP KNITTING: Needle bar movement, guide bar movement, Lapping diagram. Tricot machine knitting cycle with bearded needle, Raschel machine knitting cycle with latch needle.

UNIT - 3 **L-9**

Compound needle Warp knitting machines, The Crochet Machine, Fabric Take down, warp let-off.

LAYING-IN IN WARP KNITTING: General rules governing laying-in in warp knitting, Fall plate patterning, Full width weft insertion, cut pressure and miss press structures. Patterning mechanism, pattern wheel, pattern chain. Displacement of various knitting elements during loop formation.

SINGLE NEEDLE BAR STRUCTURES: a compound lapping movement composed of two separately derived motions.

UNIT - 4 **L-9**

Rules governing two guide bar structures. Two needle bed Basic Lapping Principles, The Simplex Machine, Double Needle Bar Raschel Products, Knitting Tubular Articles, Pile Fabrics

MULTI- GUIDE BAR MACHINES AND FABRICS: Lace, Curtain-Net and Elastic Fabrics , Pattern Guide Bars, Nesting, Multi-Bar Tricot Lace Machines, Chain Links and Electronic Control of Shogging, Mesh Structures, Elasticized Fabrics, Jacquard Raschels**.**

UNIT - 5 **L-9**

WARP KNITTED STITCHES AND STRUCTURES: Five basic Overlap/ Underlap variations, Direction of lapping at successive courses, Pillar stitch, Balanced advance and return lapping in two courses, Atlas lapping. Types of stitches and structures, laying-in, Co-We- Nit, , Milanese fabric and machines, Multi axial knitting.

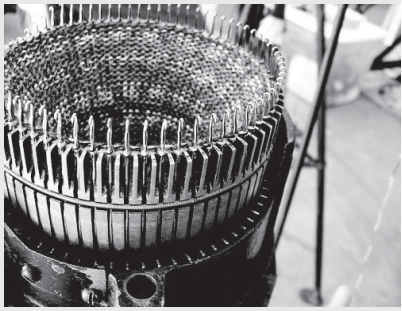
POPULAR WARP KNIT STRUCTURES: Lock knit, shark skin, Queens cord, Velour or velvet, Double atlas. Warp knitted nets, common products of warp knitting machines.

TEXT BOOKS :

1. D. J. Spencer, “Knitting Technology”, 2nd edition,Wood Head Publishing Company, 2008.
2. S. C. Ray, “Fundamentals and Advances in Knitting Technology”, 1st edition, Wood Head Publishing India in Textiles, 2011.

REFERENCE BOOKS :

1. WB.Azagoankar, “Knitting Technology”, 5th edition, Mahajan Textile Publishers, 2006.
2. N.Anbumani, “Knitting fundamentals, machines, structures and developments”, Newage International, 2007
3. Smerifit, “Warp Knitting”, 2nd edition, Marrow Publishers, 2000.



16TF452 ADVANCEMENT IN KNITTING TECHNOLOGY

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
15	15	-	-	20	-

Course Description and Objectives :

This course offers advance knowledge in circular knitting, warp and weft knitted fabric production with newly developed constructions, as well as knitted fabric composites and case studies on advanced knitted products. Objective of this course is to provide basis for acquiring expertise in knitting technology.

Course Outcomes :

The student will be able to:

- classify the knitting machines based on different criteria.
- learn the advancement in warp and weft knitting machines.
- understand the principles of knitted fabric composites.
- describe the applications of advance knitted fabrics.

SKILLS:

- ✓ *Select the knitting machine out of commercially available machines based on structure, application and productivity.*
- ✓ *Perform modification to be made in circular knitting machine based on structure.*
- ✓ *Perform modification in tricot and raschel knitting machine for newly developed construction.*
- ✓ *Identify the intelligent yarn delivery system in weft knitting.*

ACTIVITIES:

- *Analysis of newly developed knitted constructions with spandex*
- *Case study on techno economic study on advanced warp knitting .*
- *Design of warp knitted structure for moisture management.*
- *Collect specifications for spandex, Americana and modified Americana tricots.*
- *Simulation for knitted fabric composites.*

UNIT - 1 **L-9**

ADVANCES IN CIRCULAR KNITTING: Introduction, Hosiery knitting technology Current problems and limitations of circular knitted structures, Recent advances in circular knitting: Santoni seamless knitting technology, Ultra fine gauge knitting machine, Loop transfer technology in circular knitting machines, Pile and sliver insertion mechanism in circular knitting, Structure and properties of circular knitted fabrics , Applications: Seamless knitted garments, Electro textiles, Automotive textiles, Orthopedic applications, Future trends: smart garments.

UNIT - 2 **L-9**

ADVANCES IN WARP KNITTED FABRIC PRODUCTION: Introduction, Commercial warp knit machines, Types of warp knit machine, Delaware stitch and modified Delaware stitch tricot fabrics, Tricot and Raschel containing spandex, Key Raschel fabrics containing spandex, Newly developed constructions with spandex, Americana and modified Americana tricots.

SURFACE INTEREST FABRICS : Crêpe Tricot, key elements for developing good crêpe, Crepeset®, Knit-de-knit crêpe, Milanese fabrics : Milanese structure, Types of Milanese machine.

UNIT - 3 **L-9**

WEFT-KNITTED STRUCTURES FOR INDUSTRIAL APPLICATIONS: Introduction, Current problems and limitations, Knitting 3D structures using weft-knitting ,Directionally oriented structures (DOS) and combined DOS weft-knitted , Weft-knitted multifunctional structures, Simulating mechanical properties of weft-knitted structures, Applications.

INTELLIGENT YARN DELIVERY SYSTEMS IN WEFT KNITTING: Introduction, Theory of yarn delivery in brief, Stitch forming zone on weft-knitting machine, Yarn robbing-back in knitting, Passive yarn delivery systems, Feeders with yarn length control (positive feeders), Yarn storage and delivery systems on circular knitting machines, Outline of yarn feeding on a circular knitting machine,

UNIT - 4 **L-9**

KNITTED FABRIC COMPOSITES: Introduction; Types of fibre and yarn used in knitted fabric Composites, Composite, Knit structures for fabric composites, Types of matrix materials, Developments in manufacturing methods for knitted fabric composites, Mechanical properties Applications.

CASE STUDIES: advanced knitted products Women's apparel: knitted underwear Introduction, Functional requirements of knitted underwear, Performance evaluation of knitted underwear, Engineering of knitted underwear fabrics.

UNIT - 5 **L-9**

KNITTED STRUCTURES FOR SOUND ABSORPTION: Introduction, Acoustic textiles in vehicles, Sound absorption of plain knitted structures, Engineering advanced knitted fabrics for sound absorption, Thick spacer structures, Dense spacer structures .

WEFT-KNITTED STRUCTURES FOR MOISTURE MANAGEMENT: Introduction, Basics of wetting, Wicking and absorption, Experimental liquid take-up, Future.

TEXT BOOK :

1. K. F. AU, "Advances in Knitting Technology", Woodhead Publishing Limited, 1st edition, 2011.

REFERENCES :

1. W. B. Azagoankar, "Knitting Technology", Mahajan Textile Publishers, 5th edition, 2006.
2. D. J. Spencer, "Knitting Technology", 2nd edition, Wood Head Publishing Company, England, 2008

16TF253 DYES AND PIGMENT

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
15	15	-	-	-	-

Course Description and Objectives :

This course offer fundamental concepts in elements of dyeing onto various fibers and its bonding with different classes of dyes through understanding chemistry of dyes and pigments for cotton, silk, wool, polyester, nylon and other major fibers. Objective of this course is to provide fundamental knowledge and skill related to application of dyes and pigments on to textile materials.

Course Outcomes :

The student will be able to:

- know the basic difference between dye and pigment.
- compare the concept of dyeing using dyes and pigments.
- explain different methods of dyeing with different classes of dyes.
- understand developments in different classes of dyes.

SKILLS:

- ✓ *Differentiate dye and pigment.*
- ✓ *Identify the* relationship between color & chemical constitution.
- ✓ *Analyse* relationship between chemical structure & fastness properties.
- ✓ *Dye the given fabric with different classes of suitable dyes.*
- ✓ *Analyse the dyeing parameters for correct shade.*

ACTIVITIES:

- *Perform dyeing of different fabrics with dyes and pigments.*
- *Analyse chemical structure after dyeing the fabric.*
- *Prepare a flowchart of different classes of dyes and its chemical composition.*
- *Collect different trade names of dyes from dye manufacturers.*

UNIT - 1 **L-8**

INTRODUCTION OF DYE : Introduction to synthetic dyes. Classification of dyes - according to the method of application, according to the chemical structure. Definition of dye & pigment, Color index and its significance, Nomenclature of dyestuffs**.**

UNIT - 2 **L-9**

PIGMENTS & THEIR CLASSIFICATIONS BASED ON COLOR : Pigments & their classifications based on chemical structure, aspects of chemical structure of dyestuff - Factors governing absorption of light, Relationship between color & chemical constitution, Relationship between chemical structure & substantively, Relationship between chemical structure & fastness properties.

UNIT - 3 **L-9**

ELEMENTS OF DYEING : Concept of-% Shade, Affinity and substantively of dyes, Liquor ratio, pH, Solubility, Dissolution of dyes, Exhausting agents, Retarding agents, Aggregates of dyes, Equilibrium factor, Time of dyeing, Temp of dyeing, Compatibility of dyes in combination shades, % Exhaustion, % Expression.

UNIT - 4 **L-10**

DYES : Direct dye - Classification & general method of dyeing, Fastness properties of direct dyed goods. Reactive dye - Classification of dyes and general methods of dyeing, Fastness properties of reactive dyed goods. Vat dyes - Classification vat dyes, Various steps involved in vat dyeing, Fastness properties of vat dyed goods. Sulphur dyes - Classification of sulphur dyes, General Method of dyeing, Fastness properties. Acid dye - Classification & mechanism of dyeing of Nylon with acid dye, Fastness properties of acid dyed material.

UNIT - 5 **L-9**

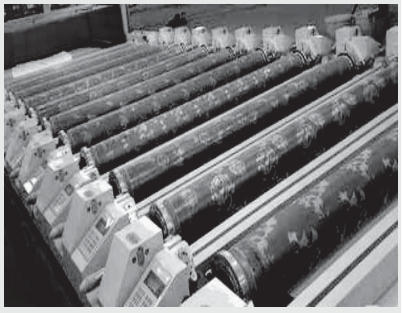
BASIC DYE : General method of Dyeing of acrylics, nylon & cotton with basic dye, Fastness properties of basic dyed goods. Disperse dye - General methods of Dyeing with disperse dye, Fastness properties of disperse dyed goods. Developments in dyes- Chlorine based homo functional and bi-functional reactive dyes, Fluorine based reactive dyes. Concept of - Fluorescent dyes, Thermo chromic dyes, Photo chromic dyes, Antimicrobial dyes. Antimicrobial pigments, Air dyes.

TEXT BOOK :

1. C V Koushik, “Chemical Processing of Textiles”, NCUTE Publications, 2003.
2. V.A. Shenai “Chemistry of Dyes and Principles of Dyeing Vol- 1”, Sevak Publications, 2004.

REFERENCE BOOK :

1. E.R.Trotman, “Dyeing and Chemical Technology of Textile Fibres”, 3rd edition, Griffin Publications, SBT Bomboy, Ahmedabad, 1992.



16TF356 DYEING AND PRINTING MACHINERY

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
16	40	6	10	4	2

Course Description and Objectives :

This course offer concepts in machineries required for dyeing of fibers, yarns and fabrics as well as machinery components required to print the fabrics like screen, flat bed, roller, rotary and ink jet or digital printing. Objective of this course is to provide knwledge and skill required to impart fundamental concepts of dyeing and printing machinery.

Course Outcomes :

The student will be able to:

- understand principles of dyeing machines.
- compare principles of dyeing of fibers, yarns and fabric using different machines.
- analyse different machines available for printing of fabrics.
- know recent advancements in dyeing and printing machines.

SKILLS:

- ✓ *Differentiate the principles of dyeing*
- ✓ *Identify suitable machines for fibers, yarn and fabric dyeing.*
- ✓ *Print the different fabrics with suitable style of printing.*
- ✓ *Optimise various machine parameters that influence dye and print quality.*

ACTIVITIES:

- *Collect of Different dyeing machines and its technical aspects*
- *Identify of type of print on a given fabric or garment*
- *Compare dyeing performace of diffferent machines*
- *Analyse the package requirement for cone dyeing*
- *Collect of different printing machines technical aspects.*

UNIT - 1 **L-8**

DYEING MACHINES : Preparation of cotton fabric for dyeing, Principles of dyeing machine constructions, fiber dyeing machine – loose stock dyeing machine. yarn dyeing machine – hank yarn dyeing machine, package dyeing machine.

UNIT – 2 **L-9**

FABRIC DYEING : Fabric dyeing machine – Jigger Dyeing machine, High temperature Jigger dyeing machine. winch dyeing machine – conventional winch, high temperature winch, high temperature winch with circulating liquor HTHP Beam dyeing machine, Padding mangle, Jet dyeing machine, Soft overflow jet dyeing machine.

UNIT – 3 **L-9**

BEAKER DYEING MACHINE : Textile Dyeing Machines, Multi Nozzle Soft Flow Economical Dyeing Machine, IR Beaker Dyeing Machine, HTHP Beaker Dyeing Machine, U Type Fabric Dyeing Machine, Industrial Basket, Arm Dyeing machine, electrochemical dyeing, use of ultrasonic in dyeing (sonicator).Dyeing of blends, problems and solutions. Single bath and two bath methods, reuse of dye bath.

UNIT - 4 **L-10**

PRINTING MACHINES: Preparation of cotton fabric for printing, Table screen printing - Technical features of table, Technical features of printing on table, Faults of table screen printing, their causes and remedies. **Flat bed screen printing -** Features of flat bed screen printing m/c. and its various parts, Technical features of printing with flat bed printing m/c, Flat bed screen printing m/c. for garments, Faults of flat bed screen printing m/c. their causes and remedies. Recent developments in flat bed screen printing **m/cs.**

UNIT – 5 **L-9**

ROLLER PRINTING MACHINE: Features of roller printing m/c and its various parts, Technical features, defects and its remedial measures. **Rotary screen printing m/c -** Features of rotary screen printing m/c. and its various parts, Squeezee system, Technical features of rotary printing m/c, Faults of rotary screen printing m/c. causes and remedies. **Inkjet / Digital printing -** Basic principles, Mechanism of printing, Requirement of ink. Recent developments in rotary screen printing m/cs.

TEXT BOOKS :

1. C V Koushik, “Chemical Processing of Textiles”, NCUTE Publications, 2003.
2. A J Hall, “Textile Bleaching, Dyeing, Printing and Finishing Machineries”, Van Nostrand Company, Printed 1996.

REFERENCE BOOKS :

1. A K Choudhury, “Textile Preparation and Dyeing” Science Publishers, 2006.
2. V. A. Shenai, “Technology of Mercerising”, Mahajan Books Publishers, Gujarat, 1997.

16TF357 ECO-FRIENDLY WET PROCESSING

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
15	15	20	-	-	5

Course Description and Objectives:

This course offer importance of ecofriendy processing of textile goods, various developments in the field of textile wet processing with special emphasis on eco friendly dyeing and finishing. Objective of this course is to impart fundamental concepts of eco friendly grey fabric preparation, dyeing and finishing.

Course Outcomes:

The student will be able to:

- know the importance of eco friendly grey preparation for processing.
- compare process modification in pretreatments.
- explain developments in ecofriendly dyeing and finishing.
- understand role of nano-technology and plasma technology in textiles.

SKILLS:

- ✓ *Select suitable eco friendly treatment for grey fabric.*
- ✓ *Optimise eco friendly processes in dyeing for the selected fibers.*
- ✓ *Differentiate ecofriendly process and conventional processing.*
- ✓ *Selection of modified chemicals for finishing.*
- ✓ *Find suitable applications of nano and plasma technology.*

ACTIVITIES:

- *Analyze different eco friendly processed fabrics.*
- *Identify various areas where eco friendly process followed.*
- *Analyse GOTS standards for dyeing, printing and finishing*
- *Calculate pollution load on the ETP by ecofriendly processing.*
- *Prepare techno economic study of eco friendly processing.*

UNIT - 1 **L-8**

USE OF BIOTECHNOLOGY IN PRETREATMENTS : Biotechnology, significance of bio technology, Different applications of biotechnology, Combined bio-scouring and bleaching of cotton fibers, enzymatic degumming, enzymatic bleaching, nano- biotechnology.

UNIT - 2 **L-9**

PROCESS MODIFICATIONS IN PRETREATMENTS : Developments in singeing, desizing and its eco-aspects, bleaching and its eco aspects, Eco-friendly per acetic acid bleaching, Eco-friendly retting of Jute, Redox H2O2 bleaching, Concept of Eco-friendly stabilizers for H2O2 bleaching, Combined operations like desizing, scouring, bleaching, solvent scouring, Hot mercerization, add-on mercerization and ammonia treatment.

UNIT - 3 **L-9**

DEVELOPMENTS IN DYES AND DYEING TECHNIQUES : Eco-friendly dyeing with sulphur & vat dyes. New developments in reactive dyes like HF dyes, low and no salt reactive dyes, multifunctional dyes, neutral fixing and acid fixing reactive dyes, Photo chromic dyes, thermo chromic dyes, fluorescent dyes. Super critical CO2 dyeing, Ultrasound in dyeing, Low temperature dyeing.

UNIT - 4 **L-10**

DEVELOPMENT IN FINISHING : Various Low liquor and minimum application techniques in textile finishing, their advantages and limitations. wrinkle free finishing – concept of wet and moist cross linking. various eco-friendly resin finishes, Concept of UV-A and UV-B, factors affecting UV protection, Various UV- protection finishes and their evaluation. Antimicrobial finishes – mode of action, factors affecting, various antimicrobial finishes**.**

UNIT - 5 **L-9**

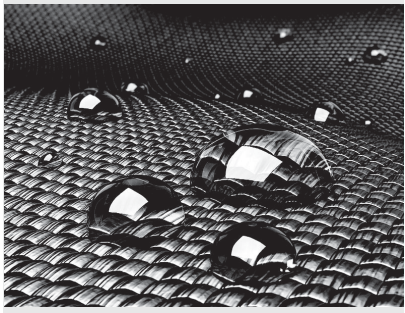
APPLICATION OF NANOTECHNOLOGY IN TEXTILES : Nano finishes - Super hydrophobicity and lotus effect, self cleaning, UV protection finish, Antimicrobial finishes. **Application of Plasma in Textiles -** Concept, types of plasma and their generation, Plasma treatment of textile for water and oil repellency, Interfacial engineering of functional textiles for biomedical applications, plasma modification of wool, plasma modification of natural cellulosic fibers.

TEXT BOOKS :

1. R M Christie, “Environmental Aspects of Textile Dyeing”, Woodhead Publishing Limited, 2011.
2. S R Eklahare, “Eco friendly chemical processing of textiles and environment management”, Green engineering company, 2001

REFERENCE BOOK :

1. Blackburn, “Biodegradable and Sustainable Fibres”, Woodhead Publishing Limited, 2005.



16TF453 FUNCTIONAL FINISHES

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
15	15	-	-	-	5

Course Description and Objectives:

This course offer basic knowledge on different types of finishes given to various fibers based on the end use, Special Finishes and Recent Advancements in finishing of textile materials. Objective of this course is to provide fundamental concepts of functional finishes and its importance.

Course Outcomes:

The student will be able to:

- know importance of functional finishes.
- describe various types of finishes given to the different types of fibers.
- understand about the special finishes given different fabrics.
- analyse recent advancements in finishing.

SKILLS:

- ✓ *Analyse the performance characteristics upon finishing.*
- ✓ *Identify suitable finish to the particular end use of fabric.*
- ✓ *Differentiate various special finishes available for the fabrics.*
- ✓ *Identify advancements in functional finishes.*

ACTIVITIES:

- *Collect different types of finished fabrics in regular usage*
- *List out Temporary nad permanent finishes.*
- *Compare fabric properties before and after softner finishing.*
- *List out chemicals used for different finishes for specific fibers.*
- *Collect the trade names and application methods of chemicals used for Fininshing.*

UNIT - 1 **L-9**

REPELLENCY & RESIN FINISH : Wetting and Wicking; surface energy – concept, measurement and relevance to repellency; repellents applied to textile substrates; repellency tests; application of repellents by impregnation, coating and surface modification techniques. **Resin Finishing -** Mechanism of creasing and resin finishing, concept of Anti crease, wash-n-wear and Durable Press, Eco-friendly cross linking agents, Evaluation of Resin Finishing.

UNIT - 2 **L-9**

SOFTENERS AND HAND BUILDERS : Desirable properties and various classes of softeners, Properties, mode of action and application of cationic, anionic, Non-ionic, reactive and emulsion type softeners. Softeners for cotton, wool, silk, jute, polyester and acrylic. Comparison of various softeners, Classification of stiffeners, examples and their application.

UNIT- 3 **L-9**

ANTIMICROBIAL FINISHES : Object, requirements, types of anti microbial finishing. Mechanism of antimicrobial finishing. Desirable properties of a good anti microbial finishes, various antimicrobial finishes for cotton, wool, silk, PET, Nylon and Acrylic, Mildew-proof and rot proof finishing, Evaluation of antimicrobial finishes.

UNIT - 4 **L-10**

ANTI-PILLING & SOIL RELEASE FINISHING : Causes of pill formation, Factors affecting pilling tendency, various physical and chemical methods to reduce pilling, Evaluation of efficiency of anti pilling finishing. Soil Release Finishing - Type of soils, mechanism of soil impingement and soil retention, Mechanism of soil release, Soil release finishing of synthetics & its blends, Evaluation of soil release finishing

UNIT - 5 **L-8**

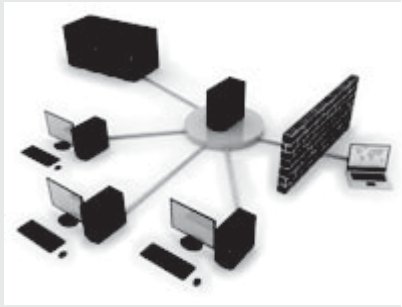
SPECIAL FINISHES AND RECENT ADVANCES : Flame proofing, Silk like polyester, Antistatic finishes. Finishing of micro denier polyester goods. Recent developments in finishing like nano-finishes, micro-encapsulation, UV protection Introduction to finishing of technical textiles.

TEXT BOOK:

1. W. D. Schindler and P J Hauser, “Chemical finishing of textiles” Woodhead Publishing Ltd, Cambridge, UK, 2004.

REFERENCE BOOK:

1. A. A. Vaidya, “Production of Synthetic Fibers”, Prentice Hall of India, New Delhi, 2005.



16TF358 COMPUTER APPLICATIONS IN TEXTILES

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
15	15	20	-	-	-

Course Description and Objectives:

This course is aimed at offering applications of computers in textiles. It starts with introduction to computers, computer aided design and computer integrated manufacturing. Then it introduces the applications of computers in various fields of textiles. It also includes the introduction to .net and ERP with applications to textiles. As an applied course, it forms the basis to give essential skill required for a modern textile mills.

Course Outcomes:

The student will be able to

- understand fundamental of Computer Aided Design.
- understand application of computer in manmade fibre manufacturing.
- understand application of computer in spinning.
- understand application of computer in weaving.
- understand application of chemical processing and garment production management.
- describe applications of .net and ERP specific to textiles.

SKILLS:

- ✓ *Make a fabric structure design using textile CAD software.*
- ✓ *Optimize the cotton mixing using programming.*
- ✓ *Make spin plan and weaving plan using computer.*
- ✓ *Develop design for dobby and jacquard using textile CAD.*
- ✓ *Drape a apparel using fashion CAD.*
- ✓ *Create small application to textile using .Net.*

ACTIVITIES:

- *Creating of spin plan for small spinning mill in excel.*
- *Creating a weaving plan for a loom shed running 8 looms.*
- *Finding out optimized proportions of cotton verities using LPP for a mixing.*
- *Designing a weave pattern for a small motif using textile CAD.*

UNIT - 1 **L-9**

DIGITAL TECHNOLOGY FOR YARN, FABRIC STRUCTURE AND APPEARANCE ANALYSIS : Introduction, Measurement of yarn evenness, Analysis of yarn hairiness, Measurement of yarn twist, Recognition of yarn snarl, Analysis of yarn blend, Grading of yarn appearance, Future trends, digital system for weave pattern recognition, Theoretical background for weave pattern analysis, Methodology for active grid model (AGM) construction and weave pattern extraction.

UNIT - 2 **L-9**

COMPUTER VISION-BASED FABRIC DEFECT ANALYSIS AND MEASUREMENT: Fabric inspection for quality assurance, Fabric defect detection methods, Fabric defect classification, Fabric properties and color measurement using image analysis.

MODELING AND SIMULATION TECHNIQUES FOR GARMENTS: Model development, Computer graphics techniques for garment structure and appearance, Rendering of garment appearance and model demonstration for garments, Considerations for real-time applications, Advanced modeling techniques, Future developments in simulating garment materials.

UNIT - 3 **L-9**

HUMAN INTERACTION WITH COMPUTERS AND ITS USE IN THE TEXTILE APPAREL INDUSTRY: Principles of human computer interaction (HCI), Methods for improving human interaction with computers for textile purposes.

COMPUTER TECHNOLOGY FROM A TEXTILE DESIGNER'S PERSPECTIVE: Role of computer technology in textile design, Main computer technologies in textile design, Benefits and limitations of computers for textile design, Future trends.

UNIT - 4 **L-9**

DIGITAL PRINTING TECHNOLOGY FOR TEXTILES AND APPAREL: Review of digital printing technology, Global developments in digital printing technology, Colour technology and colour management, Three stages of computing for digital printing.

THREE-DIMENSIONAL (3D) TECHNOLOGIES FOR APPAREL AND TEXTILE DESIGN: Applications of three-dimensional (3D) human body modeling, Technologies of human body modeling in three-dimensions (3D), Development of the body surface, Animation, Generic vs individualized body models, Virtual try-on technologies.

UNIT - 5 **L-9**

INTEGRATED DIGITAL PROCESSES FOR DESIGN AND DEVELOPMENT OF APPAREL: Conventional design, development and production processes for apparel, Simultaneous design of textile and garment utilizing digital technology, Integrated processes in practice, Role of computer-aided design (CAD) and visualization technologies in integrated textile product design, The future of integrated digital apparel design and development processes.

TEXT BOOKS:

1. Jinlian Hu, "Computer Technology for Textiles and Apparels", Woodhead Publications, 2011.

REFERENCE BOOK:

1. "All India Seminars by Institution of Engineers", Coimbatore Center, 1983.
2. "Computers in World of Textiles Vol - 6", Textile Institute, 2002.

16TF359 LEAN AND SIX SIGMA IN TEXTILES AND APPARELS

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
20	15	20	-	-	-

Course Description and Objectives:

This course offer introduction to the tools and techniques required for total quality management, basics of six sigma and lean, use of six sigma and evolution of integrated lean six sigma with case study to textile industry. Objective of this couse is to impart knowledge and skill required for assessment of key parameters and quality control in textile industries.

Course Outcomes:

The student will be able to:

- know quality related terminology.
- describe computing of statistical quality control tools.
- understand the problem solving strategy and benchmarking.
- compare lean and 6sigma strategies.
- explain L6QMS 2008 model.

SKILLS:

- ✓ *Analyze the results using total quality management tools.*
- ✓ *Optimize the robust design parameters using Taguchi method.*
- ✓ *Apply the lean strategies to textile manufacturing.*
- ✓ *Draw and analyze the process control chart at certain confidence level.*

ACTIVITIES:

- *Analyse results of spinning mill using total quality management tools.*
- *Apply Taguchi for optimization on small experiment.*
- *Case study of application of L6QMS 2008 model in textile industry*
- *Calculation of C_{pk} based on results for a spinning mill.*

UNIT - 1 **L-10**

INTRODUCTION: Definitions: quality, quality control, quality planning, quality assurance, quality management, Total Quality Management (TQM) as per ISO 8402 - Overview on TQM. The TQM axioms-Commitment, Scientific knowledge, Involvement and consequences of total quality.

TOOLS AND TECHNIQUES IN TQM: Statistical Quality Control – process capability and performance. Seven quality improvement tools. Taguchi method

UNIT - 2 **L-9**

BASICS OF SIX SIGMA : The Basics of Six Sigma: The Problem Solving Strategy Y = f(x), Critical to Quality Characteristics (CTQ's) Cost of Poor Quality (COPQ) Pareto Analysis (80:20 rule) steps to six sigma. Quality circles. Benchmarking – types. Quality Function Deployment (QFD). 5 S concept. Applications in Textiles in Apparel industries.

UNIT - 3 **L-9**

LEAN : Essentials of Lean (6s) Strategies, Background, Statistical Theory of Lean (6s). Strategies, Normal and standard normal distribution, Lean Six Sigma and Principles: Elements of Lean Performance Measurements, Mathematical Modeling of Lean Six Sigma Relations. Creation of Six Sigma Infrastructure.

UNIT - 4 **L-8**

USE OF SIX SIGMA : Road Map to Lean (6s) Continuous Improvement: Continuous Improvement. Engineering, Definition and Measurement: Phase 0 and Phase 1, Evaluation of Existing Process Sigma/Baseline Sigma, Data Analysis, Optimization and Improvement, Evaluation of New Sigma, Process Control.

UNIT - 5 **L-9**

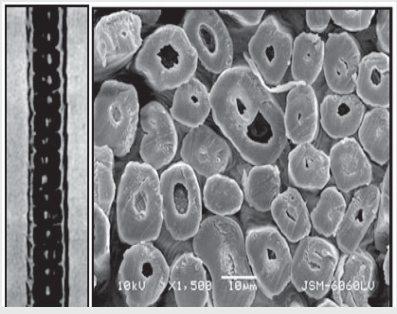
EVOLUTION OF INTEGRATED LEAN SIX SIGMA : Evolution of integrated Lean Six Sigma Origin of implementing Lean Six Sigma, Six Sigma concepts in textile industry, Lean Six Sigma through ISO 9001:2008 standard based QMS in textile industry, L6QMS-2008 model, Case study in Lean Six Sigma for textile industry.

TEXT BOOKS:

1. N. Logothetics, "Managing for Total Quality - From Deming to Taguchi and SPC", Prentice all Ltd., New Delhi, 1997.
2. S. Taghizadegan, "Essentials of Lean Six Sigma" Elsevier, 2006.

REFERENCE BOOKS:

1. J. S. Karthi, S.R. Devadasan, K. Selvaraju, N.M. Sivaram, and C.G. Sreenivasa, "Implementation of Lean Six Sigma through ISO 9001:2008 based QMS: A Case Study in a Textile Mill", The Journal of The Textile Institute, 104:10, 1089-1100.
2. J. H. Salor, "TQM-FIeld Manual," McGraw Hill, New York, 1992.



16TF360 PHYSICAL PROPERTIES OF TEXTILE FIBERS

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
20	20	-	-	-	-

Course Description and Objectives:

This course offer fundemental knowledge in fibre structure and its parameters, characterization techniques for investigation of fibre structure, fibre density as well as the basic concepts of other physical properties of fibre. Objective of this course is to impart fundamental concepts in physical properties of textile fibres.

Course Outcomes:

The student will be able to:

- know fibre structure and related parameters.
- compare the investigation of textile fibres by X-ray, IR, NMR.
- describe the measurement of hygroscopic properties of fibre.
- understand the mechanical conditioning of textiles.
- explain concepts of heat setting of textiles.

SKILLS:

- ✓ *Calculate structure related parameters like degree of order, degree of localization.*
- ✓ *Differentiate fibers based on structural parameters.*
- ✓ *Analyze the time effect properties like creep of textile fibre.*
- ✓ *Identify heat setting condition for various fibers.*

ACTIVITIES:

- *Analyse Degree of order, degree of localization for polyester and nylon.*
- *Analyse of x-ray pattern of oriented, disoriented and partially crystalline fibre.*
- *Compare fiber properties based on fiber structure.*
- *Perform heatsetting of polyester.*
- *Analyse NMR graph and identify fibre.*

UNIT - 1 **L-10**

FIBRE STRUCTURE : Introduction to fiber structure – Micellar theory, continuous theory, fringed micelles theory, fringed fibrils theory, modified fringed micellar theory – fine structure of natural, fine structure and cross-section of regenerated and synthetic fibres, Importance of studying fine structure, requirements for fibre formation (Definitions of parameters which characterize most important features) – Degree of order, degree of localization of order, length/width ratio of localized units, degree of orientation, Degree of polymerization.

UNIT - 2 **L-9**

CHARACTERIZATION TECHNIQUES : Brief introduction of Methods of investigating textiles – X – Ray diffraction, IR, NMR, Thermal Analysis, Optical microscopy, Electron microscopy, Scanning Electron microscopy. Fibre density – Measurement, Relation between density and order - Equilibrium absorption of water, Relation between regain and RH, Comparison of relation between regain and RH of various textile fibres (influence of temperature)- Heat of sorption – measurement of sorption.

UNIT - 3 **L-9**

MOISTURE AND TENSILE PROPERTIES : Diffusion of moisture, penetration into a dry fibre, conditioning of mass of fibres, Retention of liquid water, Swelling – introduction to theories of moisture sorption, effect of hydrophilic groups – Absorption in crystalline and nano crystalline regions, Hysteresis – a molecular explanation. Tensile properties – factors determining the results of tensile experiments, load elongation and stress-strain curves.

UNIT - 4 **L-8**

MECHANICAL CONDITIONING AND STATIC ELECTRICITY : Effects of variability – Introduction to elastic recovery – Mechanical conditioning, time effect – Creep, Flexural, Torsional Rigidity – Significance of Dielectric Properties for Textiles-measurements-effect of moisture and temperature - static electricity-significance.

UNIT - 5 **L-9**

HEAT SETTING : Heat Setting of Textile Fibres: Introduction to heat Setting, need, objectives, types of setting, mechanism of temporary and permanent set, physics of setting, set between fibres, set with in the fibres, synthetic fibre structure and setting, measuring efficacy of setting. Thermal conductivity- structural changes in fibre on heating.

TEXT BOOKS:

1. W. E. Morton and J W S Hearle, “Physical Properties of Textile Fibers”, The Textile Institute, Manchester, 1994.
2. J. E. Booth, “Principles of Textile Testing”, Butterworths, London, 2009.

REFERENCE BOOKS:

1. J. Happy, “Fiber Structure”, Elsevear Edition, Amsterdam, (Vol 3), 1984.
2. J. W. S. Hearle, “Moisture Relations in Textiles”, The Textile Institute Manchester, 1976.

16TF361 PROCESS CONTROL AND QUALITY MANAGEMENT IN TEXTILES

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
15	15	20	-	-	-

Course Description and Objectives:

This course offer applied knowledge in process and quality control of spinning, weaving chemical processing through various test methods to be followed, controlling mechanism involved in production and quality at each stage. Objective of this course is to impart desired key skill required for textile mill quality management.

Course Outcomes:

The student will be able to:

- understand process control in textile mills.
- control quality at different stages of textile process.
- know available norms for productivity and labor allotment.
- Know different chemical evaluation tests.
- Identify the chemical groups in finished fabrics.

SKILLS:

- ✓ *Identify a key process parameters for different textile industries.*
- ✓ *Calculate yarn realization for a spinning mill.*
- ✓ *Analyze the result of snap efficiency.*
- ✓ *Compare the key variable with norms and standards.*

ACTIVITIES:

- *Calculate individual and overall efficiency for spinning mill*
- *Perform breakage study at warping and weaving.*
- *Measure absorbency of bleached cloth.*
- *Carry Iodine absorption test for evaluation of degree of cross linking.*
- *Collect of standerds and norms for textile mill processes.*

UNIT – 1 **L-10**

PROCESS CONTROL IN BLOW ROOM, CARD & DRAW FRAME : Introduction to Process Control, PQC in Blow Room, Card & Draw Frame, Raw Material Management - need of instrumental evaluation, traditional methods of cotton selection, importance of cost in raw material, linear programming for mixing. Blow Room; Control of mixing quality, control of yarn realization, Control of waste and Waste extraction study, Cleaning in Blow room.

Carding - Waste extraction at card, Nep study & control; Draw Frame - Breakage study, Stop motion checking, Use of NILO meter, Drafting rollers pressure checking.

UNIT - 2 **L-9**

PROCESS CONTROL IN COMBER, SIMPLEX & RING FRAME : Comber - evaluation of comber performance, fractionating efficiency of comber, comber waste analysis, influence of various factors on combing performance **(**5 minute test), head wise and Overall waste at Comber; Breakage study at Simplex; Ring Frame - Breakage study, Snap study analysis, Idle spindle study, Measurement and analysis of productivity means to improve productivity, control of yarn quality - count, strength and their variability, yarn unevenness and imperfections.

UNIT - 3 **L-9**

PROCESS CONTROL AT WINDING AND WARPING : Process & Quality Control in Winding Scope, Optimizing of Yarn tensioning and clearing (settings for different kinds of yarns) Producing good package, unwinding tension and optimum guide distance, Approach to control of productivity. Process & Quality Control in Warping: Scope, breakage study, Effort to minimize the breakage rate, quality of warper beams, breakage study in warping (norms), productivity, warping defects and remedies.

UNIT - 4 **L-8**

PROCESS & QUALITY CONTROL IN SIZING & LOOM SHED : Process & Quality Control in Sizing - Measurement & control of size pick up, control in size preparation, Lappers study, breakage study, controlling sizing conditions, stretch control in various zones, moisture control, Migratory behavior study, quality of sized beams, productivity, Dead loss and its control, hard waste and its control, Process & Quality Control in Loom Shed - Control of speed, Breakage and snap study, Determination of labor allotment (ATIRA procedure), Norms for breakage rate, No. of looms/operative, control of efficiency, control of loom stoppages.

UNIT - 5 **L-9**

PROCESS & QUALITY CONTROL IN CHEMICAL PROCESSING : Functions of control house, grey cloth inspection; Process control measures in Bleaching and mercerizing - method to estimate the concentration of caustic and silica in peroxide bleach, absorbency of bleached cloth, Cuprammonium fluidity, ash content, barium activity no. luster no. fastness of bleaching; Process control in dye house, parameters for process control in different forms of dyeing (yarn and fabric), test method to determine the caustic and Hydros concentration in vat dye liquor. Process control in Printing - Test for the suitability of thickner in the print paste formation; Process control in Finishing - Iodine absorption test for the evaluation of degree of resign cross linking, Optimal brightness test for the uniformity of cross linking, heat setting assessment in polyester by Iodine absorption method.

TEXT BOOKS:

1. R. Senthil Kumar, “Process management in spinning”, CRC Press, 2015
2. V. A. Shenai, “Evaluation of Textile Chemicals”, Sevak Publications, 1980.

REFERENCE BOOK:

1. V. K. Kothari, “Testing & Quality Management”, AFL Publication, 2006.
2. K. R. Salhotra, “Process Control in Spinning”, Institute of Textile Technology, 2002.