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## FOREWORD

Clothing is one of the basic needs for mankind. It protects the body from heat and cold, but also brings out one's personality, enhances beauty, gives comfort and expresses the status of living. Thus the need to study about fiber, fabric and clothing.

What is Textile....? Textiles, generic term (from Latin texere - which means capable of being woven, "to weave") originally applied to woven fabrics, but now also applied to natural and synthetic filaments, yarns, and threads as well as to the woven, knitted, felted, tufted, braided, bonded, knotted, and embroidered fabrics made from them. The term textile fibers refer to fibers that can be spun into yarn or made into fabric.

India's textiles sector is one of the oldest industries in Indian economy dating back several centuries. Even today, textiles sector is one of the largest contributors to India's exports with approximately 11 per cent of total exports. The textiles industry is also labour intensive and is one of the largest employers. The textile industry has two broad segments. First, the unorganised sector consists of handloom, handicrafts and sericulture, which are operated on a small scale and through traditional tools and methods. The second is the organised sector consisting of spinning, apparel and garments segment which apply modern machinery and techniques such as economies of scale.

In the Department of Textile Technology, a wide range of professional subjects are offered to empower the students. The curriculum of the programme consists of core courses, elective courses of student's choice, and some basic courses of science that form the bridge to technology, industry internship and project works. In the **new curriculum of R19**, project-based learning is included to enable the students to acquire hands-on experience of technology to make them industry ready.

In R19 curriculum, every care has been taken to accommodate the knowledge and skill requirements of industry through proper activities for practice. While making the graduates industry ready, it also enables them to be successful in competitive examinations like GATE etc.

The focus area of each unit in every course is clearly defined. Topics of contemporary relevance such as the Spinning, Weaving, Chemical Processing, Textile testing, Apparels and Fashion technology areas are included. The Board of Studies consisting eminent personalities along with experienced faculty members of the university have designed the curriculum to offer knowledge and skill of Textile Technology on the above mentioned areas. The department aims to make graduates ready for the industrial needs.

#### **External BoS Members:**

#### Academic

1. Prof. Dr. J. Hayavadana, Head, OUCT, Osmania University.

2. Dr. Shakeel Iqbal, Head, NIFT Hyderabad.

#### Research

3. Dr. Syamal Maiti, Assistant Director, MANTRA, Surat.

#### Industry

4. Mr. Upul Nallaperuma, General Manager- Operations, TEEJAY, Brandix Apparel City.

5. Mr. Ranjit Boumik, Head - Processing, NSL TEXTILES, Chandole.

6. Mr. Balakrishna Shetty, CEO, SHAHI Exports, Bangalore.

Dr.M.Ramesh Naidu HoD, Textile Technology



#### VISION

To evolve into a Centre of Excellence in Science & Technology through creative and innovative practices in teaching – learning, towards promoting academic achievement and research excellence to produce internationally accepted, competitive and world class professionals who are psychologically strong & emotionally balanced, imbued with social consciousness & ethical values.

#### MISSION

To provide high quality academic programmes, training activities, research facilities and opportunities supported by continuous industry - institute interaction aimed at promoting employability, entrepreneurship, leader-ship and research aptitude among students and contribute to the economic and technological development of the region, state and nation.

## Department of TEXTILE TECHNOLOGY

#### VISION

To attain global recognition in research in training students for meeting the challenging needs of textile and allied industries and society.

#### MISSION

- To enlighten the students about the latest technology in textile and garment through innovative educational practices and multi disciplinary researc.
- To engage with the industry through consultancy as solution provides.

## B.Tech. - TEXTILE TECHNOLOGY

#### **Programme Educational Objectives (PEOs)**

PEO1: Graduates pursue profession in Textile & allied engineering

PEO2: Graduates of the programme will have the continual learning ability.

PEO3: Graduates will pursue higher education & research

## **Programme Specific Outcomes (PSOs)**

- **PSO1:** Ability to apply knowledge of textile technology in identifying and providing appropriate solutions to problems of textile industry.
- **PSO2:** Ability to Demonstrate learned techniques, experiments, modern engineering tools and software to estimate the optimum utilization resources such as raw materials, machineries, manpower and to predict the properties of fibre, yarn, fabric and garments as per the end uses.
- **PSO3:** Ability to apply knowledge of fashion technology in developing new products with different styles and also to design optimized textile process to develop quality and cost effective products.

## **Programme Outcomes (POs)**

The graduates of Electrical & Electronics Engineering will be able to:

- **PO1:** Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **PO2: Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO3:** Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **PO4:** Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **PO5:** Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- **PO6:** The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- **PO7:** Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- **PO8:** Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **PO9:** Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **PO10:** Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- **PO11: Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- **PO12:** Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



(Applicable for students admitted into First Year from academic year 2019-20 onwards)

### I Year I Semester

Course Code	Course Title	L	Т	Р	C
19HS104	Engineering Mathematics-I(D)	3	1	2	5
19HS114	Engineering Physics (B)	3	-	2	4
19CS101	Programming for Problem Solving	3	-	2	4
19ME101	Engineering Graphics & Design	2	-	2	3
19HS123	Technical English Communication	2	-	2	3
19HS124	Constitution of India	1	-	-	1
19EE102	Basics of Engineering Products	2	-	2	3
19PC001	Physical Fitness, Sports & Games - I	-	-	3	1
	Total	19	1	15	24

#### I Year II Semester

Course Code	Course Title	L	Т	Р	C
19HS110	Engineering Mathematics-II(D)	3	1	2	5
19HS119	Engineering Chemistry (B)	3	-	2	4
19EE101	Basics of Electrical & Electronics Engineering	3	-	2	4
19HS122	English Proficiency and Communication Skills	-	-	2	1
19ME103	Workshop	1	-	2	2
19TT101	Textile Fibers	3	-	2	4
199PC002	Physical Fitness, Sports & Games - II	-	-	3	1
	Total	13	1	15	21

L : Lecture Hours/week ; T : Tutorial Hours/week ;

 ${\sf P}$  : Practical Hours/week ;  ${\sf C}$  : Credits of the Course ;

(Applicable for students admitted into First Year from academic year 2019-20 onwards)

# B.Tech.

#### II Year I Semester

Course Code	Course Title	L	Т	Р	C
19HS203	Probability and Statistics	3	1	-	4
19TT201	Technology of Manufactured Fibres	3	-	-	3
19TT202	Yarn Manufacturing	3	-	-	3
19TT203	Fabric Manufacturing	3	-	-	3
19TT204	Fashion Theory	3	-	2	4
19MS303	Principles of Management and Organizational Behaviour	3	-	-	3
19PC003	Life Skills - I	-	-	2	0
19PC004	Technical Seminar - I	-	-	2	1
19PC005	Intra Disciplinary Project - I	-	-	3	1
19PC006	Physical Fitness, Sports & Games - III	-	-	2	1
	Total	18	1	11	23

#### II Year II Semester

Course Code	Course Title	L	Т	Р	C
19TT211	Testing of Fibers and Yarns	3	-	2	4
19TT212	Technology of Knits and Nonwovens	3	-	-	3
19TT213	Textile Wet Processing	3	-	2	4
19TT214	Pattern Engineering Laboratory	-	-	4	2
19HS204	Enviornmental Studies	1	-	-	1
19PC007	Life Skills - II	-	-	2	1
19PC008	Technical Seminar - II	-	-	2	1
19PC009	Intra Disciplinary Project - II	-	-	2	1
	Department Elective - I	3	-	-	3
	Open Elective - I	3	-	-	3
	Total	16	-	14	23



(Applicable for students admitted into First Year from academic year 2019-20 onwards)

#### III Year I Semester

Course Code	Course Title	L	Т	Р	C
19TT301	Testing of Fabrics and Garments	3	-	2	4
19TT302	Apparel Production Technology	3	-	2	4
19TT303	Technical Textiles	3	-	-	3
19HS205	Soft Skills Lab	-	-	2	1
19PC010	Employability Skills - I	-	-	2	0
19HS301	Human Values, Professional Ethics & Gender Equity	2	-	-	2
19PC011	Inter Departmental Project - I	-	-	4	2
19PC012	Modular Course	-	-	-	1
	Department Elective - II	3	-	-	3
	Open Elective - II	3	-	-	3
	Total	17	-	12	23

#### III Year II Semester

Course Code	Course Title	L	Т	Р	C
19TT311	Fabric Structure and Design	3	-	2	4
19TT312	Apparel Merchandising	3	1	-	4
19TT313	Structural Mechanics of Fiber, Yarn and Fabric	3	1	-	4
19TT314	Fundamentals of Textiles 4.0	2	-	-	2
19HS206	Professional Communication Lab	-	-	2	1
19PC013	Employability Skills - II	-	-	2	1
19PC014	Inter Departmental Project - II	-	-	4	2
	Department Elective - III	3	-	-	3
	Open Elective - III	3	-	-	3
	Total	17	2	10	24

(Applicable for students admitted into First Year from academic year 2019-20 onwards)



#### IV Year I Semester

Course Code	Course Title	L	Т	Р	C
19TT401	Industrial Engineering for Textiles and Apparels	3	-	2	4
19TT402	Textile Mechanics and Calculations	3	-	-	3
19TT403	Clothing Comfort	3	-	-	3
19TT404	Textile Product Design and Development	3	1	-	4
19PC015	Societal Centric and Industry related Projects	-	-	6	3
	Department Elective - IV	3	-	-	3
	Total	15	1	8	20

#### IV Year II Semester

Course Code	Course Title	L	Т	Р	C
19PC016/19PC017	Internship / Project work	-	-	24	12
	Total	-	-	24	12

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



(Applicable for students admitted into First Year from academic year 2019-20 onwards)

## **DEPARTMENT ELECTIVE COURSES**

#### **DEPARTMENT ELECTIVE - I**

Course Code	Course Title	L	т	Р	C
19TT231	Blow Room and Carding	3	-	-	3
19TT232	Preparatory Aspects of Fabric Formation	3	-	-	3
19TT233	Hand Knitting and Flat Kniting	3	-	-	3
19TT234	Dyes and Pigment	3	-	-	3
19TT235	Fashion Product Development	3	-	-	3

#### **DEPARTMENT ELECTIVE - II**

Course Code	Course Title	L	Т	Р	C
19TT331	Drawing, Comber and Simplex	3	-	-	3
19TT332	Technology of Fabric Forming	3	-	-	3
19TT333	Knitting Technology	3	-	-	3
19TT334	Technology of Dyeing and Printing	3	-	-	3
19TT335	Costing of Fashion and Apparel Production	3	-	-	3

#### **DEPARTMENT ELECTIVE - III**

Course Code	Course Title	L	Т	Р	C
19TT336	Technology of Yarn Formation	3	-	-	3
19TT337	Advanced Fabric Formation	3	-	-	3
19TT338	Advancement in Knitting Technology	3	-	-	3
19TT339	Eco-Friendly Wet Processing	3	-	-	3
19TT340	Fashion Marketing and Visual Merchandising	3	-	-	3

#### **DEPARTMENT ELECTIVE - IV**

Course Code	Course Title	L	T	Р	C
19TT431	Operations Research for Engineers	3	-	-	3
19TT432	Lean and Six Sigma for Textile and Apparels	3	-	-	3
19TT433	Retailing and Branding of Textiles and Apparels	3	-	-	3
19TT434	Process Control and Quality Management in Textiles	3	-	-	3

(Applicable for students admitted into First Year from academic year 2019-20 onwards)

## **OPEN ELECTIVE COURSES**

Course Code	Course Title	L	Т	Р	C
19AE521	Basic Automobile Engineering	3	-	-	3
19AE531	On Road and Off-road Vehicles	3	-	-	3
19AE532	Safety systems in Automobiles	3	-	-	3
19AE541	Vehicle Maintenance and pollution Norms	3	-	-	3
19BI521	Community Informatics	3	-	-	3
19BI531	Health Informatics	3	-	-	3
19BI532	Software Tools for Sustainable Biodiversity	3	-	-	3
19BM521	Basic Clinical Sciences	3	-	-	3
19BM522	Assist Devices and Implant Technology	3	-	-	3
19BM531	Clinical Instrumenatation	3	-	-	3
19BM532	Biomaterial and Artificial Organs	3	-	-	3
19BM533	Biomedical Equipments	3	-	-	3
19BM541	Medical Imaging Techniques	3	-	-	3
19BM542	Medical Physics	3	-	-	3
19BT521	Elements of Biotechnology	3	-	-	3





(Applicable for students admitted into First Year from academic year 2019-20 onwards)

# **OPEN ELECTIVE COURSES**

Course Code	Course Title	L	Т	Р	C
19BT531	Community Medicine and Public Health	3	-	-	3
19BT532	Biodiversity Economics, Trade and Commerce	3	-	-	3
19BT533	Bioplastics and Biocomposites engineering	3	-	-	3
19CE521	Environmental Pollution & Control	3	-	-	3
19CE522	Building Technology	3	-	-	3
19CE531	Disaster Management	3	-	-	3
19CE532	Solid Waste Management	3	-	-	3
19CE533	Remote Sensing & Geographical Information System	3	-	-	3
19CE541	Environmental Impact Assessment	3	-	-	3
19CS531	Python Programming	3	-	-	3
19CS532	R Programming	3	-	-	3
19CS533	Data Structures	3	-	-	3
19CS534	Database Management Systems	3	-	-	3
19CS535	Operating Systems	3	-	-	3

(Applicable for students admitted into First Year from academic year 2019-20 onwards)



# **OPEN ELECTIVE COURSES**

Course Code	Course Title	L	Т	Р	C
19CS541	Data Mining Techniques	3	-	-	3
19CS542	Internet of Things	3	-	-	3
19EC521	Embedded Linux	3	-	-	3
19EC531	Embedded Systems and RTOS	3	-	-	3
19EC532	Microcontrollers for Embedded Systems	3	-	-	3
19EC541	Design of IOT Systems (IOT)	3	-	-	3
19EE521	Solar PV Technologies-I	3	-	-	3
19EE531	Solar PV Technologies-II	3	-	-	3
19EE532	Design & Economics of PV plants	3	-	-	3
19EE541	Solar Thermal Conversion Systems	3	-	-	3
19FT521	Introduction of Food Laws and Regulation	3	-	-	3
19FT531	Food Quality and Evaluation	3	-	-	3
19FT532	Subjective and Objective Evaluation in Food Products	3	-	-	3
19FT541	Food Safety and Public Health	3	-	-	3
19HS521	Modern Indian History and Indian Culture	3	-	-	3



(Applicable for students admitted into First Year from academic year 2019-20 onwards)

## **OPEN ELECTIVE COURSES**

Course Code	Course Title	L	Т	Р	C
19HS531	Polity and Governance in India	2	-	-	2
19HS532	Economic and Social Development in India	2	-	-	2
19HS541	Geography of India	2	-	-	2
19IT521	OOPs through JAVA	3	-	-	3
19IT541	Data Science using Python	3	-	-	3
19MS521	Business Environment and Ethics	3	-	-	3
19MS522	Managerial Economics	3	-	-	3
19MS531	Marketing and HR Management	3	-	-	3
19MS532	Finance for Engineers	3	-	-	3
19MS541	Production and Operations Management	3	-	-	3
19ME521	Biomechanics & Kinesiology	3	-	-	3
19ME522	Basics in Robotics	3	-	-	3
19ME531	Advances in Robotics	3	-	-	3
19ME532	Reliability Engineering	3	-	-	3
19ME533	Field and Service Robots	3	-	-	3
19ME534	Energy Audit & Management	3	-	-	3
19ME535	Supply Chain Management	3	-	-	3
19TT531	Fashion Product Development	3	-	-	3
19TT532	Costing of Fashion and Apparel Production	3	-	-	3
19TT541	Fashion Marketing and Visual Merchandising	3	-	-	3

Note : Students should not choose open electives offered by their branch.

# TEXTILE TECHNOLOGY

# B.Tech.

#### I SEMESTER

	19HS104	-	Engineering Mathematics - I (D)
	19HS114	-	Engineering Physics (B)
►	19CS101	-	Programming for Problem Solving
►	19ME101	-	Engineering Graphics and Design
Þ	19HS123	-	Technical English Communication
Þ	19HS124	-	Constitution of India
Þ	19EE102	-	Basic of Engineering Products
	19PC001	-	Physical Fitness, Sports & Games - I

#### **II SEMESTER**

	19HS110	-	Engineering Mathematics - II (D)
	19HS119	-	Engineering Chemistry (B)
	19EE101	-	Basic of Electrical & Electronics Engineering
	19HS122	-	English Proficiency and Communication Skills
►	19ME103	-	Workshop
►	19TT101	-	Textile Fibers
	16BT102	-	Physical Fitness, Sports & Games - II



## 19HS104

## ENGINEERING MATHEMATICS - I(D) LINEAR ALGEBRA & NUMERICAL METHODS

Hours Per Week :								
	L	Т	Р	С				
Γ	3	1	2	5				

Iotal Hours :
---------------

L	Т	Р	] [	WA/RA	SSH/HSH	CS	SA	S	BS
45	15	30		20	45		10	-	5

#### COURSE DESCRIPTION AND OBJECTIVES:

To acquaint students with principles of mathematics through matrices, numerical methods, vector calculus that serves as an essential tool in several Engineering applications.

#### COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Determine rank, Eigen values and Eigen vectors of a matrix and solution of a system of linear equations.	1, 2
2	Appreciate the use of Cayley-Hamilton theorem.	1, 2
3	Demonstrate the techniques of numerical methods.	1, 2
4	Illustrate the concepts of gradient, divergence and curl of a given function.	1, 2
5	Use software tools to obtain and verify the solutions.	5

#### SKILLS:

- ✓ Find the consistency of System of linear equations with iterative methods.
- Compute the numerical solutions of differential equations and integrate functions using relavant methods.
- ✓ Determine the divergence, curl, gradient and directional derivative of vector equations.



#### SOURCE:

https:// www.google.co.in/ search?q=mathematics+ pictures&sour ce=Inms&tbm=isch&sa = &ved=0a hUKEwiQ-837lvXiAhVPVH0K He56CVEQ\_ AUIECgB#imgrc=Fm9KHSsVuOJjM:

#### I Year I Semester

#### L-9

#### L-9

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

UNIT-III

UNIT-I

UNIT-II

a matrix.

#### NUMERICAL METHODS-I

Solutions of Algebraic and Transcendental Equations : Introduction, Bisection method, Regula-Falsi method, Iteration method, Newton-Raphson method.

MATRICES : Rank of a matrix, Normal form, Triangular form, Echelon form; Consistency of system

of linear equations, Gauss-Jordan method, Gauss elimination method, Gauss-Siedal method.

Numerical integration : Trapezoidal rule, Simpson's 1/3 and 3/8 rules, Boole's rule, Weddle's rule. UNIT-IV L-9

NUMERICAL METHODS - II : Introduction, Finite differences, Forward differences, Backward differences, Differences of a polynomial, Newton's formulae for interpolation, Gauss forward and backward interpolation formulae: Interpolation with unevenly spaced points, Lagrange's interpolation formula.

#### UNIT-V

**VECTOR DIFFERENTIATION :** Review of Vector Algebra (Not for testing) Vector Function, Differentiation, Scalar and Vector point functions, Gradient, Normal Vector, Directional Derivate, Divergence, Curl, Vector identities.

#### LABORATORY EXPERIMENTS

#### LIST OF EXPERIMENTS

- 1. Mathematical Preliminaries.
- 2. Algebra of Matrixs.
- Determine Rank, Triangular & Echelon form of a matrix. 3.
- Solving system of equations using Direct Method. 4.
- 5. Solving system of equations using Cramer's rule.
- Solving system of equations using matrix inversion method. 6
- 7. Solving system of equations using Gauss-Jordan method, Gauss elimination method.
- 8. To find Eigen values, Eigen vectors of a Matrix.
- 9. Cayley-Hamilton Theorem for a square Matrix.
- 10. Modal Matrix, Diagnolization of a given Matrix.
- 11. Algebra of Vectors.
- 12. Gradient, Divergance & Curl of Scalar and Vector functions.

#### **TEXT BOOKS:**

- 1. H. K. Dass and Er. Rajanish Verma, "Higher Engineering Mathematics", S. Chand & Co., 3<sup>rd</sup> edition. 2015.
- 2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 44<sup>th</sup> edition, 2018.

#### **REFERENCE BOOKS**:

- 1. John Bird, "Higher Engineering Mathematics", Routledge (Taylor & Francis Group), 2018.
- 2. Srimanta Pal and Subodh C. Bhunia, "Engineering Mathematics", Oxford Publications, 2015.
- 3. B. V. Ramana, "Advanced Engineering Mathematics", TMH Publishers, 2008.
- N. P. Bali and K. L. Sai Prasad, "A Textbook of Engineering Mathematics I, II, III", Universal 4 Science Press, 2018.
- 5. T. K.V. Iyengar et al., "Engineering Mathematics, I, II, III", S. Chand & Co., 2018.

#### **ACTIVITIES:**

- o Differentiate method to solve the numerical equation.
- o Compute the numerical solutions of differential equations.
- o Compare the solutions of differential equations obtained by different methods.

#### **TOTAL HOURS:30**

L-9

L-9

## **19HS114 ENGINEERING PHYSICS (B)**

L	Т	Р	С
3	0	2	4

Total Ho	urs :
----------	-------

L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	0	30	20	15	-	10	2	3

#### COURSE DESCRIPTION AND OBJECTIVES:

This course emphasizes on the wave phenomenon including ultrasonic waves and their applications. It promotes the understanding of mechanical properties of solids and the non-destructive testing of the materials. This enables thorough understanding of fundamentals and applications of Lasers, Optical fiber along with Quantum Mechanics and free electron theory of metals. It also focuses on Nano-materials and experimental techniques for characterizing the materials.

#### COURSE OUTCOMES:

Upon completion of the course, student will able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Acquire knowledge on mechanical and sound waves in the perspective of engineering applications.	1
2	Analyze the mechanical properties of materials by the study of stress – strain curve and to adjudge materials from NDT methods.	5
3	Analyze the wavelengths of Laser for suitable applications in the field of industry, medicine and communication and to foster the knowledge on optical fibers to realize fiber optic communication and fiber optic sensors.	1
4	Apply the principles of quantum mechanics to learn the dynamics of free electrons in metals.	4
5	Compute the dimensions of nanoparticles to consolidate the physical aspects of nanomaterials.	5

#### SKILLS:

- ✓ Apply the concepts of waves to unravel the functioning of various physical systems.
- ✓ Enunciate the importance of ultrasonics in non-destructive testing of materials.
- Understand the concepts of Lasers and optical fibers in science and engineering.
- Mathematical interpretation of quantum mechanical waves and hence the determination of electrical conductivity of metals.
- ✓ Production and characterization of nanomaterials aiming at their applications.



SOURCE: https:// en.wikipedia.org/ wiki/ Optical\_fiber\_cable

#### UNIT - I

L-7

**WAVES & OSCILLATIONS:** Simple Harmonic Motion; Free oscillations; Damped oscillations; Forced oscillations; Resonance.

**ULTRASONICS** : Introduction, properties of ultrasonic waves, Types of ultrasonic waves; Production of ultrasonic waves, Piezoelectric method; Determination of velocity of ultrasonic waves in solids and liquids (Interferometer method).

#### UNIT - II

L-8

**MECHANICAL PROPERTIES OF SOLIDS**: Introduction, Stress-Strain curve, Elasticity, Poisson's ratio; Creep; Fatigue; Fracture; Factors affecting mechanical properties.

**NON DESTRUCTIVE TESTING OF MATERIALS**: Introduction, Methods of NDT, Visual inspection, Liquid penetrant method, Ultrasonic testing systems, X-ray radiography.

#### UNIT - III

L-12

**LASERS:** Characteristics of laser light, Spontaneous and stimulated emission of radiation; He-Ne laser; CO<sub>2</sub> laser; Semiconductor laser and laser applications, Holography and its applications.

**FIBER OPTICS :** Principle of optical fiber, Acceptance angle, Numerical aperture; Types of fibres; Dispersion and attenuation in optical fibres; Optical fibre communication system; fibre optic sensors.

#### UNIT - IV

L-9

L-9

**QUANTUM PHYSICS** : Introduction to quantum mechanics, de Broglie's hypothesis; Time independent Schrodinger wave equation, Particle in one dimensional box; Heisenberg's uncertainty principle.

**FREE ELECTRON THEORY**: Elements of classical free electron theory and its limitations; Quantum theory of free electrons; Fermi level, Density of states; Fermi-Dirac distribution and effect of temperature.

#### UNIT - V

**NANO MATERIALS:** Introduction to nanoscience and technology, Concept of quantum size effect; Synthesis of nanomaterials - top down and bottom up approaches; Applications of nanotechnology.

**EXPERIMENTAL TECHNIQUES FOR CHARACTERIZATION OF MATERIALS:** X-Ray diffraction-Bragg's law, Powder method of X-ray diffraction; Optical microscope; Scanning electron microscope (SEM); Atomic force microscopy (AFM).

#### TEXT BOOKS

- 1. M.N. Avadhanulu, P.G. Kshirsagar and T.V.S.Arun Murthy, "A text book of Engineering Physics", 11<sup>th</sup> edition, S. Chand and Company Ltd., 2019.
- 2. Shatendra Sharma and Jyotsna Sharma, "Engineering Physics", Pearson India Eduction Services Pvt. Ltd., 2018.

#### **REFERENCE BOOKS**

- M.R. Srinivasan, "Engineering Physics", 2 <sup>nd</sup> edition, New Age International Publishers, 2014.
- 2. William T. Silfvast, "Laser Fundamentals" 2<sup>nd</sup> edition, Cambridge University Press, 2004.
- 3. M.R.Srinivasan, "Engineering Physics" New Age International Pulishers, 2006.
- 4. T. Pradeep, "A Textbook of Nanoscience and Nanotechnology", Tata McGraw Hill, 2003.

#### ACTIVITIES:

- o Determination of Ultrasonic impedance of materials.
- o Estimate ultimate strength of a given material. (Ductile/brittle)
- o Evaluate hardness of a material with respect to ambient temperature.
- Measurement of height of a room using Laser instrument.
- o Study the Numerical Aperture of Optical fiber prepared from different materials.
- o Identification of materials from the determination of acceptance angle of a given fiber.
- Measurement of electrical conductivity / resistivity of a given conductor.

#### LABORATORY EXPERIMENTS

#### LIST OF EXPERIMENTS

#### **TOTAL HOURS:30**

- 1. Laser Determination of wavelength using diffraction grating.
- 2. Optical fiber Determination of Numerical aperture Acceptance angle.
- 3. Determination of Planck's constant.
- 4. Melde's Experiment determination of the frequency of tuning fork
- 5. Measurement of Young's modulus by bending beam method.
- 6. Determination of moment of inertia using torsional pendulum
- 7. Determination of velocity of ultrasonic waves velocity in liquid medium using interferometer method
- 8. Dye penetrant test method
- 9. Seebeck Effect Determination of Seebeck coefficient.
- 10. Stewart & Gee's Experiment- Study of magnetic field along the axis of a current carrying coil.
- 11. Verification of Tangent law
- 12. Solar cell Determination of Fill factor & Efficiency.
- 13. LED Study of V-I characteristics.

#### LABORATORY MANUALS:

- 1. Dr. Ruby Das, C.S. Robinson, Rajesh Kumar and Prasanth Kumar "A text book of Engineering Physics Practical", Sahu University Science press, 1<sup>st</sup> edition, 2010.
- Jayaraman, "Engineering Physics Laboratory manual", 1<sup>st</sup> edition, Pearson education, 2014.

## 19CS101

## PROGRAMMING FOR PROBLEM SOLVING

#### Hours Per Week :

L	Т	Р	С
3	0	2	4

Total	Hours	<b>3</b> :						
L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	30	5	30	5	20	5	5

#### COURSE DESCRIPTION AND OBJECTIVES:

This course is aimed to impart knowledge on basic concepts of C programming language and problem solving through programming. It covers basic structure of C program, data types, operators, decision making statements, loops, functions, static and dynamic data structures. At the end of this course, students will be able to design, implement, test and debug modular C programs.

#### COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

[		1
COs	Course Outcomes	POs
1	Understanding of how to write simple, but complete, C programs.	-
2	Identification of suitable data type operands and design of expressions having right precedence.	2
3	Application of decision making and iterative features of C Programming language effectively.	1
4	Design and development of non-recursive and recursive functions and their usage to build large modular programs.	3
5	Selection of problem specific static/dynamic data structures and suitable accessing methods.	2
6	Development of C programs that are understandable, debuggable, maintainable and more likely to work correctly in the first attempt.	3

#### SKILLS:

- ✓ Analysis of a given problem to be solved.
- ✓ Design of algorithm/solution for a given problem.
- Identification of suitable data types for operands.
- ✓ Application of suitable control statements for decision making.
- ✓ Design of non-recursive and recursive functions to perform different tasks.
- Selection of static or dynamic data structures for a given problem and manipulation of data items.



10

#### **ACTIVITIES:**

- o Analysis of a given problem.
- o Design of algorithm/ solution.
- o System testing

0

Implementation (coding and unit testing) of algorithm.

IDevelopment of C programs that are understandable, debuggable, maintainable and ~ more likely to work correctly in the first attempt.

UNIT-I

**INTRODUCTION TO C:** Structure of a C program; pre-processor statement, inline comments, Variable declaration statement, Executable statement; C Tokens: C Character Set, Identifiers and Keywords, Type Qualifiers and Type Modifiers, Variables and Constants, Punctuations, and Operators.

Data Types: Basic data types; Storage classes; scope of a variable; Formatted I/O; Reading and writing characters;

#### UNIT - II

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 - III

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

#### UNIT - IV

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; Dynamic memory allocation functions.

#### UNIT-V

STRUCTURES AND UNIONS: Structures - Defining a Structure, Declaration of a structure objects, Operations on structures; Pointers to a structure; Array of structures; Nested Structures; Unions; Bit Fields.

#### LABORATORY EXPERIMENTS

#### LIST OF EXPERIMENTS

#### **Experiment 1:**

- (a) Write a C program to display a simple message on the standard output device using puts ().
- Every character holds an ASCII value (an integer number in the range of 0 to 255) rather (b) than that character itself, which is referred to as ASCII value. Likewise, for a given input whether it is character or digit or special character or lower case or upper case letter, find corresponding ASCII value.

Example: ASCII value of 'A' is 65.

#### **TOTAL HOURS: 30**

L - 9

#### 1 - 9

#### L - 9

L - 9

L - 9

#### **Experiment 2:**

(a) For the given Basic salary, compute DA, HRA and PF using the following criteria and find out the Net Salary of an Employee by deducting PF and IT.

```
DA = (Basic salary *25)/1000
HRA= (Basic salary * 15)/100
Gross salary = Basic salary + DA + HRA
PF = Gross salary * 10/100
IT= Gross salary * 10/100
Net Salary = Basic Salary + DA + HRA – (PF + IT)
```

(b) Write a C program to swap the two integers with and without using additional variable.

Example: Before swapping values of a =4, and b = 5 and after swapping a = 5, and

b = 4.

#### **Experiment 3:**

(a) Write a C program to check whether a given character is a vowel or consonant.

**Hint**: Read input from the user, and check whether it is an alphabet or not. If it is an alphabet, then check whether it is a vowel or a consonant. Otherwise display it is not an alphabet.

(b) The marks obtained by a student in 'n' different subjects are given as an input by the user. Write a program that calculates the average marks of given 'n subjects and display the grade. The student gets a grade as per the following rules:

#### **Experiment 4**:

(a) Write a C Program to print Floyd triangle for the user given number of rows.

**Example:** If the user entered 4 rows, then the output is as follows:

```
1
2 3
4 5 6
7 8 9 10
```

(b) Write a C Program to print the \* for the given number of times in a rows to form a diamond shape.

**Example:** If the user input is 5, then the output is as follows:

\* \*\*\* \*\*\*\* \*\*\*

#### **Experiment 5:**

(a) Write a C Program to check whether the given number is a palindrome or not.

**Hint**: To check whether a number is a palindrome or not, reverse the given number and compare the reversed number with the given number, if both are same then the number is palindrome otherwise not.

**Example**: Given Number = 121, Reversed number = 121.

(b) Write a C Program to calculate sum of the individual digits of the given number.

**Hint**: To find the sum of the digits of given number, use modulus operator (%) to extract individual digits of a number and keep on adding them.

**Example**: Given number is 9875. Sum of the digits of given number "9875" is 9+8+7+5 = 29

#### **Experiment 6:**

(a) Write a program to search for a given number in the given set of numbers.

**Example**: Read set of numbers  $L=\{2,4,6,1\}$ . Search whether 4 is present in the set or not.

- (b) Write a program to perform the following operations on a given list of elements.
  - i. Insert the given element at the beginning of the list and at the end of the list.

**Example**: The given list is  $L=\{1,2,3,8\}$ . Insert '0' at the beginning of the list and at the end of the list. Hence the resultant list is  $L=\{0,1,2,3,8,0\}$ 

ii. Delete an element at the beginning of the list and at the end of the list.

**Example**: The given list is  $L=\{1,2,3,8\}$ . Delete an element at the beginning of the list and at the end of the list. Hence the resultant list is  $L=\{2,3\}$ 

#### **Experiment 7:**

Write a C program to perform the following operations on a list.

(a) Find the maximum or the largest element in a given list.

(b) Find the minimum or the smallest element in a given list.

Hint: Choose one dimensional array to store the given list of data items.

#### **Experiment 8:**

Write a C program to perform addition, subtraction, multiplication operations on the two given matrices using functions.

#### **Experiment 9:**

(a) Write a C program to compute the factorial of a given number using recursion.

**Hint:** Factorial is represented using '!' and it is calculated as n! = n\*(n-1)\*(n-2)\*...\*3\*2\*1.*As a function factorial(n)=n\*factorial(n-1). Note: 0!=1.* 

(b) Write a C program to swap two numbers using call by value and call by reference.

#### Experiment 10:

- (a) Write a C program to read string using gets() function and use puts() function to print the contents of the string.
- (b) Write a C program to copy a given string into another string without using standard string handling library function **strcpy()**.

**Hint**: Read one string as an input and then with the help of loop copy the content of given string into the new string. If the storage space allocated to the new string is less than the given string, entire string will not be copied into the new string.

Example: consider storage space allocated to new string is 20 and given string length is 30. In this case, your program can only copy 20 characters from given string into the new string.

#### Experiment 11:

(a) Write a C program to reverse a string without using standard string handling library function. Do not use another array to store the reversed string.

Hint: If a user enters a string "hello", then on reversing it will be displayed as "olleh".

(b) Write a C program to find whether the given two strings are same or not.

**Hint**: User need to enter two strings *s1* and *s2* and check whether the two strings are same or not. For example: s1=hello, s2=hello output: YES

#### **Experiment 12:**

Write a C program for the following:

Given a string S, consisting of uppercase and lowercase letters, change the case of each alphabet in the string. That is, all the uppercase letters should be converted to lowercase and all the lowercase letters should be converted to uppercase.

Input: Vignan University

Output: vIGNANuNIVERSITY

#### **Experiment 13:**

(a) Write a C program to access the integer elements of the array using pointers.

Hint: Declare a pointer variable and assign the base address of the array to it and print the values of an array using pointer variable.

(b) Declare a character array to hold the input string and declare a character pointer variable. Assign the character array base address to the pointer and then display the every element of the character array.

Hint: Increment the pointer in loop.

#### **Experiment 14:**

Write a C program to count the number of vowels and consonants in a string using pointers.

Hint: Use pointers to read the content of the string.

#### **Experiment 15:**

Create a jagged array [array of variable length lists] with no of rows and no of columns in each row as specified by the user

Hint: Use Dynamic memory allocation (malloc() or calloc())

#### Input:

Enter no of rows: 3

Enter no of columns in Row 1: 3

Enter no of columns in Row 2: 5

Enter no of columns in Row 3: 2

Enter the elements row wise:

84697 92

#### Experiment 16:

Write a C program for the following:

Customer billing system is a structure, having customers\_name, street\_address, city, state, account\_number, payment\_status(paid/ not\_paid), payment\_date(current date/ due\_date), and amount as members. In this example, payment\_date is also structure includes month, day and year as members. So, every customer record can be considered as nested structure. Display the payment status of each customer.

Hint: Use nested structure concept.

#### Experiment 17:

Write a C program for the following: Define a structure named 'Complex' consisting of two floating point members called "real and imaginary". Let c1 and c2 are two Complex variables; compute the sum of two variables.

#### **TEXT BOOKS:**

- Behrouz A. Forouzan, Richard F.Gilberg, "Programming for Problem Solving", 1<sup>st</sup> edition, Cengage, 2019.
- 2. Ajay Mittal, "Programming in C A practical Approach", 1<sup>st</sup> edition, Pearson Education, India, 2010.

#### **REFERENCE BOOKS:**

- ReemaThareja, "Introduction to C Programming", 2<sup>nd</sup> edition, Oxford University Press India, 2015.
- 2. Herbert Schildt, "C: The Complete Reference", 4<sup>th</sup> edition, Tata McGraw-Hill, 2017.
- 3. Byron S Gottfried, "Programming with C", 4th edition, Tata McGraw-Hill, 2018.

## 19ME101 ENGINEERING GRAPHICS AND DESIGN

Hours Per Week :

L	Т	Р	С
2	-	2	3

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IOTAL	HOUIS	-
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				-	-		-	
L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
30	-	30	20	15	-	-	-	3

#### COURSE DESCRIPTION AND OBJECTIVES:

Engineering graphics is the Language of Engineers and is the most effective way of communicating and sharing technical ideas in the form of pictures/drawings. The objective of this course is to familiarize the students with the conventional concepts of engineering drawing and computer aided drawing.

#### COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Communicate the technical ideas in the form of drawings.	1
2	Apply the drawing skills in representing various geometrical features.	1
3	Develop orthographic projections and isometric views of various objects	2
4	Estimate the lateral surface area of regular geometrical solids.	2
5	Sketch simple objects and their pictorial views using AutoCAD.	5

#### SKILLS:

- ✓ Convert isometric views of objects into orthographic views and vice versa.
- ✓ Visualize the shape of the 3D components.
- ✓ Create pictorial views by using AutoCAD.
- ✓ Understand projections by visualization.



**SOURCE:** https:// www.gettyimage.in

#### I Year I Semester

#### L-6 P-6

#### L-6 P-6

**PROJECTION OF PLANES:** Projection of planes inclined to one reference plane - triangle, square, regular pentagon and hexagon.

PROJECTIONS OF SOLIDS: Projection of solids axis inclined to one reference plane - prism, pyramid, cylinder and cone.

**INTRODUCTION & ENGINEERING CURVES:** Types of lines, Lettering, Dimensioning, Geometric construction of lines, Polygons (Angle, ARC, General and Inscribe in circle method), Conical curves

ORTHOGRAPHIC PROJECTIONS OF POINTS & LINES: Principle of projection, Planes of projections, Projections of points, Projection of straight lines: Inclined to one plane, Inclined to both planes.

#### UNIT - IV

UNIT-I

UNIT - II

UNIT - III

(General method), Ellipse by Oblong method.

DEVELOPMENT OF SURFACES: Development of lateral surfaces of simple solids (Prisms, Pyramids, Cylinder and Cone).

**ORTHOGRAPHIC VIEWS:** Conversion of pictorial views into orthographic views.

#### UNIT - V

DRAFTING USING COMPUTER PACKAGE: Introduction to 2D modelling software - AutoCAD; Conversion of Isometric view into Orthographic views of simple castings, Conversion of Orthographic views into Isometric view of simple solids (Prisms, Pyramids, Cylinders and Cones).

#### **TEXT BOOKS:**

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

#### **REFERENCE BOOKS:**

- 1. J Hole, "Engineering Drawing", 2<sup>nd</sup> edition, Tata McGraw-Hill, 2008.
- K L Narayana, "Engineering drawing", 2<sup>nd</sup> edition, Scitech Publications, 2008. 2.

L-6 P-6

#### L-6 P-6

L-6 P-6

## 19HS123 TECHNICAL ENGLISH COMMUNICATION

	Hours	Per	Week	:
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L	Т	Р	С
2	-	2	3

Total	Houre
iotai	110013

L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
30	-	30	13	15	-	13	-	6

#### COURSE DESCRIPTION AND OBJECTIVES:

The course will introduce students to the specific use of English for Technical Communication. In this course students will read, analyze, and interpret material from general and technical fields, and will practice reading, writing, listening and speaking skills on a variety of contemporary topics

#### COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Understand and interpret a wide range of materials on technology.	9,10
2	Apply a variety of strategies to achieve comprehension, including listening for main points; checking comprehension using contextual clues etc.	9,10
3	Apply functional/academic language and grammar to express clearly while speaking and make short presentations on general/technical topics.	9,10
4	Apply functional/academic language and grammar to write clearly on topics related to technology and writing in the workplace.	9,10

#### SKILLS:

- ✓ Oral communication skills to make presentations.
- ✓ Paraphrasing and summarizing skills.
- ✓ Etiquette in interpersonal communication.
- ✓ Language competence to work in international environments.



Source: www.google.com

#### UNIT - I

#### ENVIRONMENTAL CONSCIOUSNESS:

**Reading:** Reading for comprehension (general/technical articles); Reading subskills: predicting, skimming, scanning, reading for inference; Reading and note making (**Reading Texts:** 1) Is a Global Agreement the Only Way to Tackle Climate Change? 2) How to Regain Green Cover 3) Solution to Plastic Pollution).

**Writing:** Precis writing; Paraphrasing; Functional grammar [articles, prepositions of time, place, direction and movement, verb; tense, subject; verb agreement]; Glossary of 25 words from the texts studied.

**Listening:** Anupam Mishra; TED Talk on Water Harvesting (LC); Answering comprehension based Qs; Listening to improve pronunciation

**Speaking:** Functional English(LC); Introducing oneself; Speaking of likes & dislikes/hobbies; Speaking of daily/weekly routine; Speaking of past and present habits/ activities/events; Speaking of future plans.

#### UNIT - II

#### SPACE TREK:

**Reading:** Reading for global understanding; Reading for specific information; Guessing meanings from context; Inter-textual (extrapolative) reading;

Reading Texts: 1) The Hubble Telescope 2) Genesis of ISRO 3) A Home in the Sky

Writing: Writing formal and informal letters; Functional grammar; Modals[Receptive practice of modals like can, could, will, would, shall, should, may, might, must, ought to, used to; Receptive practice of modals for habit, advice, ability, permission, obligation and possibility]; Framing questions: Open ended & Close ended

**Listening:** Listening to a debate on "Colonising the Moon" (LC); Listening subskills; Listening for global understanding; Listening for specific information; Note Making

**Speaking:** (LC) Making mini presentations on general topics; Sharing information about ISRO / NASA/ Elon Musk

#### UNIT - III

#### TRAVELAND TOURISM:

**Reading:** Reading for specific information; Reading with a focus to learn new words; Reading critically for the narrative tone; 50 most commonly used collocations; **(Reading Texts:** 1) Ten Reasons Why Travel is a Waste of Time 2) Southern Splendour 3) Tourism in India: Role in Conflict and Peace.)

**Writing:** Paragraph writing [writing a topic sentence, supporting sentences, effective introductions & conclusions, cohesive devices]; Stages of writing: planning /organising /writing /editing /rewriting; Functional grammar [relative pronouns, comparative adjectives, adverbs of time, frequency, place & manner, speaking of the future/ simple future using *will* and *am/is/are + going to*]

Listening: (LC) Listening to a Song; Listening for global meaning; Listening for getting at the nuances and the mood of the singer.

Speaking: (LC) Telephonic Skills; Participating in an interactive video or telephone talk.

UNIT - IV

#### ENERGY:

**Reading:** Reading for factual information; Reading for extrapolation; Reading for understanding author's stance; (**Reading Texts:** 1) In Search of Our Energy Solution 2) Wind Energy 3) How pertinent is the nuclear option).

L-6

L-6

L-6

L-6

Writing: Current modes of communication; Writing an E-mail; Fax texting; SMS texting for Mobile

**Speaking:** Group Discussion (LC) – Language functions; initiating a discussion; expressing one's opinion; leading a discussion; agreeing/ disagreeing to someone's view; cutting into a speech; **(G.D Topics:** Dumping of nuclear wastes, Exploring eco-friendly energy options, Lifting subsidies on petrol, diesel, LPG, etc).

**Listening:** Listening to an Interview (LC) related to the text ; Listening critically for understanding the attitude/tone of the speaker.

#### UNIT – V

#### MEDIA MATTERS:

**Reading:** Reading for factual understanding; Reading for specific information; Reading for inferring words/phrases from context; Reading for summarizing the main ideas/points in a diagrammatical form; Reading for extrapolation; **Reading Texts**: 1) The Evolution of Media 2) The Top Ten Developments in Journalism in the 2000s 3) Criminal Cases and the Media.

**Writing:** Drafting a report/proposal (LC); Using graphic tools [tables, pie & bar charts; Writing an abstract; Leveraging ICT for communication; Preparing a Ppt (LC).

**Speaking:** Making short presentations [individual/team] with the aid of Ppt (LC); Physical appearance, body language & voice modulation; Making impromptu presentations

**Listening:** Listening to a radio program (LC); Watching a movie scene (LC); Subskills: Listening to understand one's viewpoint; Listening to understand speaker's intention; Listening for local understanding.

#### LIST OF LAB ACTIVITIES

#### **TOTAL HOURS: 30**

- 1. Note making while reading a technical/general article.
- 2. Paraphrasing.
- 3. Paragraph writing.
- 4. Note taking while listening to a technical/general talk.
- 5. Precis writing/Summarising.
- 6. Preparing an outline for developing a report.
- 7. Writing a Short Report.
- 8. Making a Ppt and Mini presentations with the aid of a Ppt.
- 9. Using Language Functions suiting the context.
- 10. Team presentations/Group Discussion.
- 11. Using Collocations.
- 12. Speaking face to face / on the telephone with appropriate stress and intonation.

#### **TEXT BOOKS:**

1. Elango, K et.al., "Mindscapes: English for Technologists and Engineers", Orient Blackswan, 2014.

#### **REFERENCE BOOKS:**

- 1. M. Balasubrmanyam, "Business Communication" Vani Educational Books, 1985.
- 2. T. Balasubramanian, "A Text book of Phonetics for Indian Students", Orient Longman, 1989.
- N. Krishnaswamy and Sriraman, T., "Current English for Colleges", Macmillan India Ltd. 1995.
- 4. Mohan Krishna and Meera Banerjee, "Developing Communication Skills", Macmillan India Ltd., 1990.
- 5. V.R.Narayanaswamy, "Strengthen your Writing", Orient Longman, 1979.
- 7. B. Jean Naterop and Rod Revell., "Telephoning in English", Cambridge University Press, 1997.

## 19HS124 CONSTITUTION OF INDIA

#### Hours Per Week :

L	Т	Р	С
1	-	-	1

Total	Hours	s :						
L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
12	-	-	2	12	1	2	-	-

#### COURSE DESCRIPTION AND OBJECTIVES:

To provide students with a basic understanding of Indian Polity and Constitution and make them understand the functioning of government at the centre and state besides local self government, in order to equip the them with knowledge on fundamental rights and duties of a citizen in democracy.

#### COURSE OUTCOMES:

Upon completion of the course, the students will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Analyze the major articles and provisions of Indian constitution.	6,8
2	Understand the constitution and its role in safeguarding individual rights.	6,8
3	Understand the functioning of organs of the State in a democracy.	6,8
4	Understand the relationship between rights and duties of citizens.	6,8

#### SKILLS

- ✓ Understanding of the basics of Indian constitution.
- ✓ Awareness on fundamental rights, duties and DPSP
- $\checkmark$  Knowledge of the functioning of various institutions in democracy



Source: www.livemint.com

#### UNIT - I

L - 7

Meaning of the constitution law and constitutionalism; Historical perspective of the Constitution of India; Salient features and characteristics of the Constitution of India.

Scheme of the fundamental rights; Scheme of the fundamental right to equality; Scheme of the fundamental right to certain freedom under article 19; Scope of the right to life and personal liberty under article 21; The scheme of the fundamental duties and its legal status; The directive principles of state policy; Its importance and implementation.

#### UNIT - II

L - 8

Federal structure and distribution of legislative and financial powers between the union and the states; Parliamentary form of Government in India; The constitution powers and status of the President of India; emergency provisions: National emergency, President rule, Financial emergency.

Amendment of the constitutional powers and procedure; The historical perspectives of the constitutional amendments in India; Local self-government; Constitutional scheme in India.

#### **TEXT BOOK:**

1. P.M.Bhakshi, "Constitution of India", 15<sup>th</sup> edition, Universal Law Publishing, 2018.

#### **REFERENCE BOOK:**

1. Subhash Kashyap, "Our Constitution", 2<sup>nd</sup> edition, National Book Trust, India, 2011.
## **19EE102 BASIC ENGINEERING PRODUCTS**

#### Hours Per Week :

L	Т	Р	С
2	-	2	3

	Total	Hours
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L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
30	-	30	5	40	-	8	5	-

#### COURSE DESCRIPTION AND OBJECTIVES:

This course enable 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 maintenance of engineering products.

#### COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Describe the working principle of IC engine, refrigeration and air conditioning systems.	1,2,6
2	Gain awareness on choosing appropriate construction materials.	1,2,6
3	Install, operate, maintain and troubleshoot basic electrical engineering appliances.	1,2 3,4,6
4	Analyze the different lighting sources and it's features.	1, 2, 6
5	Know the basic electronics engineering appliances.	1, 2, 6

#### SKILLS:

- ✓ Trouble shoot issues relating to air conditioning and refrigeration systems.
- ✓ Testing the quality of different construction materials.
- ✓ Identify UPS requirements for a given load.
- ✓ Design a composition of heating element for a particular application.
- ✓ 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.



http://sazehpardazi. ir/wp-content/ uploads/2017/01/ Mokran-tank.jpg

I - 6

L - 6

#### 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 - I

**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 - II

**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 - III

**POWER GENERATION:** Overview of Power System Structure, Conventional and Non-conventional power generation sources.

**PROTECTION SCHEMES:** Earthing procedure, Switch Fuse Unit (SFU), MCB. Methods of Electrical Wiring Systems.

**ENERGY STORAGE SYSTEMS:** Types of Batteries, Important characteristics for batteries; Elementary calculations for energy consumption.

**UNINTERRUPTIBLE POWER SUPPLY (UPS) :** Components in UPS, Functionality, Calculation of ratings for UPS components to a specific load.

#### UNIT - IV

LIGHT: Working of Incandescent, Fluorescent, MV, SV and LED Lamps, Comparison and applications.

HEAT: Resistance and Induction Heating, Comparison and Applications.

**MOTOR:** Motors used in Domestic applications - Mixer grinder, Ceiling fan, Hair dryer, Washing machine, Air coolers, Vacuum cleaner and Electric vehicle.

#### UNIT - V

VFSTR

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

L - 6

24

#### L - 6

#### L - 6

#### LABORATORY EXPERIMENTS

#### LIST OF EXPERIMENTS

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 and Iron Box.
- 13. Induction Heater.
- 14. Ceiling Fan and Mixer.
- 15 Washing Machine.
- 16. Incandescent and Fluorescent lamps.
- 17. Television and Remote Control.
- 18. Microwave oven.
- 19. Telephone and Mobile Phone.
- 20. PA System.

#### **TEXT BOOKS:**

- 1. M.S. Shetty, "Concrete Technology", 1<sup>st</sup> edition, S. Chand & Co., 2005.
- S.C. Rangwala, "Engineering Materials", 36<sup>th</sup> edition, Charotar Publishing House, Anad, 2009.
- Govindasamy and A. Ramesh, "Electrical Engineering Electrical Machines and Appliances Theory, 1<sup>st</sup> edition, Tamilnadu Text Book Corporation, 2010.

#### **REFERENCE BOOKS:**

- Janakaraj and A. Sumathi, "Electrical Engineering Electrical Machines and Appliances Theory", 1<sup>st</sup> edition, Tamilnadu Text Book Corporation, 2011.
- 2. Marshall Brain, "How Stuff Works", 1<sup>st</sup> edition, John Wiley & Sons, 2001.
- 3. Pravin Kumar, "Basic Mechanical Engineering", 1<sup>st</sup> edition, Pearson Publishers, 2013.

#### TOTAL HOURS: 30

## 19HS110 DIFFERENTIAL EQUATIONS, LAPLACE TRANSFORMATIONS

Hours Per Week :

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L	Т	Р	С
3	1	2	5

Total	Hours	
Total	nours	

L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	15	30	20	45		10	-	5

#### COURSE DESCRIPTION AND OBJECTIVES:

To provide students with solid foundation in Mat hematical fundamentals such as numerical methods, differential equations, Laplace transformations required for Engineering applications.

#### COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Discuss the Laplace transformation of a function and apply to solve differential equations.	1, 2
2	Apply various analytical methods to solve ordinary differential equations.	1, 2
3	Demonstrate the various numerical methods to solve differential equations.	1, 2
4	Identify the appropriate method to solve apartial differential equation.	1, 2
5	Use software tools to obtain and verify the solutions.	5

#### SKILLS:

- ✓ Find the capacitor voltage for the given circuit.
- Analyze variety of phenomenon in nature such as sound, heat, electro statistics, fluid flow, elasticity etc. through differential and partial differential equations.



SOURCE:

https:// www.google.co.in/ search?q=mathem atics+pictures&source =Inms&tbm=isch&sa= X&ved=0ahUKEwiQ-&37JXAhVP-HKH-ESGCVEQ\_ &37JXAhVP-HKH-ESGCVEQ\_ &JUIECgB#imgrc = g0fSzu\_iSo715M:

#### L-9

#### L–9

**HIGHER ORDER ORDINARY 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 :  $e^{ax}$ , sin ax,cos ax and  $x^n$ .

FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS : Basic Definitions, Variables separable,

homogeneous differential equations, Linear differential equations, Bernoulli's differential equations,

#### UNIT – III

UNIT-I

UNIT – II

Exact and non-exact differential equations.

**ACTIVITIES:** 

o Compute the

partial

numerical

differential

equations.

o Solve the given

equation using

differential

suitable method.

solutions to the

**PARTIAL DIFFERENTIAL EQUATIONS** : Introduction, Partial differential equations, Order and degree, Formation of partial differential equations; Lagrange's linear equations, Method of multipliers,

Classification of Second order PDE, Method of Seperation of variables, Examples: One dimensional wave equation, Heat equation and Laplace's equation.

UNIT-IV

**NUMERICAL METHODS – III :** Taylor series method, Picard's method, Euler's and modified Euler's method, Runge-Kutta method.

#### UNIT – V

**LAPLACE TRANSFORMATIONS** : Introduction, Laplace transformation, Properties, Change of scale property, Shifting theorems, Laplace transformation of derivative, Laplace transformation of integral, Multiplication by t, Initial and final value theorems, Convolution theorem.

Inverse Laplace transformation, Multiplication by s, Division by s, Shifting properties, Inverse Laplace transformation of derivatives; Applications : Solutions of ordinary differential equations.

#### LABORATORY EXPERIMENTS

#### LIST OF EXPERIMENTS

- 1. Differentiation of functions of one or two variables.
- 2. Integration of functions of one or two variables.
- 3. Definite Integration functions of one variable.
- 4. Trapezoidal rule for numerical integrations.
- 5. Simpson's rules for numerical integrations.
- 6. Boole's rule, Weddle's rules for numerical integrations.
- 7. Lagrange Interpolation for given data.
- 8. Solving ordinary Differential Equations.
- 9. Euler's method for first order differential equation.
- 10. Runge-Kutta method for first order differential equation.
- 11. Plotting of graphs for functions one variable.

#### **TEXT BOOKS:**

- H. K. Dass and Er. Rajanish Verma, "Higher Engineering Mathematics", S. Chand & Co., 3<sup>rd</sup> edition, 2015
- 2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 44<sup>th</sup> edition, 2018.

#### **REFERENCE BOOKS:**

- 1. John Bird, "Higher Engineering Mathematics", Routledge (Taylor & Francis Group), 2018.
- 2. Srimanta Pal and Subodh C. Bhunia, "Engineering Mathematics", Oxford Publications, 2015.
- 3. B. V. Ramana, "Advanced Engineering Mathematics", TMH Publishers, 2008.
- 4. N. P. Bali and K. L. Sai Prasad, "A Textbook of Engineering Mathematics I, II, III", Universal Science Press, 2018.
- 5. T. K.V. Iyengar et al., "Engineering Mathematics, I, II, III", S. Chand & Co., 2018.



L-9

L-9

**TOTAL HOURS:30** 

# 19HS119 ENGINEERING CHEMISTRY (B)

	Hours	Per	Week	1
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L	Т	Р	С
3	-	2	4

Total	Hours	<b>3</b> :						
L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	30	20	10	-	10	-	5

#### **COURSE DESCRIPTION AND OBJECTIVES:**

The course aims to cover the knowledge about the fundamentals of Chemistry and its applications, which are essential for developing new engineering materials for scientific and engineering applications. Besides these, the students are also expected to acquire knowledge on some contemporary advanced topics such as instrumental techniques, nanomaterials, polymers, batteries and fuel cells etc.

#### **COURSE OUTCOMES:**

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes				
1	Analyze the quality of water and design a suitable mechanism for its purification.	2,3			
2	Apply various synthetic methods for preparing polymers for engineering applications.	1,2			
3	Analyze and apply desirable characteristics in different engineering materials for industrial applications.	1,2,3			
4	Apply the principle of electrochemistry for designing various batteries and fuel cells.	3,4			
5	Apply the electromagnetic radiation to the spectroscopic methods for the analysis of engineering materials.	3,4,5,6			

#### SKILLS:

- Analyze the total hardness of water sample.
- Synthesize various polymers.
- Identify the properties of different industrially relevant Engineering materials.
- Characterize chemical compounds by using UV and IR spectroscopic techniques.



SOURCE: Koya Prabhakara Rao et al., Adv. Funct. Mater. 2013, 23, 3525-3530

VFSTR

#### I Year II Semester

#### UNIT-I

Activities:

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Electroplating

plating on

Analysis of

Battery

water and its purification.

construction.

Preparation of

soaps and

detergents.

and Electroless

different metal surfaces.

#### CHEMICAL BONDING AND WATER TECHNOLOGY:

Chemical Bonding - Introduction to VBT and VSEPR theory; Crystal field splitting of octahedral and tetrahedral complexes; Molecular orbital theory of diatomic molecules (O<sub>2</sub> and CO), Molecular orbital energy diagram of octahedral complex, Ex: Hexamine Cobalt (II).

Water Technology - Hardness of water, Determination of hardness by EDTA and numerical problems; Softening of water by lon-exchange process, Desalination of brackish water by electrodialysis, Reverse osmosis.

#### UNIT - II

POLYMERS: Introduction-classification, Polymerization - types, Mechanism of addition polymerization; Preparation, properties and applications of polyethylene, Polymethyl methacrylate, Phenol formaldehyde, Nylon 6,6; Rubber-vulcanization, Synthetic rubbers - Buna-S, neoprene, conducting polymers (Ex: Polythiophene).

#### UNIT - III

#### **ENGINEERING MATERIALS:**

Refractories - Classification and properties-refractoriness, refractoriness under load, Thermal stability, Thermal spalling, Porosity, Chemical inertness.

Lubricants - Classification, Properties - viscosity, viscosity index, flash and fire points, Cloud and pour points, Aniline number, Mechanical stability, Carbon residue.

Abrasives - Hardness of abrasive, natural and artificial abrasives - properties and applications

Nanomaterials - Carbon Nanotubes (CNT's) - Synthesis - electric arc discharge method and chemical vapor deposition method, Applications of CNT's in water purification and catalysis

#### UNIT-IV

#### BATTERIES AND CORROSION:

Batteries - Electrode potential, Primary cell - Leclanche cell, Secondary cell - lead-acid storage cell, Lithium ion battery; Methanol oxygen fuel cell.

Corrosion - Introduction, Dry corrosion, Wet corrosion; Factors influencing the rate of corrosion temperature, pH and dissolved oxygen; Corrosion prevention by cathodic protection.

#### UNIT-V

#### **INSTRUMENTAL TECHNIQUES:**

Introduction to electromagnetic radiation

Electronic Spectroscopy of Organic Molecules - Selection rules, Beer-Lambert's law and its derivation, Numerical problems and applications, Instrumentation of UV-Visible spectrophotometer.

**IR Spectroscopy** - Selection rules, Types of vibrations, Instrumentation of IR spectrophotometer, Applications of IR Spectroscopy.

L-9

L-9

30

L-9

L-9

#### LABORATORY EXPERIMENTS

#### LIST OF EXPERIMENTS

#### **TOTAL HOURS: 30**

- 1. Determination of total alkalinity of water.
- 2. Determination of total hardness of water.
- 3. Determination of available Chlorine in bleaching powder.
- 4. Determination of Fe (II) by dichrometry method.
- 5. Preparation of phenol formaldehyde resin.
- 6. Preparation of Nylon 6,6.
- 7. Preparation of nanomaterial.
- 8. Determination of strength of strong acid by pHmetry.
- 9. Determination of viscosity of lubricating oil.
- 10. Determination of Mn<sup>+7</sup> by Colorimetry.
- 11. Removal of hardness by ion-exchange method.
- 12. Determination of strength of weak acid by conductometry.
- 13. Determination of rate of corrosion by weight loss method.

#### **TEXT BOOKS:**

- 1. P.C Jain and Monica Jain, "Engineering Chemistry", 17<sup>th</sup> edition, DhanpatRai Publications, 2010.
- 2. Shashi Chawala, "A Text book of Engineering Chemistry Engineering Materials and Applications", 3<sup>rd</sup> edition, Dhanpat Rai Publications, 2015.
- 3. K.S. Maheswaramma and Mridula Chugh, "Engineering Chemistry", 1<sup>st</sup> edition, Pearson publication, 2015.

#### **REFERENCE BOOKS**:

- 1. H. W. Wilard and Demerit, "Instrumental Methods of Analysis", 7<sup>th</sup> edition, CBS Publications, 1986.
- 2. Gurudeep Raj and Chatwal Anand, "Instrumental Methods of Analysis", 5<sup>th</sup> edition, Himalaya Publications, 2007.
- 3. Shikha Agarwal, "Engineering Chemistry: Fundamentals and Applications", 2<sup>nd</sup> edition, Cambridge Publications, 2019.

#### LABORATORY MANUAL:

1. Sunita Rattan "Experiments in Applied Chemistry", S.K. Kataria & Sons Publications, 2008.

## 19EE101 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

#### Hours Per Week :

L	Т	Р	С
3	-	2	4

L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	30	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 DC & AC machines. It also deals with the basic electronic components like P-N junction diode, Zener diode, Transistor and their characteristics.

#### COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Analyse the resistive circuits with independent sources and find its solution.	1, 2, 3
2	Solve the AC (single and three phase) and DC circuits using different methods.	1, 2, 3
3	Familiarize the concepts of electromagnetism and it's applications.	1, 2
4	Explain the types of electrical equipment, machines and its applications.	1, 2
5	Acquire the knowledge about the characteristics and working principles of semiconductor diodes, transistor.	1, 2

#### 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 and full wave rectifiers using PN junction diode.



Source:

http://sazehpardazi.ir/ wp-content/uploads/ 2017/01/Mokrantank.jpghttps:// engineeringinterview questions.com/wpcontent/uploads/ 2017/07/ ELECTRICAL-Engineering-Multiple-Choice-Questionsand-Answers.png

34

**TOTAL HOURS-30** 

1 - 9

#### 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. UNIT-I

**FUNDAMENTALS OF ELECTRIC CIRCUITS:** Concept 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 resistive circuits with DC source (Simple numerical problem). **UNIT – II** 

**FUNDAMENTALS OF AC CIRCUITS:** Generation of AC voltage - Frequency, Average value, R.M.S. value, Form factor, Peak factor for sinusoidal only; Analysis of single-phase ac circuits consisting of R, L, C, RL, RC (series and parallel) (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 – III 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 – IV L - 9 DC MACHINES:** Constructional details of a DC Machine, DC Generator - Principle of operation, EMF equation (simple numerical problems); DC Motor - Principle of operation, Torque equation (simple numerical problems).

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

**SEMICONDUCTOR DEVICES:** Classification of semiconductors, P-N junction diode - Operation and its characteristics, Half wave rectifier - Operation, efficiency; Full wave rectifiers - Types, operation, Efficiency; Zener diode and its characteristics, Zener diode as Voltage regulator, Bi polar junction transistor- Operation, Types (NPN & PNP).

### LABORATORY EXPERIMENTS

#### LIST OF EXPERIMENTS

- 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. Determination of R.M.S. Values of sinusoidal waveform.
- 8. Determination of impedance in complex AC circuits.
- 9. Verification of PN junction diode characteristics under both forward and reverse bias.
- 10. Verification of Zener diode characteristics under reverse bias.

#### TEXT BOOKS:

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

#### **REFERENCE BOOKS:**

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

## 19HS122 ENGLISH PROFICIENCY AND COMMUNICATION SKILLS

#### Hours Per Week :

L	Т	Р	С
-	-	2	1

L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
-	-	30	15	15	-	10	-	-

#### COURSE DESCRIPTION AND OBJECTIVES:

The course will provide students an exposure on a wide range of language used in everyday situations. They will read, analyze, and interpret material from a variety of general topics and practice reading, writing, listening and speaking skills in English, to use it confidently in their professional and social contexts.

#### COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Ability to read and grasp the content and significance of news, articles and reports on a wide range of general topics connected with their interests.	9,10
2	Apply suitable strategies to achieve comprehension, like listening for main points; checking comprehension by using contextual clues etc.	9,10
3	Ability to follow lectures or talks on topics within their own field, and well structured presentations outside their field.	9,10
4	Apply their knowledge of functional English to communicate effectively in real life situations and demonstrate good presentation skills in classroom situations.	9,10

#### SKILLS:

- ✓ Reading strategies for global meaning and for specific details.
- ✓ Writing with a purpose.
- ✓ Listening for drawing inferences.
- ✓ Speaking fluently with appropriate stress and intonation.



SOURCE: www.google.com/

P-6

P-6

**P-6** 

P-6

**P-6** 

#### UNIT - I

Introducing self / others (SWOT Analysis), Expressing needs/feelings/opinions: Skill Focus:

- Reading Understanding factual information.
- Writing Understanding word order and sentence formation.
- · Listening Decoding for meaning following elements of stress, intonation and accent.
- · Speaking Articulating individual sounds/syllables clearly, speaking fluently with intelligibility.
- Vocabulary Discerning use of right word suiting the context, Preliminary English Test (PET) word list.
- Grammar Spellings, Use of Nouns, Adjectives, Verbs, Prepositions.
- Practice: Units 1 6 in the Text Book, Objective PET.

#### UNIT - II

#### Describing people and things:

#### Skill Focus:

- · Reading Drawing inferences from sentences and short messages(True/False statements).
- Writing Rewording, Sentence transformation, Convincing.
- Listening –Understanding short messages and conversations.
- Speaking Role-plays, Short conversations.
- Vocabulary / Grammar Use of Adjectives/Adverbs, Comparatives and Superlatives.
- **Practice**: Units 7 12 in the Text Book, *Objective PET*. **UNIT III**

Describing places and processes, Spatial and temporal aspects, Giving directions/instructions: Skill Focus:

- Reading Reading between the lines, Drawing 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: Units 13 – 18 in the Text Book, Objective PET.

#### UNIT - IV

#### Narrating, Predicting, Negotiating, Planning:

#### Skill Focus:

- Reading Reading for comprehension, evaluation and appreciation.
- Writing Letters, E-mails, 7 C's.
- · Listening Following long conversations / Interviews.
- Speaking Participating in Group Discussions, Debates, Mini-presentations.
- Vocabulary / Grammar Modals, Conditionals, Verb forms (Time and Tense).

Practice: Units 19 - 24 in the Text Book, Objective PET.

UNIT - V

## Requesting, Denying, Suggesting, Persuading: Skill Focus:

- Reading Understanding factual information.
- Writing Short stories, Explanatory paragraphs.
- Listening Inferring information from long speeches/conversations.
- Speaking Making announcements, Presentations.
- Vocabulary / Grammar Punctuation, Cloze tests.

Practice: Units 25 - 30 in the Text Book, Objective PET.

#### **TEXT BOOK:**

- 1. Louise Hashemi and Barbara Thomas, "Objective PET", Student's Book with answers,
  - 2<sup>nd</sup> edition, Cambridge University Press, 2015.

#### **REFERENCE BOOK:**

1. Annette Capel and Rosemary Nixon, "Introduction to PET", Oxford University Press, 2009.

## 19ME103

## WORKSHOP

Hours Per Week :

L	Т	Р	С
1	0	2	2

Total	Houre	
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L	Т	Ρ	WA/RA	SSH/HSH	CS	SA	S	BS
15	-	30	10	20	-	-	-	-

#### COURSE DESCRIPTION AND OBJECTIVES:

This course deals with different workshop trades and tools and also introduction of CNC machines. The objective of this course is to provide hands on experience in carpentry, fitting, tinsmith, black smithy, house wiring and welding.

#### COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Identify various tools connected to the carpentry, fitting, tinsmith, black smithy, house wiring and welding.	1
2	Fabricate different models using workshop trades.	2
3	Develop methodology as per specifications of the product.	2
4	Understand various advance machine tools and its components.	1,3

#### SKILLS:

- Understand the concepts of making various wooden joints for house hold purpose.
- ✓ Design and develop various sheet metal products.
- ✓ Fabricate various agriculture tools by using forging technique.
- ✓ Create products by using different trades for Industrial applications.



#### Source:

http:// woodtech.weebly.com/ lesson-1—handtools.html

#### L-3

L-3

L-3

L-3

L-3

**ENGINEERING MATERIALS:** Introduction, Classification, Ferrous & non ferrous metals and alloys, Physical, Electrical, Optical & Mechanical Properties.

#### UNIT-II

UNIT-I

**CARPENTRY:** Introduction, Classification of wood, Marking tools, Measuring tools, Holding tools, Cutting tools & supporting tools, Classification of joints, Safety precautions.

#### UNIT-III

FITTING: Introduction, Vices, Try square, Files, Hacksaw.

TIN SMITHY: Introduction, Metals used in sheet metal work, Classification of tools.

#### UNIT-IV

FORGING: Introduction, Tools and equipment used in forging; Smith's forge or hearth.

**HOUSE WIRING:** Concepts of basic electricity, Single phase and three phase circuits, Knowledge of different electrical wirings-residential, offices, hospitals, godowns.

#### UNIT-V

WELDING: Concepts of welding, Arc welding, Gas welding, Soldering and Brazing.

CNC: Introduction, Components of CNC, Types of CNC systems.

#### LABORATORY EXPERIMENTS

#### LIST OF EXPERIMENTS

- 1. Fabrication of Mortise and Tenon joint using carpentry tools.
- 2. Fabrication of T-lap joint using carpentry tools.
- 3. Fabrication of V-fit using fitting tools.
- 4. Fabrication of U-fit using fitting tools.
- 5. Fabrication of truncated cylinder using tin smith tools.
- 6. Fabrication of square tray using tin smith tools.
- 7. Forging of S shape using black smith technique.
- 8. Forging of square to round cross section using black smith technique.
- 9. Peformance of 1 lamp controlled by one way switch using house wiring.
- 10. Performance of 2 lamp controlled by one way switch using house wiring.
- 11. Demonstration of CNC and welding operations.

#### **TEXT BOOKS:**

- 1. S.K Hazra Choudhury, "Elements of Work Shop Technology", 11<sup>th</sup> edition, Media Promoters, 1997.
- 2. Venkatachalapathy, V.S, "First year Engineering Workshop Practice", Ramalinga Publications, 2014.

#### **REFERENCE BOOKS:**

VFSTR

- 1. T.V.Gopal, T.Kumar and G. Murali, "A first Course on Workshop Practice: Theory, Practice and Work Book", Suma Publication, 2005.
- 2. K.V.N.Pakirappa, "Workshop Technology", Radiant Publishing House, 5<sup>th</sup> edition, 2011.

#### **ACTIVITIES:**

o To make wooden joints like Mortise and Tenon joint, T-lap Joint which are used to prepare a wooden furniture.

 To prepare metal joints and metal sheet products like V-Joint and trays by using mild steel flats and Galvonised iron sheets.

o Trials on electrical circuit connections.

38

#### TOTAL HOURS: 30

BS

5

## 19TT101 TEXTILE FIBRES

#### Hours Per Week :

L	Т	Ρ	С
3	-	2	4

Total	Hours	3:					
L	Т	Р	WA/RA	SSH/HSH	CS	SA	S
45	-	30	25	50	-	-	5

#### 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.

#### COURSE OUTCOMES:

Upon completion of the course, student will able to achieve the following outcomes:

COs	Course Outcomes	POs
1.	Examine the suitability of any fiber for textile applications	4
2	To find the suitable application of given fiber based on its properties.	2
3	Ddistinguished the distinct properties of wool and silk.	1
4	Understand the use of natural fibers and its extraction which does not harm to environment	7

#### SKILLS:

- ✓ To Identify a given natural textile fibers.
- ✓ Value addition of silk fibre.
- ✓ To identify a given manmade textile fibers.



SOURCE: http:// gpktt.weebly.com/ classification-oftextile-fibers.html

#### **ACTIVITIES:**

- Observation 0 of cross section of various fibres under microscope.
- Tabulation 0 for comparative analysis of properties of different fibre.
- 0 Collection of different natural and manmade fibres
- Chemical 0 retting of raw iute fibre
- o Mechanical extraction of leaf fibres usina mechanical beater

UNIT - I L-9 **INTRODUCTION TO TEXTILES:** Textile elements defined, Scope of Textiles in various fields, Classification of textile fibers; Specification for fibres & Yarns: Introduction to count systems, conversion within and between different count systems; Theories of fiber structure & elements to define the structure: Micellar theory, continuous theory, fringed micelles theory, fringed fibrils theory, modified fringed micellar theory, requirements for fibre formation. UNIT - II 1 -9

CHARACTERISATION TECHNIQUES : Interpretation of results of X-Ray diffraction, IR, NMR, Thermal Analysis: Physical and chemical proerties of textile fibers: need, significance brief note on Optical microscopy, Electron microscopy, Scanning Electron microscopy.

**COTTON**: Types of Cotton, morphology and physical properties of cotton, Chemical Properties of Cotton, conversion of cotton fibre to fabric; brief note on organic, GM or BT, Never Dried Cotton. UNIT-III 1-9

WOOL : Brief note on types of wool, Morphology and Physical and Chemical Properties of wool, Brief study on frictional properties of wool, heat of wetting, warmth of wool, conversion of wool fibre to woollen and worsted varns.

BAST FIBRES : JUTE-Retting methods, Properties of Jute, Jute as an apparel, conversion of fibre to fabric; brief note on Linen, Hemp, Sisal: Properties and applications.

#### UNIT - IV

L-9

**TOTAL HOURS-30** 

SILK : Introduction to silk, Types of Silk, Sericulture and Moriculture, Terminology in Silk, Brief note on Mulberry cultivation. Pests and Diseases: Life cycle of silk worm: Grianage Centers. Introduction to rearing of silk, cocoon stifling (Methods), Storage, Sorting, cooking, brushing, reeling (Methods and Machines), degumming and weighting - Morphology and properties of silk, A brief study on types of silk Yarns and fabrics, Flow sheet of the manufacture of spun silk. L-9

UNIT-V

IDENTIFICATION OF TEXTILE FIBRES : By Microscopic Examination, Physical and Chemical Means-Comparison of Cotton, Wool, Silk, Linen and Jute for common properties.

**INTRODUCTION TO UNCONVENTIONAL NATURAL FIBRES** : Need, scope, fibers from bacteria, deodorant fiber, fiber from Spider silk, Alginate, Paper/bamboo, Starch, Banana fibre, Maize fibre, Coir fibre.

#### LABORATOTY EXPERIMENTS

#### LIST OF EXPERIMENTS

- Microscopic test of fibers. 1.
- 2. Burning test of fibers.
- 3. Chemical test of fibers.
- 4. Feel test of fibers.
- 5. Determination of fibres in P/C blended yarn using phenol method.
- Determination of fibres in P/C blended varn using sulphuric acid. 6.
- 7. Identification of specific manmade fiber out of different manmade fibers.
- 8. Identification of specific natural fiber out of different natural fibers.
- Determination of specific cellulosic fiber out of different cellulosic fibers. 9.
- Determination of specific protein fiber out of different protein e fibers. 10.
- 11. Identification fibre from standard FTIR spectra of textile fibers.
- Determination of fibres in P/V blended varn using phenol method. 12
- Determination of fibres in P/V blended yarn using sulphuric acid. 13.
- 14. Identification of unknown fibre using chemical test.
- 15. Observing of FTIR spectra of modified fibres

#### **TEXT BOOKS:**

- 1. Gohl&Vilensky, "Textile Science", Mahajan Book Publishers, Ahemedabad, 2nd ed., 2003.
- 2. SreenivasaMurthy, H V Textile Fibres, Woodhead Publishers, New Delhi, 2017.
- 3. J.Gordon Cook, "Hand Book of Textile Fibers", Wood Head Publishers, London, Vol 1 & 2, 2005.

#### **REFERENCE BOOKS:**

- S. P. Mishra, "Fibre Science and Technology", New Age International Publishers, New 1 Delhi, 2000.
- 2. Tammanna& N. Sonwalkar, "Handbook of Silk Technology", Wiley Easterrn Limited, New Delhi, 2002.
- 3. Shenai, VA, Technology of Textile Processing-Textile Fibers, Sevak Publication, Mumbai. 2004.
- 4. Bernard P and Corbmann Textile Fiber to Fabric, McGraw-Hill International Education, 2001.

# TEXTILE TECHNOLOGY

# B.Tech.

#### I SEMESTER

	19HS203	-	Probability and Statistics
	19TT201	-	Technology of Manufactured Fibers
	19TT202	-	Yarn Manufacturing
Þ	19TT203	-	Fabric Manufacturing
Þ	19TT204	-	Fashion Theory
Þ	19MS303	-	Principles of Management and Oraganizational Behaviour
Þ	19PC003	-	Life Skills - I
Þ	19PC004	-	Technical Seminar - I
	19PC005	-	Intra Disciplinary Project - I
Þ	19PC006	-	Physical Fitness, Sports & Games - III
II SE	MESTER		
Þ	19TT211	-	Testing of Fibers and Yarns
<b>&gt;</b>	19TT211 19TT212	-	Testing of Fibers and Yarns Technology of Knits and Nonwovens
<ul> <li></li> &lt;</ul>	19TT211 19TT212 19TT213		Testing of Fibers and Yarns Technology of Knits and Nonwovens Textile Wet Processing
<ul> <li></li> &lt;</ul>	19TT211 19TT212 19TT213 19TT214	- - -	Testing of Fibers and Yarns Technology of Knits and Nonwovens Textile Wet Processing Pattern Engineering Laboratoty
>	19TT211 19TT212 19TT213 19TT214 19HS204	- - - -	Testing of Fibers and Yarns Technology of Knits and Nonwovens Textile Wet Processing Pattern Engineering Laboratoty Environmental Studies
>           >           >           >	19TT211 19TT212 19TT213 19TT214 19HS204 19PC007	- - - - -	Testing of Fibers and Yarns Technology of Knits and Nonwovens Textile Wet Processing Pattern Engineering Laboratoty Environmental Studies Life Skills - II
>           >           >           >	19TT211 19TT212 19TT213 19TT214 19HS204 19PC007 19PC008	- - - -	Testing of Fibers and Yarns Technology of Knits and Nonwovens Textile Wet Processing Pattern Engineering Laboratoty Environmental Studies Life Skills - II Technical Seminar - II
<ul> <li></li> &lt;</ul>	19TT211 19TT212 19TT213 19TT214 19HS204 19PC007 19PC008 19PC009	- - - - -	Testing of Fibers and YarnsTechnology of Knits and NonwovensTextile Wet ProcessingPattern Engineering LaboratotyEnvironmental StudiesLife Skills - IITechnical Seminar - IIIntra Disciplinary Project - II
>       >       >       >       >       >       >       >       >       >	19TT211 19TT212 19TT213 19TT214 19HS204 19PC007 19PC008 19PC009	- - - - - -	Testing of Fibers and YarnsTechnology of Knits and NonwovensTextile Wet ProcessingPattern Engineering LaboratotyEnvironmental StudiesLife Skills - IITechnical Seminar - IIIntra Disciplinary Project - IIDepartment Elective - I

I SEM AND II SEM

## **19HS203 PROBABILITY AND STATISTICS**

#### Hours Per Week :

L	Т	Р	С
4	-	-	4

Total Hours .
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		• •						
L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
60	-	-	20	45	-	10	-	5

#### COURSE DESCRIPTION AND OBJECTIVES:

To provide students with foundation in elementary topics of statistics and probability such as descriptive statistics, correlation, regression, probability, random variables, distributions, test of hypothesis required for various engineering applications.

#### COURSE OUTCOMES:

Upon completion of the course, the student will be able to active the following outcomes.

COs	Course Outcomes	POs
1	Determine values of various descriptive measures.	2
2	Learning the concept of curve fitting process and apply it in correlation and regression.	2
3	Appreciate the use of concept of probability in real life situations.	2
4	Apply various probability distributions and their properties to a given situation.	2
5	Analyse a given hypothesis for acceptance or rejection.	3

#### SKILLS:

- ✓ Analyse the data using measures of central tendency.
- ✓ Fit an appropriate curve for a given set of data.
- ✓ Test the statistical data for rejection or acceptance.



#### SOURCE:

https://encryptedtbn0.gstatic.com/ images?q=tbn:ALIST OF EXPERIMENTS Total hours: 30LIST OF EXPERIMENTS Total hours: 30Nd9GcQ2H fEK4A4 rWHm83kqb5gst \_7sST2AYcfIF0ebiDcJ48P74opnCA

#### L-12

L-12

L-12

L-12

#### UNIT-I

UNIT-II

#### **DESCRIPTIVE 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.

#### CURVE FITTING, CORRELATION, REGRESSION

Least squares method, Curve fitting (straight line, parabola, exponential curve only).

Covariance: Correlation, Types, Pearson's Coefficient of correlation, Rank correlation, Spearman's rank correlation; Regression, Regression lines.

UNIT-III L-12

#### PROBABILITY

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

#### UNIT-IV

#### **RANDOM VARIABLES, 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-V

#### **TEST OF HYPOTHESIS**

Population and Sampling, Parameters and Statistics, Types of sampling.

Test of hypothesis : Null hypothesis, Errors, Level of significance, Confidence Limits, Testing large samples, one mean, two means, one proportion, two proportions.

Test of significance : t-distribution for small sample, difference between means of small sample,

Chi square test for goodness of fit, Chi square test for testing of independence of attribites.

#### **TEXT BOOKS:**

- 1. H K Dass and Er. Rajanish Verma, "Higher Engineering Mathematics", 3rd edition, S. Chand & Co., 2015.
- 2. S. C. Gupta and V. K. Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, 2012.

#### **REFERENCE BOOKS:**

- 1. P. R. Vittal, "Mathematical Statistics", Margham Publications, Chennai, 2018.
- 2 Kishore S. Trivedi, "Probability and Statistics with Realiability, Queueing and Computer Science Applications", 2<sup>nd</sup> edition, Wiley Student edition, 2008.
- A. Singaravelu, "Probability and Statistics", 22<sup>nd</sup> edition, Meenakshi Agency, 2015. 3.

## 19TT201 TECHNOLOGY OF MANUFACTURED FIBERS

ſ	L	Т	Р	С
ſ	3	1	-	4

<b>—</b> · ·	
Iotal	Hours

		-						
L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	15	-	10	45	-	-	-	-

#### COURSE DESCRIPTION AND OBJECTIVES:

The main objective of this course is to impart the knowledge of different principles of forming manmade fibers. It also enables the students to know the different fibers structures and its effects on fiber properties. It also includes the concepts of micro fibers and texturizing of manmade fibers.

#### COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Interpret different manmade fibers based on their origin	1
2	Analyze the various principles of forming manmade fibers and its effect on properties of fibers	2
3	Compare the change in properties of filaments before and after applying spin finishes	4
4	Select the monomers and polymerization technique based on the final properties required	3

#### SKILLS:

- ✓ Choose the fibers based on the end use application.
- ✓ Analyze the structure of different fibers.
- ✓ Identify the fibers by texture.



SOURCE: https:// en.wikipedia.org/

wiki/File: Rayon\_ synthesis.webm

#### II Year I Semester

#### L-9

INTRODUCTION TO MANMADE FIBERS : Distinction between natural and man made fibers for production, properties & end uses; Important operations in the production of synthetic fibres; Fibres varying substrate and geometry; Principles of fibre forming polymers, parameters influencing the quality, glass transition temperature.

INTRODUCTION TO SOLUTION SPINNING : Salient features of solution spinning: Principles of wet and dry spinning, rheology of wet & dry spinning, comparison, a brief note on dry jet wet spinning.

#### UNIT - II

UNIT-I

**MELT SPINNING**: Detailed note on elements on melt spin equipment, various zones in extruders. design of extruder, types of extruders, characteristic feature of extruder, types of spin pack assemblies, construction of spinnerets, spinneret cleaning methods, Rheology of melt spinning, variables of melt spinning, high speed spinning concept (integrated spin drop process, H4 S and FDY Process). Stretching and drawing; Drawing condition phenomena of necking, drawing behavior of thermoplastic polymer, influence of drawing on structure and property.

#### UNIT - III

SPIN FINISHES : Objectives, types of spin finish, application methods, problems of application, Ideal spin finish, constitution of spin finish, problems in removal of spin finish; Manufacture of Rayons; viscose rayons, manufacturing process, physical and chemical properties. A brief note on recent developments in modal and Tencil fiber manufacturing (Lvocell fibre); Manufacture, properties and applications of acrylics, modacrylics, polypropylene fibers.

#### UNIT-IV

**MICRO FIBRES**: Methods of production, bi-component technology, meltblown process, properties and applications of micro fibres, problems in processing of micro fibres in weaving.

**NANO FIBER**: Methods of production, properties, applications, **SPANDEX FIBER :** Methods of production, properties, applications.

#### UNIT-V

POLYESTER MANUFACTURE : Transesterification, polycondensation, technical details, chemical reactions, side reactions, properties and applications.

MANUFACTURE OF POLYAMIDE: Nylon; classification of polyamides, manufacture of nylon 6, nylon 66, (manufacture of monomers by various routes for PET and Nylon).

SURFACE MODIFICATION OF SYNTHETIC FIBRES: Need, polyester cause and effect, recent developments in polyesters like CDP, EDP, CFDP, APP etc.

#### **TEXT BOOKS:**

- 1. V. B. Gupta, "Technology of Manufactured Fibres", 3<sup>rd</sup> edition, Chapmen and Hall, New York. 2004.
- 2. 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", Woodhead Publishers, New Delhi, 2017.
- 3. E P G Gohl; L D vilensky, "Textile Science", 2<sup>nd</sup> edition, Publisher-Melbourne: Longman Cheshire, 1983.

L-9

## 1-8

L-9

L-10

VFSTR

## **19TT202 YARN MANUFACTURING**

#### Hours Per Week :

L	Т	Р	С
3	1	-	4

Total	Hours	;
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		-						
L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	15	-	10	45	-	-	-	-

#### 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 manufacturing process.

#### COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Apply the fundamental concepts to analyze the production capacities of various yarn manufacturing machines.	1,2
2	Analyze and compare the process parameters of various yarn manufacturing machinery.	2,4
3	Evaluate the process parameters through industry norms to meet the quality requirements.	2,3
4	Design the set of machinery required to produce a specific type of yarn.	3
5	Demonstrate various developments in the field of yarn manufacturing	3

#### SKILLS:

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



SOURCE:

http:// mahalakhmiyarns. com/gallery.html.

48

II Year I Semester

#### UNIT - I

**GINNING AND BLOW ROOM:** Effect of fiber parameters on selection of fibers; Ginning: objectives, pre and post ginning equipments, 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 - II

**CARDING AND DRAW FRAME:** Introduction to carding, objectives, zones, role of each element, card settings.

Draw Frame: Objects, basic concepts of drawing, principle of roller drafting, different drafting systems, methods of roller weighing, coiler mechanism, types of drafts, auto levelling in carding & draw frame (open loop and closed loop) production calculations.

#### UNIT - III

**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, production calculations, combing efficiency.

#### UNIT - IV

**SPEED FRAME:** Objects, need of speed frame, flyer lead Vs bobbin lead, detailed study of mechanisms (Drafting, twisting and bobbin building) of speed frame, types of drafts, calculation of draft, twist & production.

#### UNIT - V

VFSTR

**RING FRAME:** Objects, passage of material, principles, functions of parts, specifications of R/F, types of drafts and drafting systems, brief study of spindles, ring & travellers, calculation of draft, twist & production.

#### **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.

L-9

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L-9

L-9

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## **19TT203** FABRIC MANUFACTURING

#### Hours Per Week :

L	Т	Р	С
3	1	-	4

10101110013.	Total	Hours	:
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L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	15	-	10	45	-	-	-	-

#### COURSE DESCRIPTION AND OBJECTIVES:

This course offers the basics of weaving preparatory and fabric manufacturing processes such as shuttle and shuttle-less weaving technologies. The objective of this course is to make the students to familiar with woven fabric manufacturing using various machines in present scenario.

#### COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Apply the fundamental concepts in winding to meet the yarn quality requirements for further processes.	1
2	Analyze the process parameters of various weaving machinery to improve productivity.	2
3	Review the technical specifications of various modern weaving machinery for desired quality of fabric.	2,3
4	Demonstrate various control systems used in modern weaving machines to minimize energy consumption for an operation and increase productivity.	3,5,7

#### SKILLS:

- ✓ Able to prepare size paste preparation for given yarn.
- ✓ Setup a weaving preparatory process for given quality.
- ✓ By comparing two different fabrics can able to tell the manufacturing process route.
- ✓ Identify the different fabric defects and causes & remedies of particular fault.



**SOURCE:** Sulzer Textil.

#### UNIT-I

WINDING & WARPING : Introduction to fabric manufacture; Need for weaving preparatory process.

WARP WINDING : Drum and precision winding, essential features of drum winders, tensioner, yarn clearers, splicing, common package faults, production calculations.

PRIN WINDING : Principles, types of machines, working and production calculations.

WARPING : Classification, elements & working of beam and sectional warping machine, calculations for production, features of modern warping machines.

#### UNIT - II

SIZING: Objects, types of sizing, sizing materials, size recipes for different yarns, size paste preparation, two and multi cylinder sizing machine, construction of sow box, concept of drying, splitting and types of splitting, beam winding, functions of comb; Sizing faults and remedies; Calculations in sizing; Post sizing operations.

#### UNIT - III

SHUTTLE WEAVING : Introduction to weaving, classification of loom motions, shedding mechanisms and types of sheds; Cone under pick, over pick; Beat-up mechanism, 7-wheel take-up, negative and positive let-off, auxiliary motions, warp stop motions, temples, weft stop motion, warp protector motion; Loom production calculations.

#### UNIT - IV

PROJECTILE & RAPIER WEAVING : Limitations of ordinary looms, classification of shuttle-less weaving machines.

Projectile: Projectile picking motion, picking phases, torsion rod details, receiving unit, selvedge unit, sley drive, multi color weft insertion.

Rapier: Principle of rapier weft insertion through various mechanisms such as single rapier, double rapier, rigid and flexible, rapier heads, rapier drives, selvedge formation.

#### UNIT-V

JET & NARROW WEAVING: Air jet: Stages of weft insertion, types of air jet weaving machines, main nozzles designs, relay nozzle designs, quality of air.

Water Jet: Weft Insertion, picking mechanism, weft insertion elements, loom settings, influence of varn characteristics, features of water jet looms.

Introduction to multiphase & circular Weavingl; Fabric defects & remedies; Introduction to narrow fabric weaving.

#### **TEXT BOOKS:**

VFSTR

- 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.

#### L-10

L-8

## L-9

1-9

#### L-9

## **19TT204** FASHION THEORY

#### Hours Per Week :

L	Т	Ρ	С
3	-	2	4

Total	Hours	3:						
L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	30	10	45	-	-	-	-

#### 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 androle of garment accessories. The objective of this course is to provide insights into fundamentals of fashion theory, designing and technological aspects of fashion.

#### COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Identify and discuss Theoretical aspects of fashion, design and technology with respect to various selection factors.	2
2	Review the evolution of clothing and interpretation of theories relating to fashion.	2
3	Illustrate different clothing of Indian states and civilizations.	1
4	Design and apply various fashion accessories for a specific garment style.	1,3

#### 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 functionalrequirements.
- ✓ Select material for aesthetic and functionalrequirements.



SOURCE: ARTS THREAD January 2019 https:// www.pinterest.com/ pin/30737074 3296698101/

#### UNIT - I

**INTRODUCTION TO FASHION DESIGN :** Definition of fashion 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 - II

**DEFINITION OF FASHION DESIGNING :** Concepts of design, types of design, elements of design, principle of designing, role of fashion designers.

**COSTUMES OF ANCIENT CIVILIZATIONS :** 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 - III

**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 - IV

**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 - V

**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 pattern making 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.

### LABORATORY EXPERIMENTS

#### COURSE OBJECTIVES:

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

#### COURSE OUTCOMES:

VFSTR

Upon completion of the course, the student will be active the following outcomes :

- sketch the various elements and principles of designing.
- examine the human body structure (anthropometry) to design clothing.

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- 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.
- · development of mood board, color board, fabric board for fashion applications

#### LIST OF EXPERIMENTS:

#### **TOTAL HOURS: 30**

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

Cutwork, drawn thread work, eyelet and mirror work, shadow work, ribbon work and Kundan work.

- 9. Appliqué work and Patch work.
- 10. Fabric Painting:

Colour theory, mixing techniques, basic paint brush strokes, Stencil painting, spray fabric paint, sponges and stamp painting

- 11. Development of Tie and Dye designs on fabrics
- 12. Development of Batik printing designs on fabrics
- 13. Development of leather products using leather patterns
- 14. Development of metal accessories like bracelet, necklace, rings, lockets
- 15. Development of mood board, color board and Fabric board for fashion products.

#### **TEXT BOOKS:**

- 1. G. Russel, B. Nicholas, "Traditional Indian Textiles", Thames and Hudson, London, 1991.
- J. Peacock, "Fashion Accessories The Complete 20<sup>th</sup> 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", 5<sup>th</sup> edition, McGraw-Hill, 1990.

## 19MS303 PRINCIPLES OF MANAGEMENT & ORGANIGATIONAL BEHAVIOR

#### Hours Per Week :

L	Т	Ρ	С
3	-	-	3

				-				
L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	-	10	40	-	8	5	5

#### COURSE DESCRIPTION AND OBJECTIVES:

This course deals with human behavior in organizations. Conceptual frameworks, case discussions, and skill-oriented activities applied to course topics which include: motivation, group dynamics, leadership, communication, diversity, organizational design, and culture. Class sessions and assignments are intended to help participants acquire skills and concepts to improve organizational relationships and effectiveness.

#### COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Differentiate personality traits, job attitudes of people.	1,4
2	Understand person-organization fit.	1,4
3	Apply group decision making techniques.	1,8
4	Analyze various communication channels effectiveness.	2,5,8
5	Analyze various communication channels effectiveness.	3
6	Develop strategies of organizational diversity.	6

#### SKILLS:

(These activities are only indicative, the Faculty member can innovate)

- $\checkmark$  To conduct a survey on the practical application of laws of economics.
- To collect data on sales of consumer durable goods and predict the sales for a later year.
- To find different case studies relating to different market conditions and to do an analysis.
- ✓ To find out low demand differentiates between normal and inferior goods.
- To analyze the role of a business economist in the everyday functioning of an organization taking live examples.



SOURCE:

https:/goricastanisic. files. wordpress.com/ 2013/11/savepictures-as.jpg.

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#### IIUNIT - I

**INTRODUCTION TO OB:** Management: functions, roles, skills; Organizational behavior: Disciplines that contribute to the OB field, diversity in organizations; Attitudes: components, major job attitudes

#### UNIT - II

**EMOTIONS, MOODS & VALUES:** Emotions and Moods: Functions & sources of emotions and moods, emotional intelligence; Personality: The MBTI, the big five personality models, other personality traits relevant to OB; Values: Importance, terminal, instrumental and generational values.

#### UNIT - III

**PERCEPTION & MOTIVATION:** Perception: Meaning, factors that influence perception, person perception, common shortcuts in judging others; Motivation: Early theories of motivation, contemporary theories of motivation.

#### UNIT - IV

**THE GROUP**: Defining and classifying groups, stages of group development; Group properties: Roles, norms, status, size, and cohesiveness, diversity; Group decision making: Group think and group shift, group decision-making techniques; Work teams: Differences between groups and teams, types of teams, creating effective teams: Context, composition, processes.

#### UNIT - V

VFSTR

**COMMUNICATION:** Communication: Functions, process, direction, interpersonal communication, organizational communication, choice of communication channel, persuasive communication, barriers to effective communication, organization structure; Designs, organizational culture; Functions.

#### **TEXT BOOKS:**

1. Robbins, Judge, and Vohra: "Essentials of Organizational Behavior", 15/e, Pearson Education India, 2014.

#### **REFERENCE BOOKS :**

- 1. Fred Luthans: "Organisational Behavior", 12th Edition, McGraw-Hill, 2010.
- 2. Debra L. Nelson, James C. Quick : ORGB, 4th Edition, Cengage Learning, 2014.
- 3. John R. Schermerhorn, "Organizational Behavior", 12th Edition, John Wiley & Sons, 2011.

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## L-9

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#### L-9

## 19PC005 INTRA-DISCIPLINARY PROJECTS-I

#### Hours Per Week :

L	Т	Р	С
0	0	2	1

Total Hours :						
L	Т	Ρ				
-	-	30				

#### COURSE DESCRIPTION AND OBJECTIVES:

These projects arise from a combination of courses. The major objective of these projects is to enable students understand the relationship between the courses.

#### COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Ability to map different courses to gain the knowledge of intra-disciplinary engineering.	1
2	Function effectively as an individual and as a member or leader in diverse teams.	9
3	Comprehend and write effective reports and make effective presentations.	10

#### LIST OF INTRA - DISCIPLINARY PROJECTS

- Effect of twist of yarn on fabric properties. (Combination of courses: Yarn Manufacturing, Fabric Manufacturing)
- Development of fancy yarn (slub yarn) for specific fashion. (Combination of courses: Yarn Manufacturing, Fashion Theory)
- Development of slub on slub yarn for specific fashion product. (Combination of courses: Yarn Manufacturing, Fashion Theory)
- Development of multi twist yarn for specific fashion product. (Combination of courses: Yarn Manufacturing, Fashion Theory)
- Development of core cover yarn for specific fashion product. (Combination of courses: Yarn Manufacturing, Fashion Theory)
- Development of multi count yarn for specific fashion product. (Combination of courses: Yarn Manufacturing, Fashion Theory)
- Effect of miss dent design on fabric appearance.
   (Combination of courses: Fabric Manufacturing, Fashion Theory)
- Study on fabric development from ancient civilization and their costumes. (Combination of courses: Fabric Manufacturing, Fashion Theory)
- · Development of costumes based on element and principles of design using any two

types of fabrics.

(Combination of courses: Fabric Manufacturing, Fashion Theory)

- Development of brocade fabrics and making garments.
   (Combination of courses: Fabric Manufacturing, Fashion Theory)
- Development of Paithani fabrics and making garments.
   (Combination of courses: Fabric Manufacturing, Fashion Theory)
- Development of Jamdani fabrics and making garments. (Combination of courses: Fabric Manufacturing, Fashion Theory)
- Designing of costumes of specific state from traditional fabrics (any one state can be choosen).
   (Combination of courses: Eabric Manufacturing Eachien Theory)

(Combination of courses: Fabric Manufacturing, Fashion Theory)

- Effect of textured polyester yarn as a weft yarn on fabric appearance.
   (Combination of courses: Technology of Manufactured Fibers, Fashion Theory)
- Effect of textured polyester yarn as a weft yarn on fabric properties.
   (Combination of courses: Technology of Manufactured Fibers, Fashion Theory)
- Study of fabric properties making from polyester intermingled yarns.
   (Combination of courses: Technology of Manufactured Fibers, Fashion Theory)
- Study of fabric properties making from polyester parallel yarns.
   (Combination of courses: Technology of Manufactured Fibers, Fashion Theory)
- Study of fiber cross-section on fabric appearance and properties.
   (Combination of courses: Technology of Manufactured Fibers, Fashion Theory)
- Effect of yarn hairiness on fabric appearance.
   (Combination of courses: Technology of Manufactured Fibers, Fashion Theory)
- Study on stretch ability of fabrics made from core spun yarn. (Combination of courses: Technology of Manufactured Fibers, Fashion Theory)
- Development of intimate garments using synthetic fibers or yarns.
   (Combination of courses: Technology of Manufactured Fibers, Fashion Theory)
- Study of different denim fabrics in current fashion scenario. (Fabric Manufacturing, Fashion Theory)
- Development of dacca muslin cloth and garments. (Combination of courses: Fabric Manufacturing, Fashion Theory)
- Development of different types chenille yarn on loom.
   (Combination of courses: Fabric Manufacturing, Fashion Theory)
- Development of costumes of specific country from traditional fabrics. (Combination of courses: Fabric Manufacturing, Fashion Theory)
- Tapestry fabric development using woolen yarn.
   (Combination of courses: Fabric Manufacturing, Fashion Theory)
- **NOTE:** The afore mentioned list is not exhaustive and the objective is to provide an idea of some of the projects that can be executed by students arising from a combination of courses. Students are given full flexibility to choose any projects of their choice under the supervision of faculty Mentors.
## **19TT211** TESTING OF FIBERS AND YARNS

#### Hours Per Week :

L	-	Т	Ρ	С
3	;	-	2	4

10101110015.	Total	Hours	:
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L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	30	10	45	-	-	-	-

## PREREQUISITE COURSES : Yarn Manufacturing

#### COURSE DESCRIPTION AND OBJECTIVES:

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

#### COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Decide the parameters to be considered in selection of fibers and yarn samples.	1
2	Explain the principles of testing for the measurement of fibre and yarn properties.	1
3	Analyze test results of fibers and yarns by using statistical tool.	2
4	Distinguish the working principle of advance instrument like AFIS, HVI.	5
5	Develop the solutions for the complex problems in the process through the thorough investigation into the problem.	3

#### 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.



SOURCE:

https:// www.textilegence.com/ en/uster-systematicquality-managementis-a-priority.

#### UNIT-I

**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 - II

**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; Micronaire value; Relation between fineness and maturity. L-9

#### UNIT - II

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. L-9

#### **UNIT-IV**

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-V

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, causes and effects of irregularity.

#### LABORATORY EXPERIMENTS

#### LIST OF EXPERIMENTS:

- Determination of moisture regain of different fibers. 1. Determination of Fiber maturity by NaOH swelling method.
- 2. 3. Determination of Fiber length by bear sorter and interpretations by other methods.
- 4. Determination of Fiber fineness by ATIRA fineness tester.
- 5. Determination of Fiber strength by Stelometer.
- 6. Determination of Yarn count by Beesley's varn balance.
- 7. Determination of Yarn count by wrap reel.
- 8. Determination of Single and plied varn twists.
- Determination of single yarn strength. 9
- 10. Determination of lea CSP and CCSP of single varn.
- 11. Determination of varn diameter by microscopic method.
- 12. Determination of lint index of cotton fibers.
- 13. Determination of fiber orientation by Lindsley technique.
- 14. Determination of fiber properties using AFIS (Industry visit is needed).
- 15. Determination of yarn friction.

#### **TEXT BOOKS:**

- J. E. Booth, "Principle of Textile Testing", 3rd edition, CBS Publisher, 1996. 1.
- 2. B. P. Saville, 'Physical Testing of Textiles', 1st Edition, Woodhead Publishing, Limited, 1999.

#### **REFERENCE BOOKS:**

- ArindamBasu, "Textile Testing", Sitra Publishers, Coimbatore, 2004. 1.
- Grower and Hamby, "Hand Book of Textile Testing", Textile Institute, 1996. 2.
- Keshavan and Angappan, "Physical Testing", Vol- I & II, SSMITT Publications, 3. Komarapalyam, 1993.
- 4. V.K. Kothari, "Developments in Textile Testing", I B Publishers, New Delhi.

L-9

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**TOTAL HOURS: 30** 

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## 19TT212 TECHNOLOGY OF KNITS AND NONWOVENS

#### Hours Per Week :

L	Т	Р	С
3	1	-	4

						-		
L	Т	Р	WA/RA	SSH/HSH	CS	SA	s	BS
45	15	-	10	45	-	-	-	-

#### PREREQUISITE COURSES : Yarn Manufacturing

#### COURSE DESCRIPTION AND OBJECTIVES:

This course provides an overview on knitting elements followed by warp knitting and weft knitting. Also it introduces different types of nonwoven manufacturing techniques and applications. The objective of this course is to make the students to familiar with knitted and nonwoven fabric manufacturing processes using various machines.

#### COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Identify various knitting elements and machines to produce different types of knitted fabric structures such as plain, rib and interlock in weft knitting machines.	1,2
2	Discuss various design developments of weft knitting machines to develop latest fabric structures.	3
3	Review about the different web forming techniques and processes.	2
4	Review about the different web bonding techniques and methods to get desired quality.	2,4
5	Understand the different applications of nonwovens; various raw materials required such as natural and manmade fibers and the impact these into environment.	1,2,3,7

#### SKILLS:

- ✓ Construct different structures of knitted fabrics
- ✓ Compare the properties of knitted and nonwoven fabrics
- ✓ Identify knitted and nonwoven fabrics
- ✓ Able to prepare wet laid nonwoven web
- ✓ Prepare the binder solution for binding the nonwoven fibrous web



SOURCE:

https://www.grozbeckert.com/en/prod ucts/knitting.

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#### UNIT-I

**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 – II

**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 guidebars, needle bars and sinker bars, basic lapping movements in warp knitting, loop formation in tricot and raschel knitting machines.

UNIT – III

**INTRODUCTION TO NONWOVENS :** Definition of nonwoven, comparison of woven, knitted with nonwoven, tailor made classification of nonwoven, fibre as raw material for nonwoven fabric.

**PRODUCTION OF DRY WEB :** Fiber selection, fiber preparation, web formation, web removal system, carding, garneting, arrangement of cards, cross and vertical lapper.

**AIR LAID WEB :** Principle of web formation, feeding systems, rando webber, DOA, fehrer system, chicopee system, laroche system, spinnabau.

**WET LAID WEB :** Introduction to wet laying, raw material selection, fiber preparation, web forming concept.

**BONDING SYSTEMS :** Latex bonding, thermal bonding, hydro entanglement, parameters of wet laying, application.

#### UNIT – IV

L-9

**POLYMER LAID WEB :** Introduction, resins for polymer laying, spunbond fabric production, various system, bonding methods, and parameters controlling the quality, applications, meltblown technology, properties and applications.

**MECHANICAL BONDING :** *Stitch Bonding:* malivlies, malimo, malipol and voltex bonding systems.

*Needle Punching:* Introduction, batt formation, drafting, passage of material, needle design, types and selection, parameters of needling, methods of needle punch technology, applications.

**HYDROENTANGLEMENT TECHNOLOGY :** Introduction, principles, fibre selection, process layout, process technology, pre-wetting, support surface, injectors arrangements, jet stripes and nozzles, dewatering, drying, multilayer hydroentangled nonwovens, applications.

#### UNIT – V

L-9

**THERMAL BONDING :** Introduction, principles, raw materials, calender bonding, process parameters, through air and impingement bonding, thermal radiation, IR and ultrasonic bonding, structure of thermal bonded fabric, applications.

**CHEMICAL BONDING :** Introduction, polymers for chemical bonding, mechanism of chemical bonding, wetting, binder polymer cohesion, methods of binder applications, saturation, foam bonding, spray bonding, print bonding, coating bonding, solution bonding, drying, convection dryer, conduction dryer and IR dryers, applications.

**FINISHING OF NONWOVENS :** Wet finishing, application of chemical finishes, lamination, mechanical finishes, surface finishes, emerging technologies, 3D nonwoven; automotive trim applications.

#### **TEXT BOOKS:**

- 1. S. J. Russel, "Handbook of Nonwovens", 1<sup>st</sup> edition, Wood Head Publishing in Textiles, 2006.
- 2. D. J. Spencer, "Knitting Technology", 2<sup>nd</sup> edition, Wood Head Publishing Company, England, 2008.

#### **REFERENCE BOOKS:**

- 1. Turbak, "Nonwoven Process Performance & Testing", 2<sup>nd</sup> 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, 5<sup>th</sup> edition, 2006.

## 19TT213

## **TEXTILE WET PROCESSING**

I IUUIS FEI VVEEN.	Hours	Per	Week	:
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L	Т	Ρ	С
3	-	2	4

Total	Hours	s :						
L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	30	10	45	-	-	-	-

#### 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.

#### COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Analyze the need for grey fabric preparation before processing.	4
2	Develop the different colored fabrics using different classes of dyes.	3
3	Evaluate the quality of fabrics at each and every stage of processing.	4
4	Understand the need for effluent treatment and its effect on environment.	7

#### 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.



SOURCE:

http:// archive.citiscope.org/ story/2015/textileplants-are-dhakaswater-problem-andalso-its.

64

L-10

#### UNIT-I

**GREY PREPARATION :** Grey inspection, 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, varn mercerization, fabric mercerization, evaluation of pretreated fabrics. UNIT - II 1-8

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. Dying fault and its remedial processes. 1 - 9

UNIT - III

**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 - IV

FINISHING: Classification of textile finishes, mechanical finishes; calendaring and its types, mechanical shrinking (sanforising), compacting of knitted fabric, airo finish. 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, and soil release finish. UNIT-V

EFFLUENT TREATMENT : 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.

#### LABORATORY EXPERIMENTS

#### LIST OF EXPERIMENTS:

- 1. Scouring of cotton using alkali-boiling method.
- Bleaching of cotton fabric using hydrogen peroxide. 2
- 3. Dyeing of cotton fabric with direct dyes.
- 4. Dyeing of cotton fabric with Hot brand reactive dyes.
- 5. Dyeing of cotton fabric with vat dyes.
- 6. Dyeing of silk fabric with acid dyes.
- 7. Dyeing of Wool fabric with basic dyes.
- Determination of color fastness of dyed fabrics to washing and Light. 8
- Determination of colorfastness of dyed fabrics to rubbing and perspiration. 9
- 10. Printing of cotton with reactive dyes using blocks and screens.
- 11. Direct printing of cotton with pigment colors using screens.
- 12. Discharge styles of printing on cotton.
- 13. Printing of polyester with disperse dyes.
- 14. Discharge style of printing on polyester dyed fabrics.
- 15. Printing of wool and silk with acid dyes.

#### **TEXT BOOKS:**

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1. C. V. Koushik and A. I. Josico, "Chemical Processing of Textiles - Grey Preparation and Dveing", NCUTE Publication, New Delhi, 2004.

2 V. A. Shenai, "Technology of Finishing", Sevak Publications, Mumbai, Nitra, 1995.

#### **REFERENCE BOOKS:**

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

#### L-9

**TOTAL HOURS: 30** 

1 - 9

## 19TT214 PATTERN ENGINEERING LABORATORY

#### Hours Per Week :

L	Т	Ρ	С
-	-	4	2

Total	Hours	s :						
L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
-	-	60	10	45	-	-	-	-

#### COURSE DESCRIPTION AND 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:**

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Understand various pattern making tools and concepts involved in pattern making.	1,4
2	Apply the concepts of pattern making and making of patterns.	1,4
3	Analyze the needs of fit in pattern making in a given particular at of conditions or constrains.	1,8
4	Evaluate the patterns for better fit.	2,5,8
5	Design the patterns for a given application.	3
6	Demonstrate various developments in the field of pattern engineering.	6

#### 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



#### SOURCE:

http:// www.inventex.eu/en/ services-and-support/ services- for-systemscad-cam/cadservices-constructionand- grading-ofpatterns.

#### LABORATORY EXPERIMENTS

#### LIST OF EXPERIMENTS:

#### **TOTAL HOURS: 30**

- 1. To study the list of tools used for pattern making.
- 2. To take measurements from a mannequin.
- 3. To prepare torso blocks of basic blocks
- 4. To prepare skirt patterns of basic blocks
- 5. To prepare sleeve pattern of basic blocks and 2 customized sleeve patterns.
- 6. Preparation of patterns for making of Baba suit.
- 7. Preparation of patterns through dart manipulation.
- 8. Preparation of patterns for making of salwar and Kameez.
- 9. Preparation of patterns for making of blouse.
- 10. Preparation of patterns for making of skirt.
- 11. Preparation of patterns for making of Brassier and Panties.
- 12. Preparation of patterns for making of Men's Shorts.
- 13. Preparation of patterns for making of Men's Formal Shirts.
- 14. Preparation of patterns for making of Men's Formal Trouser.
- 15. Preparation of patterns for making of Jeans.

#### **TEXT BOOKS:**

- 1. J Helen Armstrong, "Pattern Making for Fashion Designers" 4<sup>th</sup> 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.

## **19HS204** ENVIRONMENTAL STUDIES

Hours	Per	Week	:
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L	Т	Р	С
1	-	-	1

Total	Hours	s :						
L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
15	-	-	10	15	5	-	-	5

#### COURSE DESCRIPTION AND OBJECTIVES:

This is a multidisciplinary course which deals with different aspects using a holistic approach. The major objective of the course is to plan appropriate strategies for addressing environmental issues. The course also brings awareness of nature and judicious use of natural resources for long term sustenance of life on this planet. The course also enables the students to understand their responsibility required to react effectively to natural, manmade and technological disasters.

#### COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Understand the importance of environment and natural resources.	6,7
2	Gain the concept on protection of biodiversity and maintain healthy environment.	7,8
3	Analyze the sources of pollutants and their effects on atmosphere.	4,8
4	Identify the evidence of global warming, ozone depletion and acid rain.	7
5	Develop a basic understanding of prevention, mitigation, preparedness, response and recovery.	7,8

#### SKILLS:

- 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.



#### Source:

https:// stock.adobe.com/uk/ images/sustainabledevelopment-logo

#### UNIT-I

UNIT - II

#### INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES

Environmental Studies: Multidisciplinary nature of environmental studies, definition, scope and its importance: Concept of sustainability and sustainable development: Natural resources: Deforestationcauses and impacts; Water resources-use and over exploitation of surface and ground water, conflicts over water; Heating of earth and circulation of air; Air mass formation and precipitation; Energy resources-renewable and non-renewable energy sources; Land resources-soil erosion and desertification.

#### ECOSYSTEMS AND BIODIVERSITY

Ecosystem: Structure and functions of an ecosystem; Energy flow:food chains, food webs and ecological succession; Forest, Grassland, Desert and Aquatic ecosystems (ponds, rivers, lakes, streams, ocean, estuary).

Biodiversity: Genetic, species and ecosystem diversity: Biogeography zones of India: Biodiversity patterns and global biodiversity; India as a mega diversity; Endangered and endemic species of India:Hotspots of biodiversity; Threats to biodiversity; Conservation of biodiversity.

#### UNIT - III **ENVIRONMENTAL POLLUTION**

Pollution: Air, Water, Soil, Chemical and Noise pollution; Nuclear hazards and human health risks; Solid waste Management: Control measures of urban and industrial wastes; Pollution case studies. UNIT - IV L-3

ENVIRONMENTAL POLICIES AND PRACTICES: Climate change, Global warming, Acid rain, Ozone layer depletion and impacts on human communities and agriculture; Environmental laws: Wildlife Protection Act. Water (pollution prevention and control) Act. Forest Conservation Act. Air (pollution prevention and control) Act, Environmental Protection Act; Tribal populations and rights; EIA: Introduction, definition of EIA; EIS: Scope and objectives. L-3

## UNIT-V

HUMAN COMMUNITIES AND THE ENVIRONMENT: Human population growth: Impacts on environment, human health and welfare; Resettlement and Rehabilitation of project affected persons: Case Studies; Disaster management: floods, earthquake, landslides and cyclones; Environmental communication and public awareness, case studies (C.N.G Vehicles in Delhi).

Field work/Environmental Visit: Visit to a local area to document environmental assets - river/ forest / grassland / hill /mountain; Visit to a local polluted site; Study of local environment - common plants, insects, birds; Study of simple ecosystems - pond, river, hill slopes; Visit to industries/water treatment plants/effluent treatment plants.

#### **TEXTBOOKS:**

- 1. A. Kaushik and C. P. Kaushik, "Perspectives in Environmental Studies", 5th edition, New Age International Publishers, 2016.
- 2. Y. Anjaneyulu, "Introduction to Environmental Science", B. S. Publications, 2015.
- 3. B. Joseph, "Environmental Studies", 2<sup>nd</sup> edition, Mc Graw Hill Education, 2015.
- S. Subash Chandra, "Environmental Science", New Central Book Agency, 2011. 4

#### **REFERENCE BOOKS:**

- 1. Mahua Basu & S.Xavier, "Fundamentals of Environmental Studies", Cambridge University Press. 2016.
- 2. K. Mukkanti, "A Textbook of Environmental Studies", S. Chand Company Ltd., 2009.
- 3. M. Anji Reddy, "A Textbook of Environmental Science and Technology", B. S. Publications, 2008.
- K. Joseph and R. Nagendram, "Essentials of Environmental Studies", Pearson 4. Education Pvt. Ltd., 2007.
- 5. M. Chandrasekhar, "A Textbook of Environmental Studies", Hi-tech Publications, 2006.
- 6. C. S. Rao, "Environmental Pollution Control Engineering", New Age International Publishers, 2001.

#### **ACTIVITIES:**

- o Painting contests on environmental issues and themes.
- o Models of energy resources. Pollution and Solid Waste Management-3R strategy.

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L-3

L-3

L-3

## **19PC009 INTRA-DISCIPLINARY PROJECTS-II**

#### Hours Per Week :

L	Т	Ρ	С
0	0	2	1

To	tal	Hours	3 :
	L	Т	Ρ
	-	-	30

#### COURSE DESCRIPTION AND OBJECTIVES:

These projects arise from a combination of courses. The major objective of these projects is to enable students understand the relationship between the courses.

#### COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Ability to map different courses to gain the knowledge of intra-disciplinary Engineering.	1
2	Function effectively as an individual and as a member or leader in diverse teams.	9
3	Comprehend and write effective reports and make effective presentations.	10

#### LIST OF INTRA - DISCIPLINARY PROJECTS

- Preparation wet-laid nonwoven using chemically treated natural fibers. (Combination of courses: Technology of Knits and Nonwoven, Textile Wet Processing)
- To compare the theoretical and pratical GSM of any knitted fabric. (Combination of courses: Testing of Fibers & Yarns, Technology of Knits and Nonwoven)
- To test the basic physical parameters for the hosirery knitted yarn. (Combination of courses: Testing of Fibers & Yarns, Technology of Knits and Nonwoven)
- To test and compare the twist parameter required for knitted fabric with carded yarn. (Combination of courses: Testing of Fibers & Yarns, Technology of Knits and Nonwoven)
- To measure the fibre distribution and orientation in different types of nonwoven fabrics. (Combination of courses: Testing of Fibers & Yarns, Technology of Knits and Nonwoven)
- To measure the fibre properties as per the requirement of nonwoven fabric. (Combination of courses: Testing of Fibers & Yarns, Technology of Knits and Nonwoven)

- To measure the whiteness and redness index for the different verities of fibres. (Combination of courses: Testing of Fibers & Yarns, Textile Wet Processing)
- To compre the whiteness of the yarn before and after bleaching. (Combination of courses: Testing of Fibers & Yarns, Textile Wet Processing)
- To measure the % loss in strength of yarn after mercerisation at different concentration. (Combination of courses: Testing of Fibers & Yarns, Textile Wet Processing)
- To measure the % loss in strength of yarn after bleaching at different concentration. (Combination of courses: Testing of Fibers & Yarns, Textile Wet Processing)
- Chemically fibrillated fibers for production of dry laid nonwoven fabrics.
  (Combination of courses: Textile Wet Processing, Technology of Knits and Nonwoven)
- Chemically fibrillated fibers for production of wet laid nonwoven fabrics.
  (Combination of courses: Textile Wet Processing, Technology of Knits and Nonwoven)
- Modification of polyester nonwoven fabrics using PVA and CMC. (Combination of courses: Textile Wet Processing, Technology of Knits and Nonwoven)
- Study on improvement of absorbency of dry laid nonwoven made from mercerized cotton. (Combination of courses: Textile Wet Processing, Technology of Knits and Nonwoven)
- To test and compare the CSP for knitted fabric with carded yarn.
  (Combination of courses: Testing of Fibers & Yarns, Technology of Knits and Nonwoven)
- To measure the change in absorbancy before and after scouring of yarns. (Combination of courses: Testing of Fibers & Yarns, Technology of Knits and Nonwoven)
- To identify the fibre type from any nonwoven fabric using burining test. (Testing of Fibers & Yarns, Technology of Knits and Nonwoven)
- To identify the fibre type from any nonwoven fabric using microscopic test. (Combination of courses: Testing of Fibers & Yarns, Technology of Knits and Nonwoven)
- To identify the fibre type from any nonwoven fabric using chemical test.
  (Combination of courses: Testing of Fibers & Yarns, Technology of Knits and Nonwoven)
- To identify the fibre type from any nonwoven fabric using feel test.
  (Combination of courses: Testing of Fibers & Yarns, Technology of Knits and Nonwoven)
- Efffect of fibre length in formation of nonwoven web.
  (Combination of courses: Testing of Fibers & Yarns, Technology of Knits and Nonwoven)
- Efffect of fibre fineness in formation of nonwoven web. (Combination of courses: Testing of Fibers & Yarns, Technology of Knits and Nonwoven)
- **NOTE:** The afore mentioned list is not exhaustive and the objective is to provide an idea of some of the projects that can be executed by students arising from a combination of courses. Students are given full flexibility to choose any projects of their choice under the supervision of faculty Mentors.

# TEXTILE TECHNOLOGY

# B.Tech.

#### I SEMESTER

	19TT301	-	Testing of Fabrics and Garments
Þ	19TT302	-	Apparel Production Technology
Þ	19TT303	-	Technical Textiles
►	19HS205	-	Soft Skills Laboratory
►	19HS301	-	Professional Ethics, Human Values & Gender Equity
	19PC010	-	Empolyability Skills - I
	19PC011	-	Inter Departmental Project - I
	19PC012	-	Modular Course
		-	Department Elective - II
		-	Open Elective - II
II SI	EMESTER		
II SI	E <b>MESTER</b> 19TT311	-	Fabric Structure and Design
II SI	EMESTER 19TT311 19TT312	-	Fabric Structure and Design Apparel Merchandising
II SI	EMESTER 19TT311 19TT312 19TT313	- -	Fabric Structure and Design Apparel Merchandising Structural Mechanics of Fiber, Yarn and Fabric
II SI	EMESTER 19TT311 19TT312 19TT313 19TT314		Fabric Structure and DesignApparel MerchandisingStructural Mechanics of Fiber, Yarn and FabricFundamentals of Textiles 4.0
II SI	EMESTER 19TT311 19TT312 19TT313 19TT314 19HS206		Fabric Structure and DesignApparel MerchandisingStructural Mechanics of Fiber, Yarn and FabricFundamentals of Textiles 4.0Professional Communication Lab
II SI	EMESTER 19TT311 19TT312 19TT313 19TT314 19HS206 19PC013	- - - -	Fabric Structure and DesignApparel MerchandisingStructural Mechanics of Fiber, Yarn and FabricFundamentals of Textiles 4.0Professional Communication LabEmpolyability Skills - II
II SI	EMESTER 19TT311 19TT312 19TT313 19TT314 19HS206 19PC013 19PC014	- - - -	Fabric Structure and DesignApparel MerchandisingStructural Mechanics of Fiber, Yarn and FabricFundamentals of Textiles 4.0Professional Communication LabEmpolyability Skills - IIInter Departmental Project - II
II SI	EMESTER 19TT311 19TT312 19TT313 19TT314 19HS206 19PC013 19PC014	- - - -	Fabric Structure and DesignApparel MerchandisingStructural Mechanics of Fiber, Yarn and FabricFundamentals of Textiles 4.0Professional Communication LabEmpolyability Skills - IIInter Departmental Project - IIDepartment Elective - III

**COURSE CONTENTS** 

I SEM AND II SEM

## **19TT301** TESTING OF FABRICS AND GARMENTS

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L	Т	Р	С
3	-	2	4

Total Hours :									
L	Т	Р		WA/RA	SSH/HSH	CS	SA	S	BS
45	-	30		25	50	-	-	5	5

#### 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:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs				
1	Apply the fundamental concepts and Analyse the different properties of fabrics and garments.					
2	Evaluate and interpret the results of various testing of fabrics and garments.					
3	Design and test water transmission using longitudinal wicking as per AATCC standards.	3				
4	Formulate the testing principles to be adopted for testing of technical textiles.	2				

#### 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



SOURCE:

https://textileoceang. blogspot.com/p/blog - page.html.

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#### UNIT-II

**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-II

**METHODS FOR TESTING :** Methods for testing burst strength, 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-III

**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 - IV

**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 - V

VFSTR

**DIMENSIONAL STABILITY :** Hygral expansion, relaxation shrinkage, swelling shrinkage, felting shrinkage, measurement of dimensional stability.

**APPAREL TESTING :** Button impact test, seam strength, size fitting test, seam slippage test, needle damage check.

**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.

## L-9

L-9

#### L-9

### L-9

#### LIST OF 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.
- 14. Determination of water transmission by longitudinal wicking test.
- 15. Determination of fabric thickness by using thickness tester.

#### **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 BOOKS:**

- 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.

## 19TT302 APPAREL PRODUCTION TECHNOLOGY

L	Т	Р	С
3	-	2	4

Total	Hours	:

L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	30	25	50	-	-	5	5

#### COURSE DESCRIPTION AND OBJECTIVES :

This Course Teaches the Students about Fundamental Concepts of Garment manufacturing, cutting machines, types of seams, stitches, needles, feed systems, major settings, fusing, and pressings.

#### **COURSE OUTCOMES :**

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Explain the fundamentals and applied concepts in Apparel Production.	1
2	Apply the concepts of apparel production in garment manufacturing.	3
3	Analyze and suggest various types of garment machinery for a specific application or operation.	3
4	Evaluate the process parameters through industry norms.	2
5	Design the set of machinery required to produce a specific type of garment.	3
6	Operate the modern tools like garment cad and digitizer in the field of Apparel Production.	5

#### 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.



#### SOURCE:

https:// www.fibre2fashion.com industry-article/5205/ an-overview-ofapparel-design-andproductiontechnology-ingarment-sector. https://

www.chhs.colostate. edu/dm/programs-anddegrees/b-s-inapparel-andmerchandising/ apparel-design-andproductionconcentration.

#### UNIT - I

**INTRODUCTION & SPREADING :** The Garment Industry: Structure of the garment Industry, sectors of industry, product types and organization, apparel industry in India, domestic industry, size of the industry, nature of the industry, its developments in recent years; Export industry: Size and nature of the industry.

**TYPES OF FABRIC PACKAGES :** Types of fabrics, one way, two way fabrics, their effect on spreading; Types of Spreading: NOW, NEW & NUD, methods of fabric spreading, spreading equipment, computerized spreaders; Marker making, marker efficiency, factors affecting marker efficiency, marker duplicating methods, computer aided marker making.

#### UNIT - II

**CUTTING :** 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, maintenance of cutting machines, common defects in cutting & their remedies.

#### UNIT - III

**SEWING MACHINE :** Types of needles, parts of needles and their function, needle size, sewing thread, properties of sewing threads, ticket number, fabric sew ability.

Seam quality: Effect of stitch type on seam quality, selection of seam and stitch, federal classification of seam and stitches.

**BASIC PARTS OF SEWING MACHINE :** Needle, bobbin case/bobbin hook, loopers, loop spreader, threading fingers, throat plate, take-up devices, tensioners, feed dog, pressure foot for sewing.

**SEWING TECHNOLOGY :** Feed systems, machinery and equipment, basic sewing machines, like general sewing, over locking, safety stitching, blind stitching, button holes, bar tacking & button sewing, special sewing machines like three thread overlock with a microprocessor, sewing problems, slipped stitches, staggered stitches, stitching pucker etc.

#### UNIT - IV

**FUSING & PRESSING :** Fusing Technology : Construction of fusibles, fusing process, fusing machinery, quality control; Pressing Technology: Classification, components of pressing, machinery and equipment viz. Hand irons, dry iron, electric steam iron, under pressing, top pressing, scissors press, carousel machines, steam dolly, tunnel finishing, controls, handling systems, boiler room.

#### UNIT - V

VFSTR

**TRIMS & PRODUCTION TECHNOLOGY :** Short note on buttons, zips, underlining, hooks and ornamental materials, fly, kissing, lap; Button and buttonholes, hooks and eye snaps; Velcro and other accessories.

**GARMENT FINISHING AND INSPECTION :** Attaching buttons, marking, sewing labels, cleaning, final touch, fitting quality, live models, measurements, viewing the garments, quality standards.

Production Technology: Manual systems, making through, section system, progressive bundle system, straight line system, unit production system, quick response sewing system.

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## L- 9

L- 9

L-9

L- 9

L-9

#### LABORATORY EXPERIMENTS

#### List of Experiments:

#### **TOTAL HOURS: 30**

- 1. To Study of straight knife and round knife cutting machine.
- 2. To Study single needle lockstitch machine and adjustment of major parts.
- 3. To perform stitching in different shapes used in training of the sewing operators.
- 4. To study and prepare different types of Seams.
- 5. To study and prepare different types of Stitches.
- 6. To perform fusing operation to garment parts like collars and cuffs.
- 7. To prepare different types of Collars.
- 8. To prepare the samples of DARTS, PLEATS, TUCKS.
- 9. To prepare Shirring's, frills and Gathers.
- 10. To Prepare different types of Plackets.
- 11. To Prepare a given Baby's Garments.
- 12. To prepare a given Men's Garment.
- 13. To Prepare a given Women's Garment.
- 14. To analyze the garments for quality inspection.
- 15. To analyze the garment defects and suggest the improvements in prepared garments.

#### **TEXT BOOKS:**

- Gerry Cooklin&Marshell, "Introduction to Clothing Manufacture", 6<sup>th</sup> Enlarged Edition, Blackwell Publications, USA, 2007.
- 2. Natalie Bray, "Dress Pattern Designing", Blackwell Publications, USA, 2007.

#### **REFERENCE BOOKS:**

- 1. Peggali I & Marshall Caverdesh, "The Complete Dress Maker", Textile North Publishers, London, 2004.
- 2. David .T .T yler, "Materials Management in Clothing Production", Blackwell Publications, USA, 2007.
- 3. Gerry Cooklin, "Garment T echnology for Fashion Designers", Blackwell Science, 1997.

## **19TT303 TECHNICAL TEXTILES**

#### Hours Per Week :

L	Т	Р	С
3	-	-	3

Total Hours :
---------------

L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	-	25	50	-	-	5	5

#### 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:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Categorize the properties and technical aspects of different types of yarn and fabric.	2
2	Analyse the requirement of defense clothing and principles of camouflage fabric.	3
3	Learn the application of textiles in medical field, transportation and in construction.	2
4	Explain the manufacturing, properties and applications of high performance fibre.	2
5	Correlate the function and properties of geo-textiles for specific applications.	1

#### SKILLS:

- ✓ Correlate properties of yarn, fabric a nd 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.



SOURCE: https://textileoceang. blogspot.com/p/blogpage.html.

#### III Year I Semester

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-II**

UNIT-I

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-III

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 - IV

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-V

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:**

- M.C. Kanna, "Design and Manufacture of Textile Composites", Textile Progress", 1. 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 Itd., UK, 2000.

#### L-9

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L-9

#### L-9

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## **19HS205 SOFT SKILLS LABORATORY**

L	Т	Ρ	С
-	-	2	1

L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
-	-	30	25	-	-	20	-	2

#### COURSE DESCRIPTION AND OBJECTIVES:

To impart students employability skills like resume preparation and facing interviews. To enable trainees to develop interpersonal and leadership skills. To train them on work place skills like making presentations, participating in group discussions etc.

#### COURSE OUTCOMES:

Upon completion of the course, student will able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Ability to introspect on individual strengths and weaknesses, and emerge as a balanced personality with improved self-awareness and self-worth for their future.	12
2	Ability to prepare a resume and gain the confidence to communicate effectively.	10
3	Possess the interpersonal skills to conduct himself/herself effectively in everyday professional and social contexts.	8
4	Ability to adopt professionalism into daily activities.	8
5	Observe gender sensitive language and workplace etiquette in his professional life.	8

#### SKILLS:

- ✓ Balance social and emotional intelligence quotients though SWOC, JOHARI etc. activities.
- Prepare tailor made resume and face various job interviews with enriched personality traits.
- Plan personal and professional goals.
- ✓ Solve personal and professional life hiccups with confidence and maturity.



Source: https//5.imimg.com

P - 6

P-6

 Formal and Informal Communication

**ACTIVITIES:** 

- o SWOT Analysis
- Stephen Covey Time Management Matrix
- Stress Management Technique
- Vocabulary Flashcards
- Group
  Discussions
- Resume
  Preparation
- Mock-Interviews
- Reading Comprehension Activities
- Listening
  Comprehension
  Activity by
  Watching
  American
  Accent Video

**Soft Skills**: Need for soft skills, professionalism, employability skills - **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; **Career Planning**: Job vs. career, goal setting, SWOT analysis, planning and prioritization, time management: Four quadrant system, self-management, stress-management.

**Activities:** Johari Window for SWOT analysis; Setting a SMART goal using the provided grid; Writing a Statement of Purpose (SOP) - Stephen Covey's Time Management matrix.

#### UNIT - II

UNIT-I

**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); **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); **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.

Activities: Making a flash card (one per day by each student); Vocabulary exercises with hand-outs; Vocabulary quiz; Viewing a recorded video of GD & Mock sessions on different types of GD topics-controversial, knowledge, case study (including topics on current affairs).

#### UNIT - III

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

**Activities:** Appraising some samples of good and bad resumes, preparing the resume, writing an effective covering letter; writing responses and practicing through role plays and mock interviews on the FAQs including feedback.

#### UNIT - IV

VFSTR

**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; **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.

### P - 6

#### P - 6

**Activities:** Reading comprehension exercises with texts drawn from diverse subject areas (Handouts); Narration of a story, speech excerpts with different accents (Indian, British, American), listening comprehension exercises with audio and video excerpts.

#### UNIT - V

P - 6

**Paper Presentation:** Selection of a topic, preparing an abstract, gathering information, organizing the information, drafting the paper, citing reference sources; Writing striking introductions, discussing the methodology used, developing the argument, presentation style, language, presenting the paper and spontaneously answering audience questions; **Mind your language -** How language reflects personality; Gender sensitive language in MNCs; **Seven essential skills for a team player**: Attentive listening, intelligent questioning, gently persuading, respecting other's views, assisting others, sharing, participating actively.

Activities: Watching & discussing videos on corporate etiquette; Presenting a paper; Quiz on corporate etiquette.

#### **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" 1<sup>st</sup> edition, Kogan, 2007.
- 4. Krishna Mohan & NP Singh, "Speaking English Effectively" 1st edition, Macmillan, 2008.
- 5. Dr. S.P. Dhanvel, "English and Soft Skills", Orient Blackswan, 2011.
- 6. Rajiv K. Mishra, "Personality Development", Rupa & Co. 2004.

## 19HS301 PROFESSIONAL ETHICS, HUMAN VALUES & GENDER EQUITY

#### Hours Per Week :

L	Т	Р	С
2	-	-	2

L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
30	-	-	6	6	7	-	-	10

#### COURSE DESCRIPTION AND OBJECTIVES:

The course will provide students with an understanding on Engineering Ethics and the nature of moral issues and dilemmas faced by engineers in their professional lives. It will give them an awareness on professional rights and responsibilities of an engineer and acquaint them on the Code of Conduct and Ethics prescribed by professional bodies like IEEE, ASME etc for its members

#### COURSE OUTCOMES:

Upon completion of the course student will be able to achieve the following outcomes.

COs	Course Outcomes	POs
1	Be able to engage in informed critical reflection on the nature of professionalism and ethical challenges inherent in professionalism	6, 7 8,9,12
2	Apply awareness of professional rights and responsibilities of an engineer to conduct themselves ethically within an organization	6,7,8 9,12
3	Apply understanding of safety norms to highlight ethical issues in risky situation	6,7,8 9,12
4	Understand the role of professional bodies, and the code of ethics and industrial standards prescribed for engineers	6,7,8 9,12

#### SKILLS:

- ✓ Ability to work in large teams.
- Emotional intelligence for workplace.
- ✓ Safety & Environment consciousness.
- ✓ Customer service soft skills.
- ✓ Ethical behaviour and decision-making at workplace.



https:// www.google.com/ search?q=professional +ethics&client

#### III Year I Semester 🔳

#### L-6

#### Nature of moral issues; Moral dilemmas (Problem of Vagueness, Conflicting reasons &

L-6

#### L-6

L-6

L-6

Engineering as social experimentation; Engineers' responsibility for safety ; Assessment of safety and risk; Testing for safety; Risk benefit analysis; Reducing risk; Government regulator's approach to risk; A balanced outlook on law; Discussion of case studies: Challenger disaster / Chernobyl disaster; Code of ethics; Professional societies; Sample code of ethics like ASME, ASCE, IEEE etc.

Introduction to professional ethics; Morals, values and ethics; Civic virtue; Respect for others, Living peacefully; Caring; Sharing; Honesty; Valuing time; Co-operation; Commitment, empathy; Self-confidence; Courage, character; Spirituality; Service learning; Introduction to engineering ethics;

Disagreement); Types of inquiry (Normative, Conceptual & Factual); Moral autonomy; Kohlberg's & Carol Gilligan's theory; Impediments to responsible action; Theories of right action (Bentham's

#### UNIT – IV

UNIT-I

UNIT-II

UNIT-III

Profession: Professionalism.

Theory of Utilitarianism, Theory of Consequentialism etc.).

Rights and responsibilities at workplace; Organizational complaint procedures; Whistle blowing; Environment and the workplace; Gender equity; Understanding gender; Organizational policies regarding gender; Gender roles; Looking beyond stereotypical generalizations; Service rules; Conflict of interest; Prevention of sexual harassment; Women rights under labour laws.

#### UNIT – V

Ethics in a global context; Multinational corporations; Intellectual Property Rights; Business ethics; Transparency & fair practices; Discussion of case study: Enron-Dhabol project; Environmental Ethics; Challenge of sustainable development; UN Conventions & protocols on environment; Discussion of case studies: Bhopal gas tragedy, Pacific gas & Electric company Vs. Environmental activist, Erin Brockovich; Computer ethics; Automation & artificial intelligence; Cyber security & Cyber laws; Case study; Wiki leaks; Role in technological development; Weapons development.

#### **TEXT BOOKS:**

- 1. Martin Mike and Schinzinger Roland, "Introduction to Engineering Ethics", 2<sup>nd</sup> Edtion, McGraw-Hill Higher Education, 2010 .
- 2. M. Govindarajan, S.Natarajan and V. S. Senthil Kumar, "Engineering Ethics", Prentice Hall of India, Reprint 2013.
- 3. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics: Concepts and Cases", 4<sup>th</sup> edition Wadsworth Thompson Learning, 2009

#### **REFERENCE BOOKS:**

- 1. Charles B. Fleddermann, "Engineering Ethics", 4<sup>th</sup> edition, Pearson Education/Prentice Hall, 2014.
- 2. Edmund G. Seebauer and Robert L. Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, 2008.
- "A Comprehensive Guide to Women's Legal Rights" –Prepared by Majlis Legal Centre for IIT-Kanpur, 2018.

#### 16

60

## 19PC011

## INTER-DEPARTMENTAL PROJECTS-I

Hours Per Week :

L	Т	Ρ	С
0	0	4	2

Total	Hours	3:
L	Т	Р

#### COURSE DESCRIPTION AND OBJECTIVES:

These projects are aimed at enabling students understand the relationship between the courses of various programs. Students will get an idea of how interesting technologies or processes, prototype or working model can be developed by culmination of technologies from courses of different programs.

#### COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Ability to map different courses to gain the knowledge of intra-disciplinary Engineering.	1
2	Function effectively as an individual and as a member or leader in diverse teams.	9
3	Comprehend and write effective reports and make effective presentations.	10

#### LIST OF INTER - DEPARTMENTAL PROJECTS-I

- Fabrication of laboratory scale model of banana fiber extractor. (Combination of courses from the branches of Textile Technology and Mechanical Engineering)
- Fabrication of laboratory scale model of air laid nonwoven machine. (Combination of courses from the branches of Textile Technology and Mechanical Engineering)
- Fabrication of laboratory scale model of wet laid nonwoven machine. (Combination of courses from the branches of Textile Technology and Mechanical Engineering)
- Development of cellulosic natural fiber reinforced composites using dry laid web. (Combination of courses from the branches of Textile Technology and Mechanical Engineering)
  - Study of fiber orientation on strength of fiber reinforced composites.

(Combination of courses from the branches of Textile Technology and Mechanical Engineering)

• Development of blended fiber reinforced composites and evaluation of Mechanical Engineering properties.

(Combination of courses from the branches of Textile Technology and Mechanical Engineering)

- Use of staple silk as a reinforcing agent in FRC and evaluation of Mechanical Engineer ing properties.
   (Combination of courses from the branches of Textile Technology and Mechanical Engineering)
- Development of synthetic fiber reinforced composites and evaluation of Mechanical Engineering properties.
   (Combination of courses from the branches of Textile Technology and Mechanical Engineering)
- Development of woven fabric reinforced composites and evaluation of Mechanical Engineering properties.
   (Combination of courses from the branches of Textile Technology and Mechanical
  - Development of knitted fabric reinforced composites and evaluation of Mechanical Engi neering properties. (Combination of courses from the branches of Textile Technology and Mechanical

Engineering)

- Development of high performance carbon fabric reinforced composites and evaluation of Mechanical Engineering properties. (Combination of courses from the branches of Textile Technology and Mechanical Engineering)
- Development of high performance Kevlar fabric reinforced composites and evaluation of Mechanical Engineering properties.
   (Combination of courses from the branches of Textile Technology and Mechanical Engineering)
- Development of high performance HDPE fabric reinforced composites and evaluation of Mechanical Engineering properties. (Combination of courses from the branches of Textile Technology and Mechanical Engineering)
- FEM analysis of plain woven fabrics tensile strength. (Combination of courses from the branches of Textile Technology and Mechanical Engineering)
- FEM analysis of single jersey weft knitted fabrics tensile strength.
  (Combination of courses from the branches of Textile Technology and Mechanical Engineering)
- Color removal from effluent water by using adsorption technique. (Combination of courses from the branches of Textile Technology and Chemical Engineering)

Engineering)

- Dyeing of cotton fabric with natural dyes extracted from green tea leaves.
  (Combination of courses from the branches of Textile Technology and Biotechnology)
- Antimicrobial finishing of cotton fabrics with neem oil extracted from neem leaves. (Combination of courses from the branches of Textile and Biotechnology)
- Dying of cotton fabrics treated with natural dye extracted from kasunda flower extract. (Combination of courses from the branches of Textile and Biotechnology)
- Antimicrobial properties of cotton fabrics dyed with kasunda flower extract. (Combination of courses from the branches of Textile and Biotechnology)
- Modeling of yarn structure from fiber properties.
  (Combination of courses from the branches of Textile and Mechanical Engineering)
- Natural dye extraction from flowers by using Soxhelet extractor.
  (Combination of courses from the branches of Textile and Chemical Engineering)
- Development of IOT in fashion design. (Combination of courses from the branches of Textile and Computer Science & Engineering)
- Automated spinning industry using IOT. (Combination of courses from the branches of Textile and Computer Science & Engineering)
- Automated garment industry using IOT. (Combination of courses from the branches of Textile and Computer Science & Engineering)
- Study of cloud computing applications in textile industry. (Combination of courses from the branches of Textile and Computer Science & Engineering)
- Study and development of smart textile industry using IOT. (Combination of courses from the branches of Textile and Computer Science & Engineering)
- Study of wearable electronics and smart apparels. (Combination of courses from the branches of Textile and Electronics and Communication Engineering)
- Use of Artificial Intelligence in textile manufacturing.
  (Combination of courses from the branches of Textile and Computer Science & Engineering & Electronics and Communication Engineering)
- **NOTE:** The afore mentioned list is not exhaustive and the objective is to provide an idea of some of the projects that can be executed by students arising from a combination of courses from various branches. Students are given full flexibility to choose any projects of their choice under the supervision of faculty mentors from a combination of different departments.

## **19TT311 FABRIC STRUCTURE AND DESIGN**

#### Hours Per Week :

L	Т	Р	С
3	-	2	4

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L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	30	25	50	-	-	5	5

#### **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 :**

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Apply design elements viz. drafting, lifting and reed plan for given weave.	3
2	Analyse basic design parameters of different fabrics.	2
3	Interpret the design elements for a given structure.	1
4	Develop a fabric with desired color and weave effect for specific end use.	3
5	Review various methods to produce complex fabric structures and depict various technologies involved in the production processes.	4

#### 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.



SOURCE: https://textilestudy

center.com/diamonddesign. https:// www.ashford.co.nz/ table-loom-8-shaft.

#### III Year II Semester

L-9

L-9

L-9

#### ACTIVITIES:

- Manufacturing of woven fabric from drafting and lifting plan
- o Draw-in and dent-in operation for basic weaves
- Comparision of the handle and luster of basic weaves
- 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 structure

# **INTRODUCTION TO FABRIC STRUCTURE :** Fabric structure, method of weave notation; Elements of fabric structure: design, draft, denting and peg plan and their interrelation; Types of draft, warp faced, weft faced, equifaced weaves; Classification of woven structure, reed and its selection for weaves in weaving.

**PLAIN WEAVE :** Characteristics, rib and cord effect; Modification of plain: Warp rib, weft rib, matt, fancy matt, hopsack, general and technical applications.

#### UNIT-II

UNIT-I

SATEEN AND SATIN : Characteristics, possible moves, modification of floating weaves, applications.

**INTRODUCTION TO TWILLS :** Characteristics of twills, twill angle, twist and twill interaction; Twill modification: Wavy, herringbone, combined, broken, rearranged, steep, flat, skip twills, applications

**FANCY WEAVES:** Ordinary and Brighton honey comb; Huck-A-Back; Mock leno: Basic designs, distorted thread effects (warp and weft way).

#### UNIT-III

**COLOUR AND WEAVE EFFECTS :** Classification, effect produced by simple colour and weave combinations: Crows foot and stepped twill, Hound's tooth, Bird's eye, Shepherd check, Glen check.

**CREPE WEAVES :** Crepe surface Vs Crepe weave; Different methods of construction; Semi compound fabrics: Bed fords and welts or piques.

**ADVANCED FABRICS :** Extra warp and weft thread figuring, different types, chintzing; Backed cloths: warp and weft backed, reversible and wadded backed cloths.

#### UNIT - IV

**DOUBLE & TREBLE CLOTHES :** Classification and principles of stitching, reversible, wadded, inter changeable double cloths; Treble cloths: principle of stitching.

**PILE STRUCTURES:** Classification of pile fabrics weft piles, plushes & corduroys; Warp piles: A brief note on wire plies, all over and fast pile, velvets structures by face to face principle.

#### UNIT - V

VFSTR

**TERRY PILES :** Pile formation, loom requirement, terry motion, terry weaves, terry ornamentation, dobby striped & check effects in terry.

GAUZE & LENO : Principle, sheds formed in leno, designs for simple leno.

DAMASKS AND BROCADES : Twilling jacquard, method of developing a design for Damask.

L-9

L-9
# LABORATORY EXPERIMENTS

#### List of Experiments :

#### TOTAL HOURS: 30

- 1. Identification and measurement of basic features of fabrics and Need for Analysis.
- 2. Design and analysis of different types of warp faced, weft faced and equifaced plain fabrics.
- 3. Design and analysis of different types of Twill fabrics.
- 4. Design and analysis of different types of Sateen fabrics.
- 5. Selection of Reed and Pick for different simple fabrics.
- 6. Analysis of stripes and checks using 2 or more colors with and with out plain weave and designing by using software.
- 7. Analysis for shirting and Suiting from different blended materials and designing by using software.
- 8. Analysis 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.
- 12. Design and analysis of different weft backed fabric.
- 13. Design and analysis of different extra weft figured fabric.
- 14. Design and analysis of weft pile structure.
- 15. Design and analysis of different types fancy weaves.

#### **TEXT BOOKS:**

- 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, 4<sup>th</sup> Edition 2006.
- 3. J. Hayavadana, "Woven fabric structure design and product planning", Woodhead Publishing Ltd, 2014.
- 4. J. Hayavadana, "Advanced woven fabric design, Woodhead Publishing Ltd, 2018.

- 1. John Reed, "Fabric Structure and Design", Veritas Publications, Hong Kong, 2007.
- 2. Nisbeth, "Grammar of Textile Design", Mahajan Book Publishers, Ahmedabad, Gujarat, 2004.

# **19TT312** APPAREL MERCHANDISING

#### Hours Per Week :

L	Т	Р	С
3	1	-	4

iotal libaro .	Total	Hours	:
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L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	15	-	25	50	-	-	5	5

# PREREQUISITE COURSES : NONE

# COURSE DESCRIPTION AND OBJECTIVES:

This course provides the fundamental concepts of market, production planning and control, costing and export documentation in merchandising. It discusses the types and functions of merchandising. Objective of thiscourse is to impart knowledge and skills in apparel merchandising.

# COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes						
1	Analyse the roles and responsibilities of merchandiser.	2					
2	Estimate the right pricing and sourcing of fabrics in apparel industry.	3					
3	Manage the time in apparel industry by using serveral techniques in delivering the products with in time.	11					
4	Develop the new patterens of styles for mens and womens wear.	3					
5	Communicate properly with the overseas buyers for exporting of their goods.	10					

# SKILLS :

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



# SOURCE:

https:// www.textiletoday. com.bd/coordinationand-its-importancefor-smoother-orderprocessing/ https://

www.displays2go. com/Guide/Get-Most-Out-Your-Retail-Store-Visual-

Merchandising-27 https:// transporteca.co.uk/

shipping-process.

### UNIT - I

**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 and basics of export marketing.

**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 - II

**PRICING AND SOURCING :** Pricing: Pricing theory, factors affecting price structure in apparel; Sourcing: Definition, need and important factors in sourcing, methods of sourcing, sourcing accessories; Manufacturing resource planning, JIT technology.

**TIME MANAGEMENT**: Time management in merchandising, production scheduling, route card format, accessories follow-up, practical check points, computer applications in marketing and merchandising.

#### UNIT - III

**APPAREL PRODUCTION :** 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.

**MARKER PLANNING :** Plain, striped and checked, directional, nondirectional 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.

**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 - IV

**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.

**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.

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#### L- 9

#### UNIT - V

**APPAREL COSTING :** Basics of cost, principles of cost; Types of cost: Fixed cost, variable cost, semi variable cost, conversion cost, differential cost; Elements of cost, direct material, preparation of apparel cost sheet, material and CMT costing procedures.

**EXPORT PROCEDURES AND DOCUMENTS :** 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, basics of export costing terms and document preparation for an apparel exporter.

#### **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.
- A. J. Chuter, "Introduction to Clothing Production Management", Blackwell Science Publishing, 1995.
- 4. H. Carr, B Latham, "The Technology of Clothing Manufacture", Om Book Service, New Delhi, 1995.
- 5. Shivaramu S., "Export Marketing A practical guide to exporters", Wheeler Publishing, 1996
- 6. Katherine McKelvey, "Fashion Source Book", Om Book Service, New Delhi, 2001.

- 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.
- 3. R. E. Glock and G. I. Kunz, "Apparel Manufacturing: Sewn Product Analysis", 4<sup>th</sup> edition, Pearson Education, New Delhi, 1994, ISBN: 8177580760.
- 4. J. Solinger, "Apparel Production Handbook", Van Nostrand Reinhold Publications, New York, 1998.
- 5. Jeannette Jamow, Kitty G. Dickerson, "Inside the Fashion Business", Prentice Hall, 1997.
- 6. KoshyDarlie O., "Effective Export Marketing of Apparel", Global Business Press, 1996.
- 7. Johnson Maurice and Moore E., "Apparel Product Development", Om Book Service, New Delhi, 2001.
- 8. KoshyDarlie O., "Effective Export Marketing of Apparel", Global Business Press, 1996.
- 9. Hearle J. W. S., Hines T. and Suh. M. (Ed.), "Global Marketing of Textiles" JTI, 1999.

# **19TT313** STRUCTURAL MECHANICS OF FIBER, YARN AND FABRIC

Hours Per Week :								
L	Т	Р	С					
3	1	-	4					

Total	Houre
TOLAT	nours

L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	15	-	10	20	-	-	10	10

# PREREQUISITE COURSES : NONE

# **COURSE DESCRIPTION AND OBJECTIVES :**

This course offer theoretic approach of understanding of yarn and fabric properties mainly by structural geometry. The objective of course is to learn about structure property relationship of yarns and fabrics.

# COURSE OUTCOMES :

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes							
1	Relate basic yarn geometry with final twist, contraction and retraction etc.	1						
2	Analyse the fibre path and migration in yarn structure.	2						
3	Relate the influence of fibre tensile properties in resulting yarn properties.	4						
4	Investigate the woven fabric parameters and its relation with yarn properties.	4						
5	Prediction of yarn contraction and retraction from yarn geometry.	3						

# SKILLS:

- ✓ Correlate yarn twist and yarn count with the yarn properties.
- ✓ Measurement and control of fibre migration in yarn.
- ✓ Theoretical calculation of fabric weight from fabric specification.
- ✓ Understanding relation of dimensionless constant with loop density.



#### SOURCE:

https:// slideplayer.com/slide/ 4993496/

https://www.resear chgate.net/figure/a-Idealized-twistedyarn-geometry-7-bfiber-trajectory-inyarn-6\_fig2\_272560252.

# UNIT-I

**BASIC GEOMETRY OF TWISTED YARN:** The idealised helical yarn geometry, yarn count and twist factors, Limits of twists, Real and idealised yarns, Schwarz Constant; Twist contraction: Contraction & retraction factor.

#### UNIT-II

**PACKING OF FIBERS**: Yarn idealised packing, concept of open and close packing, deviations from ideal forms of packing, specific volume of yarns, measurement of packing facts; Yarn diameter concept as suggested by pierce Hamilton, Grosberg and Dickson.

#### UNIT-III

**FIBER MIGRATION:** Ideal migration, Tracer fibre technique, characteristics of migration; Strain mechanics: Strain in yarns, with and without lateral change, determination of twist angles before and after straining (simple numerical problems), energy stored in fibre, blended yarn mechanics, Hambergers analysis.

#### UNIT - IV

**ELEMENTS OF FABRIC GEOMETRY :** Pierce cloth geometry, problems on Pierce geometry model, concept of Kemp's race track model and Olefin mechanistic model; Derivation of formula of Arial density of fabrics, problems on fabric weight; cover factor and fabric cover, Pierce & Balls weight factor, fabric quality index.

## UNIT - V

**TENSILE PROPERTIES OF WOVEN FABRIC**: Geometrical changes during extension, Load extension modulus (without considering bending energy); Geometry of plain knitted fabrics, Empirical dimensionless relationships; Concept of runners ratio, structure ratio, problems on dimensionless constants, analysis of fabric shear.

#### **TEXT BOOKS:**

- 1. Hearle, Grosberg and Backer, "Structural Mechanics of Fibers, Yarns and Fabrics", Vol I, Wiley Inter-Science, New York, 1987.
- 2. B.C.Goswami, "Textile Yarns", John Wiley & Sons, New York, 1987.

#### **REFERENCE BOOKS:**

- 1. J.W.S. Hearle, "Mechanics of Flexible Fiber Assemblies", The Textile Institute, Manchester, 1971.
- 2. D. Joing, "The Mechanics of Wool Structures–Postal", New South Wales University Publication, New South Wales, Australia, 1998.

# L-9

# L-9

L-9

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# **19TT314 FUNDAMENTALS OF TEXTILES 4.0**

#### Hours Per Week :

L	Т	Р	С
3	1	-	4

L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	15	-	25	50	5	-	-	-

# **COURSE DESCRIPTION AND OBJECTIVES :**

This course provides the fundamental concepts of Textile Design and algorithms used in CAD softwares. The course also gives input for analyzing components of IOT(Internet of Things), Sensors, Artificial Intelligence, Cloud computing, Cyber physical systems and building a smart factory as per Industry 4.0 norms. The objective of this course is to inculcate the skills and analyze algorithms relating to IOT, using sensors, Artificial Intelligence, cloud computing, cyber physical systems and implementing the components of a smart manufacturing setup. Application of these algorithms to textiles.

# COURSE OUTCOMES :

Upon completion of the course, student will able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Identify and analyze the design and algorithms used in textile design.	1,2
2	Define the components and their functions of Internet of Things and its algorithms, processes and its usage for textile applications.	1
3	Analyse, evaluate and apply the usage of sensors, algorithms of artificial intelligence, cloud computing and cyber physical system for Textile applications.	4
4	Undertake a methodical approach to implement IOT, artificial intelligence and other related algorithms to textile application.	3
5	Carry out case studies related to Design and analysis of algorithms used in Textile application.	2

#### SKILLS:

✓ Trace and analyze the steps involved in Textile Design algorithms and usage

- ✓ Identify the characteristics and components of Internet of Things and sensors
- Analyze the algorithms of artificial neural networks and its usage for textile applications
- ✓ Identify the different cloud computing methods and its usage for textiles
- ✓ Evaluate cyber physical system algorithms and smart manufacturing basics



automation

Systems

# SOURCE:

power

https:// www.textileworld. comtextileworldfeatures 201705lectraembraces-industry-4-0.

electricity

### UNIT-I

**DESIGNING TEXTILES USING COMPUTER AIDED DESIGN SOFTWARE**: Introduction of textile design need and advantages of CAD; Hardware components of CAD system; Developments of Dobby / Jacquard design using different available software packages; Marker making systems; PDS –Pattern Design Software, Body measurement software; Texture mapping: Application of CAM in various areas of textiles; Computer aided knitting and embroidery.

#### UNIT-II

**SENSORS :** Introduction to sensors and transducers; Displacement, position proximity sensors, velocity, force sensors; Fluid presence temperature, liquid level and light sensors; Selection of sensors; Actuators: Pneumatic and hydraulic systems, mechanical actuation system, electrical actuation system; Applications of sensors in textiles.

**INTERNET IN GENERAL AND INTERNET OF THINGS :** Layers, protocols, packets, services, performance parameters of a packet network as well as applications such as web, Peer-to-peer, sensor networks, and multimedia; IOT components and devices, overview of IOT, applications, potential & challenges, and architecture; IOT examples: Case studies, e.g. sensor body-area-network and control of a smart home and textile applications.

### UNIT-III

**ARTIFICIAL INTELLIGENCE AND ALGORITHMS**: Definition, basic concepts of artificial Intelligence, scope, role and potential of artificial intelligence in manufacturing, Expert systems, Popular Al application; Overview of expert systems, architecture, comparison with procedural programming, developing expert system for typical manufacturing domains, implementation and maintenance, state- of- art expert system application, case study.

#### UNIT - IV

**CLOUD COMPUTING :** Introduction to cloud computing: Definition of cloud, evolution of cloud computing, underlying principles of parallel and distributed computing, cloud characteristics; Elasticity in cloud, on-demand provisioning; Layered cloud architecture design; NIST cloud computing reference architecture: Public, private and hybrid clouds, IaaS, PaaS, SaaS; Architectural design challenges; Cloud storage; Storage-as-a-service; Advantages of cloud storage; Cloud storage providers; Applications of cloud storage in textile companies.

#### UNIT - V

**CYBER PHYSICAL SYSTEMS**: The next generation of embedded systems and networks, IT and OT convergence, co-creation and collaboration enablement; Smart cloud, hyper scale computing; Application delivery platforms and platform as a service; Intelligent analytics services.

**SMART MANUFACTURING:** Design and applications; Introduction, smart manufacturing system in textiles, working principle, design and applications of smart manufacturing system.

#### L-9

104

#### L-9

L-9

L-9

### **TEXT BOOKS:**

- 1. Vijay Madisetti, Arshdeep Bahga, "Internet of Things: A Hands-On Approach".
- 2. Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice".
- 3. Artificial Intelligence- Elaine Rich and Kevin Knight (2<sup>nd</sup> Edition) Tata McGraw-Hill.
- 4. Artificial Intelligence: A Modern Approach, Stuart Russel, Peter Norvig, PHI.
- 5. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
- 6. Rittinghouse, John W., and James F. Ransome, Cloud Computing: Implementation, Management and Security, CRC Press, 2017.

- 1. Computer Technology for Textiles and Apparels, Jinlian Hu, published by Wood head publishing, 2011.
- 2. Automation in Textile Machinery: Instrumentation and Control System Design Principles, L.Ashok Kumar, M Senthil Kumar, Published by CRC press, 2018.
- 3. CAD/CAM in Clothing and Textiles, Gray, published by Gower Publishing Ltd, 1998.
- 4. IOT (Internet of Things) Programming: A Simple and Fast Way of Learning IOT, Etter, Kindle edition, 2016.
- 5. Cloud Computing Black Book, Jagannath Kallakurchi, Donald J. Houde, Dr. Deven Shah, Kogent Learning Solutions Kailash Jayaswal, published by Dreamtech Press, 2014.
- Cyber-Physical Systems, RajRajkumar, Dionisio de Niz, Mark Klein, Pearson publishing, 2017.
- 7. The 20 Key Technologies of Industry 4.0 and Smart Factories: The Road to the Digital Factory of the Future, FranYáñez, kindle edition, 2016.
- 8. Smart Factory and Industry 4.0. The Current State of Application Technologies, Study lab, kindle edition, 2016.

# 19HS206 PROFESSIONAL COMMUNICATION LABORATORY

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L	Т	Р	С
-	-	2	1

Total	Houre	
iotai	110013	

L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
-	-	30	15	10	-	10	-	-

# COURSE DESCRIPTION AND OBJECTIVES:

To improve the overall communication skills (LSRW) of students and prepare them for their profession as engineers and managers. To provide them exposure to conventions of corporate communication and training them on how to function in the business world.

# COURSE OUTCOMES:

Upon completion of the course, student will able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Ability to communicate effectively both in their academic as well as professional environment	10
2	Clear grasp on the register of business language	8
3	Possess the ability to write business reports and proposals clearly and precisely to succeed in their future	12
4	Potentiality to make effective presentations and participate in formal meetings	10

# SKILLS:

- ✓ Articulate effective spoken and listening abilities needed for professional and social success in interpersonal situations, group interactions, and personal and professional presentations.
- Explore specific functions and vocabulary in a business context.
- ✓ Produce short business reports, proposals and correspondence
- ✓ Write various business documents through reading techniques



Source: https:// encrypted

### ACTIVITIES:

- Paraphrasing an article or a video in own words and finding topic sentence in newspaper articles
- Finding out new words from a professional view point and understanding the meaning and its usage
- Reviewing samples of well prepared proposals and reports
- Drafting different proposals / reports on assigned topics
- Classroom activities of team and individual presentations
- Finding missing appropriate sentence in the text
- Using vocabulary in context

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, cohesive devices and transitional words.

**Mechanics of Writing:** Stylistic elements, 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, code of conduct (not sending illegal, offensive, disparaging personal remarks or comments) in written business communication.

**Activity:** Basic grammar practice, framing paragraphs on topics allocated, paraphrasing an article or a video, finding topic sentences in newspaper articles, finding out new words from a professional viewpoint and understanding the meaning and its usage

## UNIT - II

UNIT-I

P - 6

P-6

**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 enquiry, claim letter – letter of apology], 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 of a report (such as title page, declaration, acknowledgements, table of contents, abstract, introduction, findings, conclusion and recommendations)

Activity: Perusing samples of well-prepared business emails, memo, letter writing and short proposals and reports, students will draft business correspondence writing tasks and different proposals/reports on topics assigned.

#### UNIT - III

# 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 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

**Activity**: 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 1

# UNIT - IV

**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

P - 6

Activity- Hand-outs; matching the statements with texts, finding missing appropriate sentence in the text from multiple choice, using right vocabulary as per the given context and editing a paragraph

#### UNIT - V

P - 6

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

Activity: Working out BEC/TOEFL/IELTS listening exercises with hand-outs; matching the statements with texts, finding missing appropriate sentence in the text from multiple choices, using right vocabulary in context-editing a paragraph, listening to a long conversation such as an interview and answer MCQs based on listening.

- 1. Guy Brook Hart, "Cambridge English Business Bench Mark: Upper Intermediate", 2<sup>nd</sup> edition, CUP, 2014.
- 2. CUP, Cambridge: BEC VANTAGE Practice Papers, CUP, 2002.
- 3. Schnurr, "Exploring Professional Communication: Language in Action". London: Routledge, S 2013.
- 4. Seely John, "The Oxford Guide to Effective Writing and Speaking". Oxford: OUP, 2005.

# 19PC014 INTER-DEPARTMENTAL PROJECTS-II

Hours Per Week :

L	Т	Ρ	С
0	0	4	2

Total	Hours	:

L	Т	Р
-	-	60

# COURSE DESCRIPTION AND OBJECTIVES:

These projects are aimed at enabling students understand the relationship between the courses of various programs. Students will get an idea of how interesting technologies or processes, prototype or working model can be developed by culmination of technologies from courses of different programs.

# COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Ability to map different courses to gain the knowledge of intra-disciplinary Engineering.	1
2	Function effectively as an individual and as a member or leader in diverse teams.	9
3	Comprehend and write effective reports and make effective presentations.	10

# LIST OF INTER - DEPARTMENTAL PROJECTS-II

- Digital Textile printing. (Combination of courses from the branches of Textile and Electronics and Communication Engineering)
- Application of digitizers in pattern making. (Combination of courses from the branches of Textile and Electronics and Communication Engineering)
- Application s of cyber physical systems in textile industry. (Computer Science & Engineering & Electronics and Communication Engineering)
- Development and evaluation of bullet proof west for defense application. (Combination of courses from the branches of Textile and Mechanical Engineering)
- Textile composites in aerospace applications.
  (Combination of courses from the branches of Textile and Mechanical Engineering)
- Application of phase change material in smart textiles.
  (Combination of courses from the branches of Textile and Electronics and Combination of courses from the branches of Textile and Agriculture Engineering)

- Development of non woven fabrics for food packaging products.
  (Combination of courses from the branches of Textile and Food Technology)
- Study on the application of textiles in airbags.
  (Combination of courses from the branches of Textile and Mechanical Engineering)
- Conversion of Petroleum Engineering bi products in manufacturing of synthetic fibers. (Combination of courses from the branches of Textile and Petroleum Engineering)
- Characterization of cotton fabrics treated with EDTA using FTIR.
  (Combination of courses from the branches of Textile and Chemical Engineering)
- Development of clothing for food processing industry.
  (Combination of courses from the branches of Textile and Food Technology)
- Extraction of fibers from Pine apple leaves.
  (Combination of courses from the branches of Textile and Food Technology)
- Development of heat resistant fabrics for food industry. (Combination of courses from the branches of Textile and Food Technology)
- Use of Teflon in Food equipments.
  (Combination of courses from the branches of Textile and Food Technology)
- Use of textile material in food processing as filtration.
  (Combination of courses from the branches of Textile and Food Technology)
- Study on Mechanical Engineering properties of nonwoven fabrics made from natural and binder fibers.
   (Combination of courses from the branches of Textile and Chemical Engineering)
- Communication Engineering)
- Development in applications of conductive textiles. (Combination of courses from the branches of Textile and Electronics and Communication Engineering)
- Study of Nano particle release kinetics in antimicrobial treated textiles. (Combination of courses from the branches of Textile and Biotechnology)
- Use of fiber source vegetables as a dietary supplement.
  (Combination of courses from the branches of Textile and Food Technology)
- Kinetic studies of dye particles in the dye bath.
  (Combination of courses from the branches of Textile and Chemical Engineering)
- Fastness properties of food colours in textiles.
  (Combination of courses from the branches of Textile and Food Technology)
- Application of fat soluble food colors in textiles.
  (Combination of courses from the branches of Textile and Food Technology)
- Color removal from effluent water from sugar cane bagasis.
  (Combination of courses from the branches of Textile and Food Technology)
- Extraction of fibers from banana stem.
  (Combination of courses from the branches of Textile and Food Technology)
- Application of sugar cane bi products in textiles.
  (Combination of courses from the branches of Textile and Food Technology)

- Application of textiles in food packaging industry. (Combination of courses from the branches of Textile and Food Technology)
- Application of textiles in medical textiles.
  (Combination of courses from the branches of Textile and Pharmacy )
- Application of textile material in filtration.
  (Combination of courses from the branches of Textile and Mechanical Engineering)
- Use of antibiotics in medicated dressing.
  (Combination of courses from the branches of Textile and Pharmacy)
- Evaluation of cotton lint index and short fiber percentage in cotton crop.
  (Combination of courses from the branches of Textile and Agriculture Engineering)
- Extraction of oil from cotton seeds. (Combination of courses from the branches of Textile and Food Technology)
- Extraction of areca fibres from areca nut plant of different regions.
  (Combination of courses from the branches of Textile and Agriculture Engineering)
- Development of areca nut fiber composites.
  (Combination of courses from the branches of Textile and Mechanical Engineering)
- Application of non woven in agriculture. (Combination of courses from the branches of Textile and Agriculture Engineering)
- Preparation of wet laid non woven mulch mats by using natural fibers. (Combination of courses from the branches of Textile and Agriculture Engineering)
- Development on protective nets for fruit crops.
- **NOTE:** The afore mentioned list is not exhaustive and the objective is to provide an idea of some of the projects that can be executed by students arising from a combination of courses from various branches. Students are given full flexibility to choose any projects of their choice under the supervision of faculty mentors from a combination of different departments.



# TEXTILE TECHNOLOGY

# B.Tech.

### **I SEMESTER**

19TT401	-	Industrial Engineering for Textiles and Apparels
19TT402	-	Textile Mechanics and Calculations
19TT403	-	Clothing Comfort
19TT404	-	Textile Product Design and Development
19PC015	-	Societal Centric and Industry related Projects
	-	Department Elective - IV

# **II SEMESTER**

	19PC016	-	Internship
►	19PC017	-	Project Work

# **COURSE CONTENTS**

I SEM AND II SEM

# **19TT401** INDUSTRIAL ENGINEERING FOR TEXTILES AND APPARELS

#### Hours Per Week :

L	Т	Р	С
3	-	2	4

	Total	Hours
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L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	30	25	50	-	-	5	5

# COURSE DESCRIPTION AND OBJECTIVES:

This course offers to understand the methods required 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 standardize the work practices.

# COURSE OUTCOMES:

Upon completion of the course, student will able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Know the different concepts and meaning of Industrial engineering.	1
2	Distinguish techniques in designing a workstation at bulk production.	2,3
3	Design a production system or work system.	3
4	Analyze the work place by using work study and method study for solving complex problems in production line.	2,4

#### SKILLS:

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



SOURCE: https:// depositphotos. com/ 186246178/ shttps:// www.google.com/ search?q=professional +ethics&client tockillustrationword-cloudindustrialengineering.html.

118

# UNIT - I

**INTRODUCTION TO INDUSTRIAL ENGINEERING :** Scope in textile & apparels, meaning, objectives; Economical size of the firm, factors governing size, small scale industries-reasons for survival and optimum firm; Facilities planning: Product selection process-new idea mortality curve, capacity planning.

**APPLICATION OF IE TECHNIQUES IN GARMENT INDUSTRY :** Capacity study; Operator performance, follow-ups, work in process (WIP); Operation bulletin.

# UNIT-II

**INTRODUCTION TO PLANT CLIMATOLOGY : PLANT BUILDING** : Significance, considerations of building design, types of industrial building, textile examples, ideal building; Plant lighting: Need, types, factors governing; A brief note on ventilation.

**PLANT LOCATION**: Definition, need, factors governing, theories, selection of actual site, quantitative techniques; Types of location like: Rural, sub-urban & urban, merits & demerits, examples from textile field.

# UNIT-III

**PLANT LAYOUT :** Definition, need, objectives of scientific layout, principles of layout, types of material flow, factors governing the layout, types of layouts, merits and demerits, textile examples; Quantitative techniques for selection of plant layout.

**LINE BALANCING :** Balancing, steps to balance the line, Initial balance, Balance control (operating a line), efficiency, cycle checks, balancing tools.

**SAFETY IN TEXTILE INDUSTRY :** Accident prone zones in textile processing, organisation for safety, safety significance; Accidents classified, causes of accidents, cost of accidents, safe-t-score test, various approaches of accident prevention and recording.

**MATERIAL HANDLING :** Need, classification, handling costs; Principles of material handling – meaning & significance; Types of equipments for textile production.

# UNIT-IV

VALUE ENGINEERING : Value and functions – types.

**MAINTENANCE MANAGEMENT :** Need, types, organisation of maintenance department, maintenance audit, maintenance cost, maintenance indices.

**PURCHASING :** Fundamentals, purchase procedure; Types of purchases; Purchase organization; Inventory and stores management: Store layout, organization & building, study of EOQ & ABC analysis.

# UNIT-V

VFSTR

**WORK STUDY :** Need, objectives from apparel & textile industry point of view.

**METHOD STUDY :** Steps in method study, tools of record.

**TIME STUDY :** Time & motion economy, steps, elements, allowances, work measurement and derivation for standard minute value (SMV or SAM); Calculations from apparel industry.

**ERGONOMICS :** Meaning, scope in apparel & textile industry, impact on working conditions & productivity, recommendations for better ergonomical conditions; Noise control.

L- 9

L-9

L-9

L- 9

PLANT HUMIDIFICATION IN TEXTILE MILLS : Working of humidification units, RH% selection.

**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.

# LABORATORY EXPERIMENTS

#### LIST OF EXPERIMENTS :

**TOTAL HOURS: 30** 

- 1. To study the terminology and process of work study.
- 2. To perform method study.
- 3. To perform RH LH chart of one sewing operation.
- 4. To perform time study.
- 5. To calculate SMV by work study.
- 6. To analyse one operation and to give suggest new method and calculate savings in tine.
- 7. To study different types of charts used in method study.
- 8. To study different types of charts used in time study.
- 9. To study various types of elements and perform a small operation into elements.
- 10. To study concepts in calculation of SAM.

#### **TEXT BOOKS:**

- 1. Chunnawala and Patel, "Production and Operations Management", Himalaya Publishing House, 2007.
- 2. Aswathappa, "Production & Operations Management", Himalaya Publishing House, New Delhi, 2006.

- 1. O.P. Khanna, "Industrial Engineering& Management", Dhanpat Rai & Sons, New Delhi, 2004.
- 2. Sridhar Rao, "Production Management", Himalaya Publishing House, New Delhi, 2009.
- V Ramesh Babu, "Industrial engineering in apparel production", Woodhead Publishing India, 2012.

# 19TT402

# TEXTILE MECHANICS AND CALCULATIONS

#### Hours Per Week :

L	Т	Ρ	С
3	-	-	3

### Total Hours :

L	Т	Ρ	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	-	25	50	-	-	5	5

# 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 analyze fibre, yarn and fabric structural aspects.

# COURSE OUTCOMES:

Upon completion of the course, student will able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Describe basic kinematics used in textile applications.	1
2	Analyze winding, warping and weaving mechanics.	2
3	Select the suitable belt, Chain & Rope drives in Textile machines for smooth running of machines.	1
4	Choose appropriate clutch and break in weaving preparatory, loom shed and other Textile machines.	2,3,4

#### SKILLS:

- ✓ 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 related parameters.
- To draw displacement, velocity and acceleration for curve for sley motion.



SOURCE: https://goricastani sic.files.wordpress. com/2013/11/savepictures-as.jpg

### UNIT-I

INTRODUCTION TO MECHANICS OF TEXTILE MACHINERIES : Need, scope, significance.

TRANSMISSION OF MOTION BY BELT. CHAIN. & ROPE DRIVES : Introduction, need, types, applications in textile machines, numerical examples from textile filed; Selection criterion of belt, chain & rope drives in textile machines with reasons.

TRANSMISSION OF MOTION BY WHEEL GEARING : Need and scope of types of gears, selection and applications in textiles; Epicyclic Gears: introduction, need, applications in textiles.

BALANCING OF REVOLVING MASSES : Concept, need and application (a brief note). UNIT - II

LAWS OF MOTION : Significance of laws of motion and application to textile production.

LINEAR AND CIRCULAR MOTION : Simple numerical examples from yarn formation, fabric formation and wet processing fields.

FEED REGULATION MOTION IN SCUTCHER : Need and types of knock-off motions and their selection; Cone drums: Role played, designing for blow room and speed frame.

BREAKS AND CLUTCHES : Need, types and selection for textile machineries, simple numerical examples, applications of clutch and break in weaving preparatory, loom shed and other textile machines.

UNIT - III

KINETICS OF FABRIC FORMING : Scope; Kinetics of warp winding: Derivation for rate of winding, relation between the elements in drum and precision winding, role of gain and its calculation. **KINETICS OF SHEDDING**: Expression for shed depth.

**KINETIC OF PICKING :** Power for picking, picking as an elastic mechanism.

KINETICS OF BEAT UP: Significance of eccentricity of sley, derivation for 'e', displacement, velocity and acceleration of slev.

UNIT - IV

MECHANICS OF FABRIC TAKE-UP : Stress relaxation and pick spacing, excess tension theory, bumping conditions; Selection of right picks per unit area in Take-up.

KINETICS OF LET-OFF : Mechanics of negative let-off motion: derivation to show that the frictional force 'F' is directly proportional to the distance of weight from the fulcrum, backrest mechanisms, expression for angular velocity of warp beam.

STEPPED PULLEYS : Need, applications in textiles and designing method.

DISPLACEMENT, VELOCITY & ACCELERATION DIAGRAMS : Need, principle of construction, methods of construction, examples from textile field. 1-9

# UNIT-V

CAMS & TAPPETS : Need ,scope, types of cams and tappets, types of followers, selection, terminology of cam and tappet construction; Displacement diagram construction for cams and tappets; Construction of textile cams (heart shaped, 3 leaved & combined build) and tappets (plain & twill).

# TEXT BOOKS:

- 1. J. Hayavadana, "Mechanics of Textile Machinery", Woodhead Publishers, New Delhi, 2018
- 2. R.S. Kurmi, "Theory of Machines", Sultan Chand publishers, New Delhi, 2017.

3 Ganeshan, "Textile Mechanics", Woodhead Publishers, New Delhi, 2018.

# **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. J. E. Booth, "Textile Mathematics," Volume-II, The Textile Institute, Manchester, 1975.
- 4. J. E. Booth, "Textile Mathematics," VolumeIII, The Textile Institute, Manchester, 1975.

L-9

L-9

L-9

# **19TT403 CLOTHING COMFORT**

#### Hours Per Week :

L	Т	Р	С
3	-	-	3

Total I	Hours
---------	-------

L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	-	25	50	-	-	5	5

# 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:

Upon completion of the course, student will able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Know the different concepts and teminologies of clothing comfort.	1
2	Distinguish tactile and physiological comfort.	2,3
3	Design a garment by considering fit for comfort.	3
4	Analyze the report from fabric assessment tests.	2,4

# 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.



### SOURCE:

https://textilelearner. blogspot.com/2014/ 01/clothing-comfortbrief-descriptionof.html

#### L-9

# L-9

comfort; Effect of fabric properties of heat transfer; Moisture vapor permeability, liquid moisture permeability, absorbency, wettability, waterproof, contact angle; Moisture management: Air permeability,

# UNIT - III

UNIT-I

UNIT - II

comfort; Clothing comfort and wearer's attitude.

factors influencing air permeability.

**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).

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

**THERMAL COMFORT** : Physics of human thermal comfort; Physical phenomena affecting thermal

#### UNIT - IV

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-V

PHYSIOLOGICAL COMFORT : Concept of physiological comfort, neuro physiological comfort, basis of sensory perceptions; Measurement techniques, mechanical stimuli and thermal stimuli.

#### **TEXT BOOKS:**

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

#### **REFERENCE BOOKS:**

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

#### SUGGESTED READING MATERIALS :

- Science in Clothing Comfort, Apurba Das and R. Alagirusamy, Woodhead Publishing 1. India Ltd., 2010.
- 2. K. Slater, The Thermal Behaviour of Textiles, Textile Progress, Vol. 8, No. 3, 1976.
- 3. K. Slater, Comfort Properties of Textiles, Textile Progress, Vol. 9, No. 4, 1977.
- Y. Li, The Science of Clothing Comfort, Textile Progress, Vol. 31, No. 1 & 2, 2001. 4.
- 5. Patnaik et. al., Wetting and Wicking in Fibrous Materials, Textile Progress, Vol. 38, No. 1, 2008.
- 6 M. Yoneda and S. Kawabata, Analysis of Transient Heat Conduction and its Application Part I, J. Text. Mach. Soc. of Japan, Vol. 29, No. 4, 1983, 73.
- Thermal and moisture transport in fibrous materials, edited by N. Pan and P. Gibson, 7. The Textile Institute, Published by woodhead Publishing Limited, Cambridge, England, 2006.

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L-10

L-9

# **19TT404** TEXTILE PRODUCT DESIGN AND DEVELOPMENT

#### Hours Per Week :

L	Т	Р	С
3	1	-	4

Total	Hours	

L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS	
45	-	-	25	50	-	-	5	5	

# COURSE DESCRIPTION AND OBJECTIVES:

This course focuses on fundamentals of design and development of innovative textile products which is the key for Textile manufacturing companies to achieve the long-term success and survive in intensively competitive global market. An integrated approach to management of product design and development is also required to create better quality products with enhanced capabilities, at attractive prices with compressed time to market cycles due to the intensified competition, rapidly changing technologies, especially computer-based technology and shorter product life cycles. This module is designed with focus on theory, technologies and practical applications in the product design, development and management over whole product lifecycle.

# COURSE OUTCOMES:

Upon completion of the course, student will able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Identify and analyze the product design and development processes in Textiles.	1,3
2	Define the components and their functions of product design and development processes and their relationships from concept to customer over whole product lifecycle	1,2
3	Analyze, evaluate and apply the methodologies for product design, development and management.	1,2,3
4	Undertake a methodical approach to the management of product development to satisfy customer needs.	11,12
5	Carry out cost and benefit analysis through various cost models.	2

# SKILLS:

- Trace the steps involved in new product development
- ✓ Identify the characteristics of textile products and its utility
- ✓ Give the product specification, technological and process related parameters for new products
- Identify the different textile techniques in recent years
- Select material for development oftextiles



SOURCE: https://textileoceang. blogspot.com/2019/ 06/productdevelopment.html.

#### UNIT-I

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GENERAL OVERVIEW OF INNOVATION AND TEXTILE PRODUCT DEVELOPMENT : Innovation and new product development in textiles; Introduction: incremental change versus disruptive innovation, forces for innovation, organizing for disruptive innovation, the textile industry and innovation; Trends in textile innovation: wearable electronics, biomedical, biomimetic and nano-textiles, case studies in innovation in textile manufacture.

PRACTICAL ASPECTS OF INNOVATION IN TEXTILE INDUSTRY : Introduction and practical aspects of innovation, meeting the needs of customers better than the competition, innovation as a driver of new strategic issues in the apparel industry, future trends in innovation. UNIT - II L-9

TEXTILE PRODUCT DEVELOPMENT AND DEFINITION : Introduction, nylon to tactel, sustainability, future trends; New product developments in knitted textiles: Introduction, seamless knitwear, printing on knitwear, computer aided knitwear design (CAD) and virtual knitwear.

FABRICS AND NEW PRODUCT DEVELOPMENT : Introduction, market demand, functionality responses, environmental sustainability responses, sensing textiles responses. L-9

UNIT - III

NEW PRODUCT DEVELOPMENT IN AUTOMOTIVE UPHOLSTERY : Introduction, automotive textile market, key drivers and supply chain, new product development process for automotive upholsterv: Novel materials and processes in automotive upholstery, future developments in automotive upholstery.

NANOTECHNOLOGY INNOVATION FOR FUTURE DEVELOPMENT IN THE TEXTILE INDUSTRY : Introduction, nanotechnology in the textile industry, adoption of nanotechnology for textile applications. NEW PRODUCT DEVELOPMENT IN INTERIOR TEXTILES : Introduction, basics and general procedures, case studies; Learning experiences for successful new product developments of interior textiles, future trends in interior textiles. 1\_9

#### UNIT - IV

NEW PRODUCT DEVELOPMENT FOR E-TEXTILES : Introduction, integration of electronics and fabrics, E-textiles product development challenges.

CUSTOMER CO-CREATION : Moving beyond market research to reduce the risk in new product development Introduction, challenges of identifying customer needs in the product development process.

TEXTILE PRODUCT ENGINEERING : Objectives and scope of product development in textiles and clothing, performance and serviceability concepts in textiles; Effect of changes in fibre, yarn type and fabric construction and finishing on performance and serviceability of textile products. UNIT-V

#### 1 - 9

TEXTILE PRODUCT DESIGN AND TECHNOLOGY ASPECTS : Consideration of a good product design. Product development procedure - Selection of product, product analysis, product design procedure, preliminary design, maintainability, reliability and redundancy, final design; Product life cycle, market research, material research, equipment and process research; Simulation of specified properties or structures leading to design - special yarns, woven fabrics, non - woven fabrics, simulation of material, texture by using computer graphics; Concept of overall designing procedure, Case studies related to product development of technical textiles.

#### **TEXT BOOKS:**

- Menghe Miao John Xin, "Engineering of High-Performance Textiles", Woodhead publish-1. ing limited. 2017.
- 2. Tom Cassidy, Parikshit Goswami, "Textile and Clothing Design Technology", 1st Edition, CRC Press. 2017.
- 3. Karl Ulrich and Steven Eppinger, "Product Design and Development", McGraw and Hill, 2017.

- 1. L. Horne, "New product development in textiles: Innovation and production", Woodhead Publishing Limited in association with The Textile Institute, 2012.
- 2. Jacquie Wilson, "Hand book of Textile Design Principles, Process and Practice", Textile Institute Publication.
- 3. T Matuo and M. N. Suresh, "The Design Logic of Textile Products", Textile progress vol. 27, No. 3, The Textile Institute Publication.
- 4. Proceedings of the Seminar - Non-woven Technology, Market and Product Potential, IIT, New Delhi, December 2006.

# 19PC015 SOCIETAL-CENTRIC AND INDUSTRY RELATED PROJECTS

#### Hours Per Week :

L	Т	Ρ	С
0	0	6	3

Total	Hours	3:
L	Т	Ρ

# COURSE DESCRIPTION AND OBJECTIVES:

The major objective of the societal-centric projects is to connect students to society through their technical knowledge. The prerequisite to start the project is to submit a report pertaining to the Societal-centric or industry related problem in the preceeding semester.

# COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Study the problems which are related to the society in their production / occupational activities	2
2	Work on technology applications which can either solve the problems or make the activities less stenuous	3
3	Design an implement or process to achieve the second outcome	4

# LIST OF SOCIETAL-CENTRIC AND INDUSTRY RELATED PROJECTS

- Use of Coir woven fabric to control soil erosion at farm.
- Development of low cost water purification technique using nonwoven fabric.
- Development of different textile product from banana fibre.
- Development of insulating material from coir waste and husk.
- Use of nonwoven filtration at small scale industries to control particulate substance.
- Use of textile waste to control noise absorption at industries.
- Development for coir fibre reinforced composite.
- Development of mulch mat and shade net for horticulture.
- Development of low cost baby diaper.
- Manufacturing of wet laid nonwoven product from the fibres extracted from agricultural waste.
- Use of geo textiles in road construction.

- Case study on analysis of clothing requirements for high income, middle income and low income people.
- 3D printed reflective textiles for traffic safety.
- Development of Photochromatic T- Shirts.
- Designing of eco friendly garments from recycled fibers.
- Enzymes usage for Eco Friendly processing.
- Development of equipment for manufacturing disposable utensils from natural materials.
- Development of loom aid gadgets for handlooms.
- Development of wet laid handmade paper from natural cellulosic waste for handicraft products.
- Manufacturing of biodegradable Nonwoven bags to replace polyethene bags.
- Development of Dish Scrubbers by using Natural Fibers.
- Development of dust free / soil release finished garments for construction workers.
- Extraction of fibers from rice plant and development of fabrics made from rice fibers.
- Characterization, extraction and fabric making from grass fibers.
- **NOTE:** The afore mentioned list is not exhaustive and the objective is to provide an idea ofsome of the projects that can be executed by students pertaining to societal or industry related problems. Students are given full flexibility to choose any project of their choice under the supervision of faculty mentor.

# DEPARTMENT ELECTIVES

# B.Tech.

# TEXTILE TECHNOLOGY

# ELECTIVE - I

	19TT231 -	Blow Room and Carding
Þ	19TT232 -	Preparatory Aspects of Fabric Formation
Þ	19TT233 -	Hand Knitting and Flat Knitting
Þ	19TT234 -	Dyes and Pigment
Þ	19TT235 -	Fashion Product Development

# ELECTIVE - II

Þ	19TT331 -	Drawing, Comber and Simplex
Þ	19TT332 -	Technology of Fabric Forming
	19TT333 -	Knitting Technology
Þ	19TT334 -	Technology of Dyeing and Printing Machinery
►	19TT335 -	Costing of Fashion and Apparel Production

# ELECTIVE - III

Þ	19TT336	-	Technology of Yarn Formation
►	19TT337	-	Advanced Fabric Formation
Þ	19TT338	-	Advancement in Knitting Technology
Þ	19TT339	-	Eco-Friendly Wet Processing
	19TT340	-	Fashion Marketing and Visual Merchandising
ELE	CTIVE - IV		
ELE	<b>CTIVE - IV</b> 19TT431	-	Operations Research
ELE	<b>CTIVE - IV</b> 19TT431 19TT432	-	Operations Research Lean and Six Sigma for Textile and Apparels
ELE	<b>ECTIVE - IV</b> 19TT431 19TT432 19TT433	- -	Operations Research Lean and Six Sigma for Textile and Apparels Retailing and Branding of Apparels

# **COURSE CONTENTS**
# **19TT231** BLOWROOM AND CARDING

#### Hours Per Week :

L	Т	Р	С
3	-	-	3

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

# 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:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Understand and explain the fundamental and applied concepts in Blow room & Carding.	1
2	Apply and calculate the production capacities of Blow room & Carding.	4
3	Analyze and compare various types of yarn manufacturing machinery.	2
4	Evaluate the process parameters through industry norms.	3
5	Design the set of machinery required in blow room to produce a specific type of yarn.	3

# 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.



SOURCE:

https://www.textile school.com/409/yarn -spinning-blow -room-functions.

# Department Electives

# UNIT - I

**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 - II

**PROCESS CONTROL IN BLOW ROOM :** Requirements for preparation of lot size of cotton, calculation of lot size from bales, 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 - III

**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.

#### UNIT - IV

**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 - V

**CALCULATION OF NUMBER OF CARDS**: Settings at zones for cotton, blends and synthetics; Replacement analysis of spares of card, Labor allotment; Productivity in cards; Automation in carding; Latest developments in carding.

#### **TEXT BOOKS:**

VFSTR

- 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. Vekatsubramani, "Spun Yarn Technology", 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.

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# 19TT232 PREPARATORY ASPECTS OF FABRIC FORMATION

# Hours Per Week :

L	Т	Р	С
3	-	-	3

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

# COURSE DESCRIPTION AND OBJECTIVES:

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

# COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Apply the fundamental concepts in winding to meet the yarn quality requirements for further processes.	1
2	Analyze the process parameters of various weaving machinery to improve productivity.	2
3	Review the technical specifications of various modern preparatory machinery for desired quality of fabric.	2,3
4	Design and develop a suitable size pick up conditions required for different types of yarns.	3

### 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.
- ✓ Optimize the parameters in sizing.
- ✓ Choose the preparatory machines for given quality
- Draw the warp end through the heald wires as per the design



SOURCE: http://www.precot. com/infrastructure.

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# Department Electives

#### UNIT - I

**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 -II

**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 - III

**SIZING :** Sizing and its importance, sizing ingredients, size 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-IV

**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 - V

**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 and 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 and productivity; Care in dressing of the beam for reducing incidence of cross ends and extra ends.

### **TEXT BOOKS:**

- 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.

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# 19TT233 HAND KNITTING AND FLAT KNITTING

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3	-	-	3

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

# COURSE DESCRIPTION AND OBJECTIVES:

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:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Identify the different types of basic stitch.	1
2	Analyze the knits used for ribbing, edges and neckline.	2
3	Construct the fabric edge or joint finishing and techniques.	3
4	Customization of flat knitting setting for complex structures.	4

# 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.
- ✓ Yan feeding at flat knitting machine



SOURCE: http://apparelsourcingvietnam.blogspot. com/2011/07/ knitting-flatmachines-and-

circular.html.

### UNIT - I

**INTRODUCTION TO NEEDLES AND TOOLS, YARNS, CARING OF FINISHED KNITS, BASIC TECHNIQUES :** Casting On, Casting On in Kichener Rib, Selvedge's, Knit and Purl, Basic pattern and Color changes, Decreasing, Increasing, Binding Off, Binding Off in Kitchener Rib, Gauge.

#### UNIT - II

**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 - III

**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 - IV

**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 - V

**FLAT KNITTING, BASIC PRINCIPLES AND STRUCTURES :** History, 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 BOOKS:**

- 1. D. J. Spencer, "Knitting Technology", 2<sup>nd</sup> edition, Wood Head Publishing Company, England, 2008.
- 2. N. Anbumani, "Knitting fundamentals, Machines, Structures and Developments", New Age international publishers, 2006

### **REFERENCE BOOKS:**

- 1. J. Katharina Buss, "Big Book of Knitting", Sterling Publishing Company, 1999.
- 2. D. B. Ajgaonkar, "Knitting Technology", 5<sup>th</sup> edition, Mahajan Textile Publishers, 2006.

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# **19TT234 DYES AND PIGMENT**

# Hours Per Week :

L	Т	Р	С
3	-	-	3

Total	Hours	S :						
L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	-	25	50	-	-	5	5

# 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 onto textile materials.

# COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Analyse the difference between dye and pigment with respect to application point of view on different fibers.	2
2	Classify the dyes based on the origin and its chemical nature.	5
3	Apply different classes of dyes on to various fibers like natural and manmade fibers.	3
4	Interpret modified synthetic dyes over conventional dyes.	2

# SKILLS:

- ✓ 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



#### SOURCE:

http://dtm-print.eu/ en/pages/dyeversus-pigment.html.

# UNIT - I

**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 - II

**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 & substantivety; Relationship between chemical structure & fastness properties.

# UNIT - III

**ELEMENTS OF DYEING :** Concept of % shade, affinity and substantivety 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 - IV

**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 - V

**BASIC & OTHER CLASSES OFDYES**: 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, Thermochromic dyes, Photo chromic dyes, Antimicrobial dyes. Antimicrobial pigments, Air dyes.

# **TEXT BOOKS :**

- 1. C. V. Koushik, "Chemical Processing of Textiles", NCUTE Publications, 2003.
- V. A. Shenai, "Chemistry of Dyes and Principles of Dyeing Vol- 1", Sevak Publications, 2004.

# **REFERENCE BOOK :**

VFSTR

1. E.R.Trotman, "Dyeing and Chemical Technology of Textile Fibres", 3<sup>rd</sup> edition, Griffin Publications, SBT Bomboy, Ahmedabad, 1992.

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# 19TT235 FASHION PRODUCT DEVELOPMENT

Hours Per Week :

L	Т	Р	С
3	-	-	3

Total	Hours	:

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L	I	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	-	25	50	-	-	5	5

# COURSE DESCRIPTION AND OBJECTIVES:

This course provides the fundamental concepts of fashion product development. The course also gives input for analyzing components of fashion product making process. The course intends to develop analytical skills involving concepts relating to fashion design, anthropometry and sizing, pattern making, seam construction and operations for fashion product development. The objective of this course is to inculcate the skills and analyze fashion product development process in detail.

## COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Apply the knowledge of elements of design and principles of design to create new design on paper, graphics, textile and garments.	1
2	Design a garment or a product by draping or flat pattern making or by using hands on skill or stitching to construct the product to meet desired specification, performance and capabilities.	3
3	Applicationof computer knowledge and skills like CAD and Computer Graphics to design and create new and industry ready Surface or Garment or Style on computer.	5
4	Evaluate different concepts involved in pattern making, stitching and production operations of fashion product.	4
5	Examine the advantages and disadvantages of different seams, stitches and production process of fashion products.	2

### SKILLS:

- Trace and analyze the steps involved in fashion product development.
- Identify the characteristics and components of fashion products and its making process.
- ✓ Analyze the fundamental concepts of fashion product development process.
- Identify and analyze the different process of fashion product development.
- Evaluate different concepts involved in pattern making, stitching and production operations of fashion product.



SOURCE:

http://www.taypa.com. tr/design/productdevelopment

# UNIT - I

**FASHION DESIGN FUNDAMENTALS**: Design types: natural, stylized, geometric, historic and abstract; Garment design: structural, decorative and functional; Elements of Design: Line, shape, form, size, colour, texture and pattern; Principles of design: Harmony, Balance, Rhythm, Emphasis and Proportion; Introducing elements and principles of design in apparels.

#### UNIT - II

**ANTHROPOMETRICS AND SIZING SYSTEM FOR FASHION PRODUCT DEVELOPMENT**: Anthropometry: Basic measurements, human anatomy, landmark terms, clothing sizing systems; Body Ideals; Eight head theory: body proportions, height and weight distribution; Important body measurements across all age groups; Methods of measuring body dimensions; Standard measurement chartdesignation and control dimensions.

#### UNIT - III

**PATTERN MAKING PRINCIPLES FOR FASHION PRODUCT DEVELOPMENT**: Functions of pattern making tools, preparing and measuring the form; Trueing, blending, pattern grain line, balance line terms, notches, seam allowance, jog seam, dart points, pleats, flares, gather and true bias; Pattern making: Drafting and draping methods; Basic men's and women's block; Dart manipulation: single dart series-slash-spread technique, pivotal transfer technique; Two dart series: slash spread and pivotal transfer technique; Graduated and radiating darts, parallel, asymmetric and intersecting darts, types of added fullness and contouring principle.

#### UNIT - IV

**STITCHING PRINCIPLES FOR FASHION PRODUCT DEVELOPMENT :** Seams: Definition, types of seams, seam quality, seam performance, factors to be considered in the selection of seam, seam finishes, seam defects; Stitches: Definition, stitch classes, stitch parameters, factors to be considered in the selection of stitches; Stitching defects; Sewing Thread: Types, construction, sewing thread quality, selection of sewing thread; Men's and women's tops: Basic bodice blocks, collars, sleeves, cuffs, plackets, pleats, gathers and darts; Functional purpose of components in garment construction.

#### UNIIT - V

**OPERATIONS FOR FASHION PRODUCT DEVELOPMENT**: Operation breakdown for shirts, trousers, jackets, waist coats, T shirts, casual bottoms; Material flow, cut component progresses, machinery allocation, man power allocation. Line set up, production line balancing; Different production system, manual system, make through system, batch production system, progressive bundle system, straight line system, conveyor belt system, unit production system, modular production system, quick response system and Just in time system.

# **TEXT BOOKS:**

- 1. Kathryn McKelvey and Janine Munslow, "Fashion Design: Process, Innovation and Practice", Blackwell Publishing, USA, 2005, ISBN: 978-0-470-65577-1.
- 2. Jacob Solinger, "Apparel Production Handbook", Reinhold Publications, 1998.
- Carr H and Latham B., "The Technology of Clothing Manufacturing", Blackwell, U.K., 1994.
- 4. Shaeffer Claire, Sewing for the Apparel Industry, Prentice Hall, New Jersey, 2001.
- 5. Helen Joseph, Armstrong, "Patternmaking for Fashion Design", Pearson Education Pte. Ltd., 2005.
- 6. Ashdown S. P., "Sizing in Clothing", Wood head Publishing Limited, 2007.

### **REFERENCE BOOKS:**

- Ruth E. Glock, Grace I. Kunz, "Apparel Manufacturing, Sewn Product Analysis", 4<sup>th</sup> edition, Pearson Education, ISBN: 8177580760159.
- 2. Laing R.M., Webster J, "Stitches & Seams", The Textile Institute, India,1998.

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# **19TT331** DRAWING, COMBER AND SIMPLEX

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#### Hours Per Week :

L	Т	Р	С
3	-	-	3

L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	-	25	50	-	-	5	5

# 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:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Understand and explain the fundamental and applied concepts in Drawing, Comber And Simplex.	1
2	Apply and calculate the production capacities of Drawing, Comber And Simplex.	4
3	Analyze and compare various types of yarn manufacturing machinery.	2
4	Evaluate the process parameters through industry norms.	3
5	Design the set of machinery required in Drawing, Comber And Simplex to produce a specific type of yarn.	3

# 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.



SOURCE:

https://textile machine spares.com/ If-1400-simplexspares

# UNIT - I

**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 - II

**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 - III

**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 - IV

**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 - V

**PRODUCTIVITY :** 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:**

- Vekat subramani, "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.

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# 19TT332 TECHNOLOGY OF FABRIC FORMING

Hours Per Week :

L	Т	Р	С
3	-	-	3

|--|

L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	-	25	50	-	-	5	5

# 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:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Understand principles in different driving mechanisms for various motions in a loom.	1
2	Investigate the various shedding mechanisms and able to select the right one for the type of fabrics produced.	4
3	Analyse the settings for various mechansims to get good quality in fabric production.	2
4	Produce various designs using dobby and jacquard shedding.	3

### SKILLS:

- ✓ Identify the negative and positive let-off/take-up motion.
- ✓ Perform pegging of pattern of the dobby lattice.
- ✓ Identify various fabric defects in shuttle looms.
- ✓ Control the loom efficiency by controlling the governing parameters of production.
- ✓ Prepare the design cards for jacquard shedding.



SOURCE:

https: // www.indiamart. com/proddetail/ sulzer-p7 100-360-390-cmtextile-weavingmachines-12851765862.html.

# UNIT-I

MOTIONS IN WEAVING : Primary 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 - II

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 - III

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 jacugard shedding: Position, material of construction and functions; Principle of shed formation and working of SLJ, DLSC, DLDC & CBJ.

#### UNIT - IV

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-V

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 10 point grading system; Fabric packaging types.

### **TEXT BOOKS :**

- Robinson and Marks, "Principles of Weaving", Textile Instt. Manchester, 2004. 1.
- 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 -1& II, 2002.
- 2. P. R. Lord and Mohammed, "Conversion of Yarn to Fabric", Butterworths Publications, Manchester, 2000.

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# **19TT333 KNITTING TECHNOLOGY**

### Hours Per Week :

L	Т	Р	С
3	-	-	3

Total Hours .	Total	Hours	:
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L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	-	25	50	-	-	5	5

# COURSE DESCRIPTION AND OBJECTIVES:

This course offer in-depth 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:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Differentiate the circular knitting machine types.	1
2	Analyze the role of circular knitting machine components.	2
3	Setting of the drives and control system of circular knitting machine.	3
4	Modern tools used for getting terry and fleece fabrics in knitting machines.	5

# SKILLS:

- ✓ Identify different components used in circular knitting machine
- ✓ Select the correct components for different fabric specifications
- ✓ Optimize settings in circular knitting machines
- ✓ Differentiate single and double bed cylinders
- ✓ Analyze the drive system used ofr circular kniting machine



### SOURCE:

https:// www.indiamart. com/proddetail/warpknitting-machine-13632124473.html.

# UNIT - I

**INTRODUCTION**: Knitting Machines, classification by diameter, classification by number of needlebeds, basic structure of a large-diameter circular knitting machine, yarn feeding system, spool holder, yarn feeders, thread guide, stitch formation motions, main components of a single-bed machine.

# UNIT - II

**MOTIONS :** Components of a double-bed machine, 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 - III

**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 - IV

**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 - V

**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 BOOKS:**

VFSTR

- 1. D. J. Spencer, "Knitting Technology", 2<sup>nd</sup> edition, Wood Head Publishing Company, England, 2008.
- 2. N. Anbumani, "Knitting fundamentals, Machines, Structures and Developments", New age international publishers, 2006.

# **REFERENCE BOOKS:**

- S. C. Ray, "Fundamentals and Advances in Knitting Technology", 1<sup>st</sup> edition, Wood Head Publishing India in Textiles, 2011.
- 2. D. B. Ajagaonkar, "Knitting Technology", 5th edition, Mahajan Textile Publishers, 2006

# L-9

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# **19TT334** TECHNOLOGY OF DYEING AND PRINTING MACHINERY

Hours Per Week :

L	Т	Р	С
3	-	-	3

Total Hours	;
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L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	-	25	50	-	-	5	5

# COURSE DESCRIPTION AND OBJECTIVES:

This course offer concepts in machineries required for dyeing of fibers, yarns and fabrics aswell as machinery components required to print the fabrics like screen, flat bed, roller, rotaryand ink jet or digital printing. Objective of this course is to provide knowledge and skill required to impart fundamental concepts of dyeing and printing machinery.

# COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Select the suitable dyeing machine based on the material to be processed.	1
2	Compare the different principles of dyeing of fibers, yarns and fabric using different machines.	2
3	Develop various finished fabrics for different end use applications.	3
4	Investigate the various problem in the dyed fabric quality.	4

# 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



SOURCE:

https://www. indiamart.com/ proddetail/dyeingmachines-8833023130.html.

# UNIT - I

**FIBER & YARN DYEING MACHINES** : Preparation of cotton fabric for dyeing, principles of dyeing machine constructions, fiber dyeing machine, loose stock dyeing machine, yarn dyeing machine, hankyarn dyeing machine, package dyeing machine.

# UNIT - II

**FABRIC DYEING MACHINES :** 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.Cold pad batch, Econtrol dyeing machine, pad-steam and pad dry methods of dyeing.

### UNIT - III

**HTHP AND OTHER DYEING MACHINES**: Textile Dyeing Machines, Multi Nozzle Soft Flow Economical DyeingMachine, 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 ofdye bath.

## UNIT - IV

**PRINTING MACHINES :** Preparation of cotton fabric for printing, **Flat bed screen printing**: Features of flat bed screen printing m/c, Faults of flat bed screen printing m/c. their causes and remedies. Recent developments flat bed screen printing m/cs; **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. Recent developments in rotary screen printing m/cs; **Inkjet / Digital printing** - Basic principles, mechanism of printing, requirement of ink..

# UNIT - V

**FINISHING MACHINES : Mechanical finishing-** Raising, Calendering, Peach Finish Machine, Sanforising machine, micro sand finish, Decating machines, Crabbing machine, **Chemical finishing**-Stenter, Fabric softenign machines, padding mangles, fabric foam finishing machines. Garment finishing machines, Denim finishing machines.Final inspection of processed fabrics.

# **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 BOOK:**

1. A K Choudhury, "Textile Preparation and Dyeing", Science Publishers, 2006.

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#### L-9

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BS 5

# 19TT335 COSTING OF FASHION AND APPAREL PRODUCTION

Hours	Per	Week	:
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L	Т	Р	С
3	-	-	3

Iotal	Hours	3:					
L	Т	Р	WA/RA	SSH/HSH	CS	SA	S
15			25	50			5

# COURSE DESCRIPTION AND OBJECTIVES:

This course provides the fundamental concepts of costing of fashion and apparel production. The course also gives input for analyzing components of costing and apparel production.

The objective of this course is to inculcate the skills and analyze costing functions and technical aspects of apparel production. Costing is an important function in apparel production. Analysis of these functional elements leads to development of fashion products with minimal cost.

# COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Identify and analyze the elements of costing and apparel production	2
2	Analyze costing components and their functions, Examining their role in costing and apparel production	2
3	Analyse, evaluatecosting for different materials, process and products	2,3
4	Application of methodical approach to study apparel production	5
5	Demonstrating and analyzing different fashion costing and apparel production concepts using real examples	2,11

# SKILLS:

- ✓ Trace and analyze the steps involved in costing of garments and apparel production
- $\checkmark$  Identify the characteristics and components of costing and apparel production
- ✓ Analyze the process of costing and apparel production
- ✓ Identify the different costing variables and apparel production systems
- ✓ Evaluate costing for different types of garments and apparel production



SOURCE:

https://quality inspection.org/ cmt-cut-make-trim.

### Unit - I

Unit - II

BASICS OF COSTING PROCESS : Introduction to Cost Accounting: Responsibility accounting, uses of cost accounting, elements of cost, direct material, direct labour, factory overhead; Cost of goods manufactured statements, cost behavior patterns in the apparel industry-fixed variable, semi variable, job order for process costing;

COSTING IN APPAREL FIRMS : Accounting for factory overhead : Capacity level concepts, production and service departments direct and indirect costs over and under applied overhead, cost volume profit analysis; Breakeven analysis: Contribution margin, Variable, cost ratio, marginal income.; sales mix by garment style, effect of volume change, price/column analysis Apparel Marketing cost Analysis: Marketing cost accounting, marketing cost standards, variance analysis formarketing cost, effective variance, price variance; 1\_9

#### Unit - III

**PRICING OF APPARELS**: Determining Pricing of apparel products: Price elasticity of demand and supply. Sample costing-marginal revenue and marginal cost, cost plus pricing methods; Full cost pricing, conversion cost pricing differential cost pricing, variable cost pricing, direct cost pricing derivation of cost of apparel products-woven/knits; Costing of fabrics; costing of apparel: woven, knits of various styles, accounting of prime costs and overhead costs, allocation of overheads, cost control; cost sheet preparation. Working capital management in garment unit: determination, sources, cost; Budget, types of budgets, budgeting and control in apparel industry Detailed project report: elements, preparation for a garment unit. L-9

Unit - IV

APPAREL PRODUCTION AND CONTROL : Introduction: control parameters, apparel production parameters, planning and lead-time. Product development: Steps from prototype to production model, Importance of pre-production activities; Introduction to timetable concepts. Product data management: Understanding and interpretation of specification sheet. Operation sequence development: Garment breakdown with machine and attachment details, developmentof production grid for garment construction, development of production flowchart. L-9 Unit - V

APPAREL MANUFACTURING AND PLANNING : Lay lot planning: Numerical exercises on lay lot planning to optimize cutting cost, bundling, ticketing and cutting room control formats. Production Planning and Control: Capacity calculation for cutting, sewing and finishing. Determination ofmachine requirements for new factory. Line balancing: Determination and allocation of manpower and, machine for balanced production inexisting plant for a given target

### **TEXT BOOKS:**

- 1. Richord D. Irwin Icn, "Principles of cost Accounting: Managerial Applications", Revised by Gayle Rayburn1983.
- 2. Sultan Chand& sons "Management Accounting", New Delhi, 2<sup>nd</sup> edition 1998.
- 3. A.J. Chuter., "Introduction to Clothing Production Management", Blackwell Scientific Publications.
- 4. David J. Tyler., "Materials Management in Clothing Production", Blackwell Scientific Publications.

### **REFERENCE BOOKS:**

- R. Rathinamoorthy, R. Surjit, Apparel Merchandising, WPI Publishing. 1.
- T. Karthik, P. Ganesan, D. Gopalakrishnan, Apparel Manufacturing Technology, CRC 2. Press.
- 3. Pandey I. M., "Financial Management", Vikas Publishing House Pvt. Ltd., New Delhi, 8<sup>th</sup> edition, 1999.
- 4. Prasanna Chandra, "Financial Management, Theory and Practice", Tata McGraw-Hill Publishing Company Ltd, 5th edition, New Delhi, 2001.

# 1-9

# **19TT336** TECHNOLOGY OF YARN FORMATION

Hours	Per	Week	:

L	Т	Р	С
3	-	-	3

Total	Houre	
iolai	110015	

L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	-	25	50	-	-	5	5

# COURSE DESCRIPTION AND OBJECTIVES:

This course deals with various yarn forming machineries consisting 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:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Understand and explain the fundamental and applied concepts in ring frame.	1
2	Apply and calculate the production capacities of spinning machinery.	4
3	Analyze and compare various types of yarn manufacturing machinery.	2
4	Evaluate the process parameters through industry norms.	3
5	Design the set of specifications required in spinning machinery to produce a specific type of yarn.	3

# SKILLS:

- ✓ Optimize twist level for ring spinning for different blends.
- ✓ Analyze 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.



#### SOURCE:

http:// www.weiku.com/ products/10345016/ Textile \_machine\_ spinning\_ machine\_ spandex\_ yarn\_ deivce.html.

#### UNIT - I

**RING FRAME** :Types of drafting systems in 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 - II

**DEVELOPMENT OF RING FRAME & POST SPINNING**: Developments in ring frame, Ring data/ ISM (Individual spindle Monitoring), Duoflex, Individual driving system, Auto doffing, developments in ring and traveller, production calculations; Post spinning operations; Systems of doubling, doubling twist, two/for one twister; Brief note on reeling, bundling, baling machinery.

#### UNIT - III

**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, rotor groove geometry: their influence on design parameters and dimensions of rotor, spinning performance, doffing tube; False twist effect; Take up and package formation, auto piecing systems, rotor yarn properties, calculation of twist, machine constant and production.

#### UNIT - IV

**TWIST-LESS, SELF TWIST & AIR-JET :** Twist-less spinning, tekja process, TNO, TWILO, Self twist spinning, Repco spinning, 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 - V

**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.
- P. R. Lord, Cherian lype, "Theory of Yarn Production", Wood Head Publishers, Wales, U.K, 2005.

#### **REFERENCE BOOKS:**

- 1. W. Klein, "NEW SPINNING SYSTEMS", Textile Institute Manchester, 1990.
- 2. Eric Oxtoby, "SPUN YARN TECHNOLOGY".

# L-9

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### L-9

# L-9

# **19TT337** ADVANCED FABRIC FORMATION

#### Hours Per Week :

L	Т	Р	С
3	-	-	3

L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	-	25	50	-	-	5	5

# COURSE DESCRIPTION AND OBJECTIVES:

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 maintain shuttle-less looms.

# COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Compare the principle differences among various shuttle less weaving machines.	1
2	Analyse the technological developments from rapier to multiphase weaving machines.	2
3	Choose the right quality of yarn based on the type of loom the fabric is going to produce.	4
4	Develop a narrow fabric by maintaining required parameters in the loom	3

# SKILLS:

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



### SOURCE:

https://www.google. com/ search? q= shuttleless+weaving & source =Inms& tbm = isch&sa =X&ved= OahUKEwiF-Mvbr YHjAh VLWXOKHfu IAWsQ AUIESgC& biw=770 &bih=565# imgrc= c8M20icea YEKjM.

### Unit - I

**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, Techno economic aspects of modern weaving, common types of shedding motions, Basic mathematics, let-off motions, take-up motions found on modern looms.

#### Unit - II

**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 - III

**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 - IV

**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 - V

**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.
- M.K. Talukdar, D.B. Ajgaonkar, "Weaving Machines, Materials & Methods", Textile Institute, 1998.

#### **REFERENCEBOOKS:**

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

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# 19TT338 ADVANCEMENTS IN KNITTING TECHNOLOGY

Hours	Per	Week	:
			•

L	Т	Ρ	С
3	-	-	3

Iotal	Hours

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L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	-	25	50	-	-	5	5

# 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:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Classify the knitting machines based on different criteria.	1
2	Analyze the advancement in warp and weft knitting machines.	2
3	Design the knitted fabric composites using suitable knitting principles.	3
4	Use the tools or attachments required in manufacturing of advance knitted fabrics.	5

# SKILLS:

- ✓ Select the knitting machine out of commercially available machines based on structure, application and productivity.
- ✓ Suggest modification to be made in circular knitting machine based on structure.
- ✓ Suggest modification in tricot knitting machine for newly developed construction.
- ✓ Suggest modification in raschel knitting machine for newly developed construction.
- ✓ Identify the intelligent yarn delivery system in weft knitting.



SOURCE:

https://www.knitting tradejournal.com/ circular-knittingnews/13452a-stich-in-time.

### Unit - I

**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 - II

**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, 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 - III

**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 - IV

**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 in Women's apparel: knitted underwear Introduction, functional requirements of knitted underwear, performance evaluation of knitted underwear, engineering of knitted underwear fabrics..

### Unit - V

**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 trends.

### **TEXT BOOKS:**

- K. F. AU, "Advances in Knitting Technology", Woodhead Publishing Limited, 1<sup>st</sup> edition, 2011.
- N. Anbumani, "Knitting fundamentals, Machines, Structures and Developments", New age international publishers, 2006.

### **REFERENCE BOOKS:**

- 1. S. C. Ray, "Fundamentals and Advances in Knitting Technology", 1<sup>st</sup> edition, Wood Head Publishing India in Textiles, 2011.
- 2. D. B. Ajagaonkar, "Knitting Technology", 5<sup>th</sup> edition, Mahajan Textile Publishers, 2006.

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# **19TT339 ECO-FRIENDLY WET PROCESSING**

#### Hours Per Week :

L	Т	Р	С
3	-	-	3

Total	Hours	÷
10101	110010	•

L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	-	25	50	-	-	5	5

# PREREQUISITE COURSES : Energy Management and Auditing

# 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 fabricpreparation, dyeing and finishing.

# **COURSE OUTCOMES:**

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Distinguish the importance of eco-friendly grey preparation in wet processing industries.	1
2	Analyse and compare the process modification in various stages of pre-treatments.	2
3	Understand the need for implementing eco-friendly dyeing and finishing in processing industries.	7
4	Investigate the problems with the help of Nano-technology and plasma technology in textile wet processing.	4

# SKILLS:

- ✓ Identify suitable eco-friendly treatment for grey fabric.
- ✓ Optimizeeco-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.



#### SOURCE:

https://www.hgtv.com/ design/make-andcelebrate/handmade/ dye-a-shirt-withveggies-and-fruits.

# UNIT-I

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 - II

PROCESS MODIFICATIONS IN PRETREATMENTS : Developments in singeing, desizing and its ecoaspects, bleaching and its eco aspects, eco-friendly per acetic acid bleaching, eco-friendly retting of jute, Redox H<sub>2</sub>O<sub>2</sub> bleaching, concept of eco-friendly stabilizers for H<sub>2</sub>O<sub>2</sub> bleaching, combined operations like desizing, scouring, bleaching, solvent scouring, hot mercerization, add-on mercerization and ammonia treatment.

## UNIT-III

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, multi functional dyes, neutral fixing and acid fixing reactive dyes, photo chromic dyes, thermo chromic dyes, fluorescent dyes, super critical CO<sub>2</sub> dyeing, ultrasound in dyeing, low temperature dyeing.

# UNIT-IV

**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 crosslinking; Various eco-friendly resin finishes, UV- protection finishes and their evaluation. Anti microbial finishes, Flame Retardant Textile Finishes, Self-Cleaning Textiles, The use of enzymatic techniques in the finishing of technical textiles.

# UNIT-V

APPLICATION OF NANOTECHNOLOGY IN TEXTILES: Nano finishes - Super hydrophobicity and lotus effect, self-cleaning, UV protection finish, antimicrobial finishes. Application of Plasma inTextiles: 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 BOOKS:**

- Blackburn, "Biodegradable and Sustainable Fibres", Woodhead Publishing Limited, 1. 2005.
- K.L. Mittal and Thomas Bahners, "Textile Finishing Recent Developments and Future 2 Trends", 1<sup>st</sup> edition, Scrivener Publishing, 2017.

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# **19TT340** FASHION MARKETING AND VISUAL MERCHANDISING

Hours	Per	Week	:
L	Т	Р	С

3

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L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS	
45	-	-	25	50	-	-	5	5	

# COURSE DESCRIPTION AND OBJECTIVES:

3

This course provides the fundamental concepts of fashion business and marketing, merchandising, sourcing and visual merchandising. The course also gives input for analyzing components of Fashion marketing, merchandising, sourcing and visual merchandising. The objective of this course is to inculcate the skills and analyze the basic concepts involved in fashion marketing and visual merchandising.

# COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Identify and analyze the concepts of fashion marketing and visual merchandising.	2
2	Evaluate fashion marketing tools and concept in fashion products and develop a fashion marketing plan for different styles.	4
3	Undertake a methodical approach to develop and design a visual merchandising concept for men's wear, women's wear and kids wear application.	3
4	Demonstrate the knowledge of fashion marketing and visual merchandising using case study examples.	11
5	Analyze the characteristics of merchandise presentation.	2

### SKILLS:

- Trace and analyze the steps involved in fashion marketing and visual merchandising.
- Identify the characteristics and components of fashion markets and visual merchandising.
- ✓ Analyze fashion market for different products like men's wear, women's wear and kids wear products.
- Identify different visual merchandising fixtures and display methods for fashion retail brands.
- Evaluate the methods of merchandise presentation and its effects on consumer perception.



https://www.india retailing.com/2017/ 03/22/fashion/visualmerchandising-thesilent-salesmanyou-cant-ignore.

#### UNIT-I

**INTRODUCTION TO FASHION BUSINESS**: International fashion business pattern, basic business concepts in Indian apparel export house, business operations in China and other south Asian countries. Business patterns for Indian apparel retail and home textiles. Understanding from concept board to finished product and its sequence. UNIT - II

**FASHION MARKETING**: Defining marketing, marketing mix the objectives of marketing department, market research, different types of markets, marketing strategies with respect to a product/brand, Indian apparel houses international marketing strategies and domestic marketing strategies. marketing models, B to B marketing, B to C marketing, direct marketing, digital marketing, UNIT - III 1-9

MERCHANDISING AND SOURCING : Concepts of merchandising, concepts and apparel product lines, dimensions of product change, determination and development of product line and product range. Creative and technical design in garments and accessories, new product development and seasons of sale, costing, coordination and communication with the production house and export house Understanding the basics of sourcing, sourcing strategy and best sourcing practice in apparel and textile businesses, supply chain and demand chain understanding, sourcing negotiations, global co-ordination in sourcing, materials management and guality in sourcing, guick response and supplier partnership in sourcing, JIT technology. UNIT - IV L-9

VISUAL MERCHANDISING FUNDAMENTALS : Visual merchandising: Definition and functions. History, understanding retail in India, Retail Store; Site and Design, Image Mix: Top Six Elements, Store Exteriors, Store InteriorsDisplay Basics, Design Basics, Principles of Design, Colour Blocking, People Buy Colours, Signage, Understanding Materials; The Purpose of Planning Fixtures, types of Fixtures, Circulation Plan and Types of Circulation Plans, Meaning and Purpose of a Planogram, Benefits of a Planogram, implementation and maintenance of a Planogram. UNIT-V

**MERCHANDISE PRESENTATION :** Principles of Merchandise Presentation; Categories in Merchandise Presentation; Dominance Factor in Merchandise Presentation; Cross Merchandising; Window Display: Meaning and Scope, Vis-à-vis Merchandise, Types of Setting, Promotional Display Vs. Institutional Display, Window Display-Construction; Styling, Display Calendar, Sales Tracking, Handling the mannequin, props, lighting, organising an in-store event, VM tool kit, quality and process in visual merchandising, standard operating procedures (SOPs).

### **TEXT BOOKS:**

- Elian stone, Jean A samples, "Fashion Merchandising", McGraw Hill Book Company, 1. NewYork, 1985.
- 2. Philip Kotler, Kevin Lane Keller, Abraham Koshy, and MithileshwarJha, "Marketing Management A South Asian Perspective", Pearson Education, New Delhi, 2006
- Ruth E. Glock, Grace I. Kunz "Apparel Manufacturing Sewn Product Analysis" 3. 4<sup>th</sup> edition, Pearson Prentice Hall, NJ, 2005.
- 4. Mike Easey, "Fashion Marketing", Third Edition, Wiley- Blackwell Publishing, 2009.
- 5. Sarah Bailey, Jonathan Baker, Visual Merchandising for Fashion, Fairchild publications, 2019.

### **REFERENCE BOOKS:**

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- Shivaramu S., "Export Marketing A Practical Guide to Exporters", Wheeler Publishing, 1. Ohio.1996.
- 2. Warren. J. Keegan and Mark.C.Green, "Global Marketing", Pearson Prentice Hall, New Delhi, 2005.
- 3. Grace I. Kunz , Ruth E. Glock, "Apparel Manufacturing: Sewn Product Analysis", 4<sup>th</sup> edition, Prentice Hall, 2004.
- 4. Pradhan Swapana, "Retailing Management", Tata McGraw Hill, 2009.
- 5. Swati Bhalla and Anurag S "Visual Merchandising", Tata McGraw Hill, 2010.

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# **19TT431 OPERATIONS RESEARCH**

#### Hours Per Week :

L	Т	Р	С
3	-	-	3

Total Hours
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L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	-	25	50	-	-	5	5

# COURSE DESCRIPTION AND OBJECTIVES:

Understand the need and scope of Operations Research for engineering applications. To learn the formulations of different models in Operations Research. To understanding the concepts of LPP, Assignment and Transportation and their applications for engineering process. To design a process with all variables and constraints and model it for a specific end use. To Plan for the various phases of Project

# COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	To select a model for a specific end use.	1
2	Design a production /marketing/ personnel case study and modeling it.	3
3	Allocate the minimum resources with maximum returns.	1
4	Plan & Design a Transportation model in material handling and transportation.	4
5	Select a project from the alternatives and preparing the PERT.	2

# SKILLS:

- ✓ Apply linear programming model effectively in fiber selection in mixing.
- ✓ Profit maximization.
- ✓ Inventory control.
- ✓ Scheduling a project .



### SOURCE:

https://www.bls.gov/ ooh/math/operationsresearch-analysts. htm?view\_full.

Department Electives

# UNIT - I

**INTRODUCTION**: Definition of OR, objectives, scope, phases and different models of OR, role of Operations Research in engineering, essential requirements of a problem.

**LINEAR PROGRAMMING MODEL :** Characteristics, assumptions, formulations and graphical solution, special cases of graphical solution.

## UNIT – II

**SIMPLEX**: Contents of a simplex problem, types of simplex problem, Maximization, Minimization, two-phase method, duality and its objective, writing a dual problem for LPP and solving by simplex, dual simplex

**ASSIGNMENT MODEL :** Objective, types of assignment problems, Hungerian method, profit maximisation, Airline crew problem, special assignment problem.

## UNIT – III

**TRANSPORTATION MODEL :** Objectives, types of transportation problems, lowest cost entry method and north west corner method.

**REPLACEMENT MODELS :** Waiting line models: optimum replacement of age of items that deteriorate with time, optimum replacement of items that fail completely.

DECISION THEORY : Need, elements of decision theory, simple problems with risk and uncertainty.

### UNIT – IV

QUEUING SYSTEMS: Classification, characteristics of queuing systems, problems on Queuing theory.

**INVENTORY CONTROL**: Need, Def, Significance types of decisions, types of Inventories, EOQ: elements, derivation for EOQ, simple problems with and without EOQ, A brief note on Production Model, Shortages.

# UNIT – V

**SEQUENCING :** Need , assumptions, types of problems (n-job on 2 machines, n-job on three machines and 2 jobs on n-machines.

**PROJECT SCHEDULING BY PERT AND CPM :** Introduction to network analysis; Construction of network diagrams, calculation of floats, a brief note on Crashing of Networks.

# **REFERENCE BOOKS:**

- 1. Operations Research : Pannerselvam, Tata-McGrawHill, 5th edition, New Delhi, 2013.
- 2. Operations Research S.K. Kapoor, Chand Publications, New Delhi, 2013
- Problems and solutions in Operation Research Man Mohan and P. K. Gupta, Dhanpathi Roy & sons, New Delhi, 2010.
- 4. PERT and CPM B.C. Punmia, Dhanpathi Roy & sons, New Delhi, 2012.

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# **19TT432 LEAN AND SIX SIGMA FOR TEXTILE AND APPARELS**

Hours	Per	Week	•
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L	Т	Р	С
3	-	-	3

Total	Houre	
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L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	-	25	50	5	-	5	5

# COURSE DESCRIPTION AND OBJECTIVES:

To provide the fundamental knowledge of concepts of Lean Manufacturing. To provide knowledge of six sigma and its concepts. To develop the understanding of statistical tools used in lean and six sigma concepts. To provide the knowledge of lean tools and lean implementation. To educate the students about modern methods of maintaining inventory and lean culture.

# COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Understand the concept of lean manufacturing in textile and apparel industry.	1
2	Examine the role Six sigma and its concepts in making an error free environment in textile and apparel production systems.	4
3	Analyse need and objectives of statistical tools in lean and six sigma applications.	2
4	Design principles of lean tools and lean implementation.	3
5	Design principles of lean tools and lean implementation.	3

# SKILLS:

- Apply Six sigma tools in the industry.
- ✓ Implement the lean tools effectively.
- ✓ Capable in applying advanced statistical tools in analysing results.
- ✓ Capable in applying advanced lean tools in getting more production.



SOURCE:

https://www. american nursetoday.com/ power-lean-sixsigma.

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# UNIT-I

**HOLISTIC VIEW OF LEAN MANUFACTURING :** Definition and brief description of the five primary elements of lean manufacturing, lean manufacturing approach, roadmap, implementation methodology, lean manufacturing principles, expected benefits; Introduction to mass production system, origin of lean production system, necessity, lean revolution in toyota, systems and systems thinking, basic image of lean production, customer focus, muda (waste).

#### UNIT-II

**INTRODUCTION TO LEAN PRINCIPLES AND SIX SIGMA CONCEPTS**: Similarities and differences, synergy, evolution of lean six sigma, lean six sigma approach methodology, phases, managing lean six sigma project, six sigma methodologies (DMAIC, DMADV, DFSS).

**ORGANISATION ELEMENT :** Introduction, communication planning, product focused responsibility, leadership development, operational roles and responsibilities, workforce preparation, six sigma tools and techniques.

#### UNIT-III

**ADVANCED STATISTICAL TOOLS :** Statistical process control, process capability analysis sigma computation, hypothesis testing, ANOVA, design of experiments, chi-square test, regression analysis, case studies Stability of lean system Standards in the lean system, 5S system, Total Productive Maintenance, standardized work, Elements of standardized work, Charts to define standardized work, man power reduction, overall efficiency, standardized work and Kaizen, common layouts.

#### UNIT-IV

**LEAN TOOLS**: Value Stream Mapping, Poka Yoke, Time Analysis, Push-Pull Systems, Waste Elimination, Total Productive Maintenance, Failure Mode Effect Analysis, Standard Work Practices, Control Plans, SMED, Visual control, Kaizen–Case studies, Principles of JIT–JIT system, Kanban, Kanban rules, Expanded role of conveyance, Production leveling, Value stream mapping, Lean six sigma implementation: Identifying Lean Six Sigma Projects, Define Scope, Planning for Implementation, Selection of tools and techniques for each phase, measuring the Benefits.

## UNIT-V.

**JIDOKA (AUTOMATION WITH A HUMAN TOUCH) :** Jidoka concept, Poka-Yoke (mistake proofing) systems, Inspection systems and zone control, Types and use of Poka-Yoke systems, Implementation of Jidoka; Worker involvement and systematic planning methodology: Involvement, Activities to support involvement activities to support involvement, Quality circle activity, Kaizen training, Suggestion Programmes, Hoshin Planning System (systematic planning methodology), Phases of Hoshin Planning, Lean culture.

### **TEXT BOOKS:**

- 1. Pascal Dennis, Lean Production Simplified: A Plain-Language Guide to the World's Most Powerful Production System, (Second edition), Productivity Press, New York, 2007.
- 2. Jeffrey Liker, The Toyota Way : Fourteen Management Principles from the World's Greatest Manufacturer, McGraw Hill, 2004.

### **REFERENCE BOOKS**

VFSTR

- 1. Michael L. George, Lean Six SIGMA: Combining Six SIGMA Quality with Lean Production Speed, McGraw Hill, 2002.
- Taiichi Ohno, Toyota Production System: Beyond Large-Scale Production, Taylor & Francis, Inc., 2010.
- 3. Thomas Pyzdek, The Six Sigma Handbook , McGraw-Hill, 2000.
- 4. Field W M, "Lean Manufacturing: Tools, Techniques, and How to Use Them", St.Lucie Press, London, 2001.

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# 19TT433 RETAILING AND BRANDING OF APPARELS

Hours Pe	r Week :
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L	Т	Р	С
3	-	-	3

Total	Houre	
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L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	-	25	50	-	-	5	5

# COURSE DESCRIPTION AND OBJECTIVES:

To provide the fundamental knowledge of concepts of retailing. To provide knowledge on the customer relationship management. To develop the understanding of retail advertising and retail sales promotion. To provide the knowledge of international retailing and influence of information technology on retailing. To educate the students about the branding and its concepts.

# COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Understand the concept of retailing.	1
2	Examine the role of Customer relationship management in retailing.	4
3	Analyse the need and objectives of retail advertising and retail sales promotion.	2
4	Factors influencing international retailing and the scope and role of information technology on retailing.	3

# SKILLS:

- ✓ Apply retailing concepts in real scenario.
- Maintain proper customer relationship.
- ✓ Get an idea about Retail Advertising and Promotion.
- ✓ Carry out the branding for an apparel product.



### SOURCE:

http://www.niceshirts. info/branded-shirtsnames-for-men/youngmens-clothing-brandsname-brand-clothinghere-is-a-list-brandedshirts-names-for-men.

### UNIT-I

**RETAILING**: Introduction to Retail, Functions of a retailer, Marketing-Retail equation, rise of the retailer, proximity to customer, rise of consumerism, global retail market, challenges and opportunities, empowered consumer-technology enabled effectiveness, FDI in retail, The Concept of life cycle in retail-innovation, accelerative growth, maturity-decline, phases of growth in retail markets, classification based on ownership, merchandise offered, franchising, non store retailing, direct selling, direct response marketing, telemarketing, fairs and road shows, event management, automated vending, kiosks, cash & carry, credit marketing.

#### UNIT II

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**CUSTOMER RELATIONSHIP MANAGEMENT (CRM) :** Scope, components, customer life cycle- B2B CRM, using customer touch, CRM planning & strategy development.

**SERVICES MANAGEMENT :** Scope, service bench marking, service strategy, designing the service enterprise marketing channels, franchising.

**MALL MANAGEMENT :** Types of various retail formats-concepts in mall design, factors influencing malls establishments, aspects in finance, aspects in security / accounting, aspects in HR-aspects in quality management, statistical methods used in measuring mall performance.

VISUAL MERCHANDIZING : Different kinds of images, store design, window displays, interior displays, display props (rent, buy, or build), lighting the display window.

MANNEQUIN: Types, functions, dressing of mannequins.

**SIGNS AND COMMUNICATION :** Need for signs, merchandise signs, departmental signs, sign sizes, merchandising staff.

#### UNIT-III

**RETAIL ADVERTISING AND PROMOTION** 

**ADVERTISING IN RETAILING :** Advertising principles-steps in planning a retail advertising, campaign, advertising for the retail store.

**MEDIA AND COPY DECISIONS :** Media objectives-planning and budgeting-advertising, evaluationcreating and producing copy-copy testing.

**RETAIL PROMOTIONAL STRATEGY :** Promotional objectives, promotional budget, selecting the promotional mix, implementing the promotional mix.

**MANAGEMENT OF SALES PROMOTION :** Role of sales promotion-types of sales promotion evaluating sales promotion.

**PERSONAL SELLING AND PUBLICITY**: Publicity and special events-role of personal selling in retailingprocess in personal selling.

#### UNIT-IV

**INFORMATION TECHNOLOGY IN RETAIL MANAGEMENT :** Influencing parameters for use of IT in retailing, IT application for retail, issues concerning the use of internet and related technology to improve retail business, types on online retailing, effective management of online catalogues, direct retailing methods that involves technology such as interactive TV and mobile commerce, electronic data interchange, E-retailing strategies.

**INTERNATIONAL RETAILING :** Scope and concepts, assessing the potential of retail markets, methods of international retailing, accessing retail markets, the form of entry, joint ventures, franchising,

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acquisition etc-Competing in foreign markets( need and modes), competing in emerging foreign markets, retail structure, enterprise density, market concentration, product sector.

#### UNIT-V

#### **BRANDING OF APPARELS :**

**BRANDING**: What is a Brand, Brand Development: Extension, rejuvenation, re launch-product Vs brands, goods and services, Retailer anddistributors. Brand challenges and opportunities, brand equity concept, Identity and image. Brand Leveraging & Brand Performance- establishing a brand equity management system, measuring sources of brand equity and consumer mindset,Co-branding, celebrity endorsement. Brand positioning & brand building- brand knowledge, brand portfolios and market segmentation; Steps of brand building, Identifying and establishing brand positioning, defining and establishing brand values. Designing & sustaining branding strategies: Brand hierarchy, branding strategy, Brand Extension and brand transfer, Managing brand over time .

#### **TEXT BOOKS:**

- J.Paul Peter and Jerry L.Olson, "Consumer Behaviour and marketing Strategy", Tata Mcgraw Hill, New york, 2006.
- 2. Swapna pradhan, "Retailing Management : Text and Cases", 2<sup>nd</sup> edition, Tata McGraw hill, New Delhi, 2006.

#### **REFERENCE BOOKS:**

- 1. Patrick M Dunne, Robert F. Lusch and David A. Grififth-Retailing, Thomson Asia Pvt. Ltd. 2002.
- 2. Gillespie, Hecht and Lebowitz, "Retail Business Management", 3<sup>rd</sup> edition, McGraw Hill Book Company, 2002.

# 19TT434 PROCESS CONTROL AND QUALITY MANAGEMENT IN TEXTILES

#### Hours Per Week :

L	Т	Р	С
3	-	-	3

Total	Houre	٠
iotai	110013	

L	Т	Р	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	-	25	50	-	-	5	5

# COURSE DESCRIPTION AND OBJECTIVES:

To provide the knowledge of Process control and Quality control in Spinning. To educate the students about importance of Process Control in Winding and Warping process. To develop an understanding of various control of process and quality in Sizing. To understand the Quality Control procedures in Loom shed. To understand the scope of Process and Quality control in Textile Wet Processing.

## **COURSE OUTCOMES:**

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Understand the control measures in Yarn formation process.	1
2	Control the quality of Wound package and Warper's beam.	2
3	Standardized the processes conditions in Yarn sizing.	4
4	Identify the key areas in process control of Loom shed.	2
5	Plan for the production of quality finished fabric.	3

#### SKILLS:

- ✓ Control the proper mix in blow room.
- Control different process parameters in spinning.
- Effective control in sizing quality and production.
- ✓ Maintaining right quality in loom shed and processing.



SOURCE:

https:// www.textiletoday. com.bd/uster-theevolution-of-qualitymanagement.

# UNIT - I

**PQC IN SPINNING :** Scope, control of mixing quality, control of yarn realization (records and accounting), control of waste and cleaning in Blow room and card, process and quality control in draw frame, control of comber waste. Measurement and analysis of productivity means to improve productivity, process and quality control at simplex, process control at ring frame: control of yarn quality, count, strength and their variability, yarn unevenness and imperfections, yarn faults and package defects, implementation of process control in cotton spinning.

#### UNIT - II

#### INTRODUCTION TO PROCESS CONTROL IN WEAVING :

**PROCESS CONTROL IN WINDING :** Scope, optimizing of yarn tensioning and clearing (settings for different kinds of yarns) producing good package, breakage and snap study in autoconer (formats) approach to control of productivity.

**PROCESS CONTROL IN WARPING :** Scope, effort to minimize the breakage rate, quality of warper beams, breakage study in warping (norms), productivity, warping defects and remedies. Process control in Pirn winding; Scope, minimizing the end breaks, improving the build of the yarn, control of speed, productivity.

#### UNIT - III

**PROCESS CONTROL IN SIZING :** Scope, choice of size recipe and measurement of size pick up, control in size preparation, control of size pick up, controlling sizing conditions, stretch control in various zones, moisture control, quality of sized beams, positive feed to sow box, productivity, Dead loss and its control, hard waste and its control, testing of sized yarn. Selection of reeds and healds, care of reeds, effect of reed parameters on weaving performance.

#### UNIT-IV

APPROACH TO PROCESS CONTROL IN LOOM SHED : Non- auto and Auto: scope, control of speed, breakage and snap study in loom shed, Norms for breakage rate, No. of looms/operative, control of efficiency (concept of calculated and expected efficiency), control of loom stoppages (due to warp and weft break, shuttle change etc.).

#### UNIT - V

**PROCESS CONTROL IN WET PROCESSING**: Scope, 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 conc. In vat dye liquor. Process control in printing and finishing: Scope, approach to process control, test for the suitability of thickener in the print paste formation, iodine absorption test for the evaluation of degree of resign cross linking, fastness properties of dyed and printed goods to wash, light perspiration and water. Fastness to rubbing, hot press. Optimal brightness test for the uniformity of cross linking, assessment of degree of heat setting in polyester by lodine absorption method.

# **TEXT BOOKS :**

VFSTR

- 1. Process& Quality Control in Spinning ATIRA, 2014.
- 2. Process& Quality Control in Weaving ATIRA, 2015.
- 3 Process & Quality Control in Wet Processing ATIRA, 2014.

# **REFERENCE BOOKS:**

- 1. Handbook of Quality Control and Testing Grover & Hamby, Merrow Publishers, London, 2009.
- 2. Norms for Textile Industries : ATIRA, BTRA, SITRA & NITRA.

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