Program Educational Objectives:
Bachelor of Textile Technology curriculum is designed to prepare the graduates having attitude and knowledge to

I. Have successful professional and technical career
II. Have strong foundation in basic sciences, mathematics and computational platforms
III. Have knowledge on the theory and practices in the field of textile technology and allied areas
IV. Engross in life-long learning to keep themselves abreast of new developments
V. Practice and inspire high ethical values and technical standards

Program Outcome:
1. Ability to apply knowledge of mathematics, sciences and engineering
2. Ability to identify and characterize the textile fibres
3. Ability to understand and apply the technical knowledge for managing yarn and fabric manufacturing industry
4. Ability to apply technical knowledge for colouring of textiles and solve associated problems using the knowledge gained
5. Ability to test the textile products and design new products and processes
6. Ability to manage garment manufacturing industry
7. Ability to understand ethical and professional responsibilities
8. Ability to communicate effectively and work in interdisciplinary groups
9. Ability to review, comprehend and report technological development
# Mapping of Programme Educational Objective with Programme Outcomes

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5
# ANNA UNIVERSITY, CHENNAI
UNIVERSITY DEPARTMENTS
B. TECH. TEXTILE TECHNOLOGY
REGULATIONS – 2015
CHOICE BASED CREDIT SYSTEM
CURRICULA AND SYLLABI I – VIII SEMESTERS

## SEMESTER I

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## ENGINEERING SCIENCES (ES)

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## PROFESSIONAL CORE (PC)

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EMPLOYABILITY ENHANCEMENT COURSES (EEC)
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COURSE DESCRIPTION:
This course aims at developing the language skills necessary for the first year students of Engineering and Technology.

OBJECTIVES:
- To develop the four language skills – Listening, Speaking, Reading and Writing.
- To improve the students’ communicative competence in English.
- To teach students the various aspects of English language usage.

CONTENTS
UNIT I  GREETING AND INTRODUCING ONESELF  12
Listening- Types of listening – Listening to short talks, conversations; Speaking – Speaking about one’s place, important festivals etc. – Introducing oneself, one’s family/ friend; Reading – Skimming a passage– Scanning for specific information; Writing- Guided writing - Free writing on any given topic ( My favourite place/ Hobbies/ School life, writing about one’s leisure time activities, hometown, etc.); Grammar – Tenses (present and present continuous) -Question types - Regular and irregular verbs; Vocabulary – Synonyms and Antonyms.

UNIT II  GIVING INSTRUCTIONS AND DIRECTIONS  12
Listening – Listening and responding to instructions; Speaking – Telephone etiquette - Giving oral instructions/ Describing a process – Asking and answering questions; Reading – Reading and finding key information in a given text - Critical reading - Writing –Process description( non-technical)- Grammar – Tense (simple past& past continuous) - Use of imperatives – Subject – verb agreement – Active and passive voice; - Vocabulary – Compound words – Word formation – Word expansion ( root words).

UNIT III  READING AND UNDERSTANDING VISUAL MATERIAL  12
Listening- Listening to lectures/ talks and completing a task; Speaking –Role play/ Simulation – Group interaction; Reading – Reading and interpreting visual material; Writing- Jumbled sentences – Discourse markers and Cohesive devices – Essay writing (cause & effect/ narrative); Grammar – Tenses (perfect), Conditional clauses –Modal verbs; Vocabulary –Cause and effect words; Phrasal verbs in context.

UNIT IV  CRITICAL READING AND WRITING  12
Listening- Watching videos/ documentaries and responding to questions based on them; Speaking – Informal and formal conversation; Reading –Critical reading (prediction & inference); Writing– Essay writing ( compare & contrast/ analytical) – Interpretation of visual materials; Grammar – Tenses (future time reference); Vocabulary – One word substitutes (with meanings) – Use of abbreviations & acronyms – Idioms in sentences.

UNIT V  LETTER WRITING AND SENDING E-MAILS  12
Listening- Listening to programmes/broadcast/ telecast/ podcast; Speaking – Giving impromptu talks, Making presentations on given topics- Discussion on the presentation; Reading –Extensive reading; Writing– Poster making – Letter writing (Formal and E-mail) ; Grammar – Direct and Indirect speech – Combining sentences using connectives; Vocabulary –Collocation;

TEACHING METHODS:
Interactive sessions for the speaking module.
Use of audio – visual aids for the various listening activities.
Contextual Grammar Teaching.
EVALUATION PATTERN:
Internals – 50%
End Semester – 50%

TOTAL: 60 PERIODS

LEARNING OUTCOMES:
- Students will improve their reading and writing skills
- Students will become fluent and proficient in communicative English
- Students will be able to improve their interpersonal communication

TEXTBOOK:

REFERENCES:
3. Redston, Chris & Gillies Cunningham Face2Face (Pre-intermediate Student’s Book & Workbook) Cambridge University Press, New Delhi: 2005

MA7151 MATHEMATICS – I

(Course offered to all branches of B.E. /B.Tech. Programmes in I Semester)

COURSE OBJECTIVES
- The goal of this course is for students to gain proficiency in calculus computations. In calculus, we use three main tools for analyzing and describing the behavior of functions: limits, derivatives, and integrals. Students will use these tools to solve application problems in a variety of settings ranging from physics and biology to business and economics.
- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT I DIFFERENTIAL CALCULUS

- Representation of functions - New functions from old functions - Limit of a function - Limits at infinity - Continuity - Derivatives - Differentiation rules - Polar coordinate system - Differentiation in polar coordinates - Maxima and Minima of functions of one variable.

UNIT II FUNCTIONS OF SEVERAL VARIABLES


UNIT III INTEGRAL CALCULUS

(Continued on next page)
Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

UNIT IV MULTIPLE INTEGRALS

UNIT V DIFFERENTIAL EQUATIONS
Method of variation of parameters – Method of undetermined coefficients – Homogeneous equation of Euler’s and Legendre’s type – System of simultaneous linear differential equations with constant coefficients.

TOTAL: 60 PERIODS

COURSE OUTCOMES
- Understanding of the ideas of limits and continuity and an ability to calculate with them and apply them.
- Improved facility in algebraic manipulation.
- Fluency in differentiation.
- Fluency in integration using standard methods, including the ability to find an appropriate method for a given integral.
- Understanding the ideas of differential equations and facility in solving simple standard examples.

TEXT BOOKS

REFERENCE BOOKS

PH7151 ENGINEERING PHYSICS
(Common to all branches of B.E / B.Tech programmes)

OBJECTIVE:
- To introduce the concept and different ways to determine moduli of elasticity and applications.
- To instill the concept of sound, reverberation, noise cancellation, and ultrasonic generation, detection and applications.
- To inculcate an idea of thermal properties of materials, heat flow through materials and quantum physics.
• To promote the basic understanding of interferometers, principles and applications of lasers, optical fibers and sensors
• To establish a sound grasp of knowledge on the basics, significance and growth of single crystals

UNIT I PROPERTIES OF MATTER

UNIT II ACOUSTICS AND ULTRASONICS

UNIT III THERMAL AND MODERN PHYSICS

UNIT IV APPLIED OPTICS

UNIT V CRYSTAL PHYSICS
Single crystalline, polycrystalline and amorphous materials – Single crystals: unit cell, crystal systems, Bravais lattices, ditections and planes in a crystal, Miller indices - interplanar distance for a cubic crystal - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - structure and significance of NaCl, CsCl, ZnS and graphite - crystal imperfections: point defects, line defects – Burger vectors, dislocations and stacking faults – Growth of single crystals: Bridgman and Czochralski methods.

TOTAL: 45 PERIODS

OUTCOME:
• The students will understand different moduli of elasticity, their determination and applications.
• The students will gain knowledge on the properties of sound, noise cancellation, and production, detection and applications of ultrasonics
• The students will acquire sound knowledge on thermal expansion and thermal conductivity of materials. Further they will gain an idea of quantum physics.
• The students will gain knowledge on interferometers, lasers and fiber optics
• The students will secure knowledge on the basics of crystal structures and their significance. Further they gain basic ideas of growing single crystals.

TEXTBOOKS:

REFERENCES:

CY7151 ENGINEERING CHEMISTRY L T P C
3 0 0 3

COURSE OBJECTIVES
• To develop an understanding about fundamentals of polymer chemistry.
• Brief elucidation on surface chemistry and catalysis.
• To develop sound knowledge photochemistry and spectroscopy.
• To impart basic knowledge on chemical thermodynamics.
• To understand the basic concepts of nano chemistry.

UNIT I POLYMER CHEMISTRY
Introduction: Functionality-degree of polymerization. Classification of polymers- natural and synthetic, thermoplastic and thermosetting. Types and mechanism of polymerization: addition (free radical, cationic, anionic and living); condensation and copolymerization. Properties of polymers: Tg, tacticity, molecular weight-weight average, number average and polydispersity index. Techniques of polymerization: Bulk, emulsion, solution and suspension.

UNIT II SURFACE CHEMISTRY AND CATALYSIS

UNIT III PHOTOCHEMISTRY AND SPECTROSCOPY

UNIT IV CHEMICAL THERMODYNAMICS
Second law: Entropy-entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions; Free energy and work function: Helmholtzand Gibbs free energy functions; Criteria of spontaneity; Gibbs-Helmholtz equation; Clausius Clapeyron equation; Maxwell relations-Van’t Hoff isotherm and isochore. Chemical potential; Gibbs-Duhem equation- variation of chemical potential with temperature and pressure.

UNIT V NANO CHEMISTRY
COURSE OUTCOMES
- Will be familiar with polymer chemistry, surface chemistry and catalysis.
- Will know the photochemistry, spectroscopy and chemical thermodynamics.
- Will know the fundamentals of nano chemistry.

TEXT BOOKS

REFERENCE BOOKS

GE7152 ENGINEERING GRAPHICS

OBJECTIVES
• To develop in students, graphic skills for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION) 1
Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES AND FREE HANDSKETCHING
Basic Geometrical constructions, Curves used in engineering practices-Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Visualization concepts and Free Hand sketching: Visualization principles – Representation of Three Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES
Orthographic projection- principles-Principal planes-First angle projection-Projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes- Determination of true lengths and true inclinations by rotating line method and trapezoidal method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS
Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to both the principal planes by rotating object method and auxiliary plane method.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES
Sectioning of solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section.

Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS

Principles of isometric projection – isometric scale – Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems.
Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method and vanishing point method.

COMPUTER AIDED DRAFTING (DEMONSTRATION ONLY) 3
Introduction to drafting packages and demonstration of their use.

L=45+T=30, TOTAL: 75 PERIODS

OUTCOMES:
On Completion of the course the student will be able to
• Perform free hand sketching of basic geometrical shapes and multiple views of objects.
• Draw orthographic projections of lines, Planes and Solids
• Obtain development of surfaces.
• Prepare isometric and perspective views of simple solids.

TEXT BOOK:

REFERENCES:

Publication of Bureau of Indian Standards:

Special points applicable to University Examinations on Engineering Graphics:
1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day.
BS7161  BASIC SCIENCES LABORATORY  L T P C
(Common to all branches of B.E. / B.Tech Programmes)  0 0 4 2

PHYSICS LABORATORY: (Any Seven Experiments)

OBJECTIVE:

- To inculcate experimental skills to test basic understanding of physics of materials including properties of matter, thermal and optical properties.
- To induce the students to familiarize with experimental determination of velocity of ultrasonic waves, band gap determination and viscosity of liquids.

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of disc
2. Non-uniform bending - Determination of young's modulus
3. Uniform bending – Determination of young’s modulus
4. Lee’s disc Determination of thermal conductivity of a bad conductor
5. Potentiometer-Determination of thermo e.m.f of a thermocouple
6. Laser- Determination of the wave length of the laser using grating
7. Air wedge - Determination of thickness of a thin sheet/wire
8. a) Optical fibre - Determination of Numerical Aperture and acceptance angle
    b) Compact disc- Determination of width of the groove using laser.
10. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids
11. Post office box - Determination of Band gap of a semiconductor.
13. Viscosity of liquids - Determination of co-efficient of viscosity of a liquid by Poiseuille’s flow

TOTAL: 30 PERIODS

OUTCOME:
Upon completion of the course, the students will be able

- To determine various moduli of elasticity and also various thermal and optical properties of materials.
- To determine the velocity of ultrasonic waves, band gap determination and viscosity of liquids.

CHEMISTRY LABORATORY:

(Minimum of 8 experiments to be conducted)

1. Estimation of HCl using Na₂CO₃ as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler’s method.
4. Determination of chloride content of water sample by argentometric method.
5. Estimation of copper content of the given solution by iodometry.
6. Determination of strength of given hydrochloric acid using pH meter.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Estimation of iron content of the given solution using potentiometer.
9. Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline/thiocyanate method).
10. Estimation of sodium and potassium present in water using flame photometer.
12. Pseudo first order kinetics-ester hydrolysis.
14. Determination of CMC.
15. Phase change in a solid.
TEXTBOOKS

GE7162 ENGINEERING PRACTICES LABORATORY
(Common to all Branches of B.E. / B.Tech. Programmes) 0 0 4 2

COURSE OBJECTIVES
• To provide exposure to the students with hands-on experience on various Basic Engineering Practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP – A (CIVIL & ELECTRICAL)
1. CIVIL ENGINEERING PRACTICES 15
   PLUMBING
   • Basic pipe connections involving the fittings like valves, taps, coupling, unions, reducers, elbows and other components used in household fittings. Preparation of plumbing line sketches.
   • Laying pipe connection to the suction side of a pump.
   • Laying pipe connection to the delivery side of a pump.
   • Practice in connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.
   WOOD WORK
   • Sawing, planing and making joints like T-Joint, Mortise and Tenon joint and Dovetail joint.
   STUDY
   • Study of joints in door panels and wooden furniture
   • Study of common industrial trusses using models.

2. ELECTRICAL ENGINEERING PRACTICES 15
   • Basic household wiring using Switches, Fuse, Indicator and Lamp etc.,
   • Stair case light wiring
   • Tube – light wiring
   • Preparation of wiring diagrams for a given situation.
   • Study of Iron-Box, Fan Regulator and Emergency Lamp

GROUP – B (MECHANICAL AND ELECTRONICS)
3. MECHANICAL ENGINEERING PRACTICES 15
   WELDING
   • Arc welding of Butt Joints, Lap Joints, and Tee Joints
   • Gas welding Practice.
   • Basic Machining - Simple turning, drilling and tapping operations..
   • Study and assembling of the following:
     a. Centrifugal pump
     b. Mixie
     c. Air Conditioner.

   DEMONSTRATION ON FOUNDRY OPERATIONS.

4. ELECTRONIC ENGINEERING PRACTICES 15
   • Soldering simple electronic circuits and checking continuity.
   • Assembling electronic components on a small PCB and Testing.
   • Study of Telephone, FM radio and Low Voltage Power supplies.
COURSE OUTCOMES

- Ability to fabricate carpentry components and to lay pipe connections including plumbing works.
- Ability to use welding equipments to join the structures
- Ability to do wiring for electrical connections and to fabricate electronics circuits.

MA7251 MATHEMATICS – II

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(Common to all branches of B.E. /B.Tech. Programmes in II Semester)

COURSE OBJECTIVES

- To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
- To acquaint the student with the concepts of vector calculus, needed for problems in all engineering disciplines.
- To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow of electric current.
- To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

UNIT I MATRICES 12


UNIT II VECTOR CALCULUS 12

Gradient and directional derivative – Divergence and Curl – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green’s, Gauss divergence and Stoke’s theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT III ANALYTIC FUNCTION 12

Analytic functions – Necessary and sufficient conditions for analyticity - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions \( w = z + c, \frac{1}{z}, az, z^2 \) - Bilinear transformation.

UNIT IV COMPLEX INTEGRATION 12


UNIT V LAPLACE TRANSFORMS 12


TOTAL : 60 PERIODS
COURSE OUTCOMES
Upon successful completion of the course, students should be able to:

- Evaluate real and complex integrals using the Cauchy integral formula and the residue theorem
- Appreciate how complex methods can be used to prove some important theoretical results.
- Evaluate line, surface and volume integrals in simple coordinate systems
- Calculate grad, div and curl in Cartesian and other simple coordinate systems, and establish identities connecting these quantities
- Use Gauss, Stokes and Greens theorems to simplify calculations of integrals and prove simple results.

TEXT BOOKS

REFERENCE BOOKS

HS7251 TECHNICAL ENGLISH L T P C
4 0 0 4

OBJECTIVES
- To enable students acquire proficiency in technical communication.
- To enhance their reading and writing skills in a technical context.
- To teach various language learning strategies needed in a professional environment.

CONTENTS
UNIT I ANALYTICAL READING
Listening- Listening to informal and formal conversations; Speaking – Conversation Skills(opening, turn taking, closing )-explaining how something works-describing technical functions and applications;Reading –Analytical reading, Deductive and inductive reasoning; Writing- vision statement–structuring paragraphs.

UNIT II SUMMARISING
Listening- Listening to lectures/ talks on Science & Technology;Speaking –Summarizing/ Oral Reporting, Reading – Reading Scientific and Technical articles; Writing- Extended definition –Lab Reports – Summary writing.

UNIT III DESCRIBING VISUAL MATERIAL
Listening- Listening to a panel discussion; Speaking – Speaking at formal situations; Reading – Reading journal articles - Speed reading;Writing-data commentary-describing visual material-writing problem-process- solution-the structure of problem-solution texts- writing critiques
UNIT IV    WRITING/ E-MAILING THE JOB APPLICATION
Listening: Listening to/ Viewing model interviews; Speaking – Speaking at different types of interviews – Role play practice (mock interview); Reading – Reading job advertisements and profile of the company concerned; Writing – job application – cover letter – Résumé preparation.

UNIT V REPORT WRITING
Listening – Viewing a model group discussion; Speaking – Participating in a discussion - Presentation; Reading – Case study - analyse - evaluate – arrive at a solution; Writing – Recommendations - Types of reports (feasibility report)- designing and reporting surveys - Report format. - writing discursive essays.

TEACHING METHODS:
Practice writing
Conduct model and mock interview and group discussion.
Use of audio – visual aids to facilitate understanding of various forms of technical communication. Interactive sessions.

EVALUATION PATTERN:
Internals – 50%
End Semester – 50%

TOTAL: 60 PERIODS

LEARNING OUTCOMES
- Students will learn the structure and organization of various forms of technical communication.
- Students will be able to listen and respond to technical content.
- Students will be able to use different forms of communication in their respective fields.

TEXTBOOK:

REFERENCES:

PH7257  PHYSICS OF MATERIALS  L T P C
(3 0 0 3)
Textile, Apparel, Industrial Biotechnology, Pharmaceutical and PET

OBJECTIVE:
- To make the students to understand the basics of phase diagrams and various materials preparation techniques
- To equip the students to have a knowledge on different types of electron theory, basics of quantum mechanics and about superconductors
- To introduce the physics of semiconducting materials and applications of semiconductors in device fabrication

25
• To familiarize the students with the theory and applications of magnetic and dielectric materials
• To provide the students a sound platform towards learning about advanced materials and their applications.

UNIT I  PREPARATION OF MATERIALS  9

UNIT II  ELECTRICAL AND SUPERCONDUCTING MATERIALS  9

UNIT III  SEMICONDUCTING MATERIALS  9

UNIT IV  DIELECTRIC AND MAGNETIC MATERIALS  9

UNIT V  NEW MATERIALS AND APPLICATIONS  9

TOTAL: 45 PERIODS

OUTCOME:
On completion of the course, the students will be able to
• acquire knowledge of phase diagram, and thin film and nanomaterial preparation techniques
• familiarize with conducting materials, basic quantum mechanics, and properties and applications of superconductors.
• gain knowledge on semiconducting materials based on energy level diagrams, its types, temperature effect. Also, fabrication methods for semiconductor devices will be understood.
• realize with theories and applications of dielectric and ferromagnetic materials
• familiarize with ceramics, composites, metallic glasses, shape memory alloys, biomaterials and their important applications.
REFERENCES:

OBJECTIVE
- The students should be conversant with
- boiler feed water requirements, water treatment techniques,
- Applications of oil and its properties, principles of different chemical analysis.
- Different kinds of preparations of important chemicals.

UNIT I   WATER TECHNOLOGY

UNIT II   OILS, FATS, SOAPS & LUBRICANTS
Chemical constitution, chemical analysis of oils and fats – free acid, saponification and iodine values, definitions, determinations and significance.Soaps and detergents - cleaning action of soap. Lubricants - definition, characteristics, types and properties – viscosity, viscosity index, carbon residue, oxidation stability, flash and fire points, cloud and pour points, aniline point. Solid lubricants – graphite and molybdenum disulphide.

UNIT III CHEMICAL ANALYSIS – AN ANALYTICAL INSIGHT

UNIT IV   DYE CHEMISTRY
Witt’s theory and modern theory of colors – synthesis of methyl red, methyl orange, congo red, malachite green, p-rosaniline, phenolphthalein, fluorescence, eosin dyes.

UNIT V   CHEMICALS AND AUXILIARIES

TOTAL: 45 PERIODS

OUTCOME
- Will be familiar with boiler feed water requirements, water treatment techniques.
- Will know the oil and its properties, principles of different chemical analysis.
- Will know the preparations of important chemicals.

TEXT BOOKS
GE7153 ENGINEERING MECHANICS

L T P C
4 0 0 4

OBJECTIVE:
The objective of this course is to inculcate in the student the ability to analyze any problem in a simple and logical manner and to predict the physical phenomena and thus lay the foundation for engineering applications.

UNIT I  STATICS OF PARTICLES 12

UNIT II  EQUILIBRIUM OF RIGID BODIES 12

UNIT III  DISTRIBUTED FORCES 16
Centroids of lines and areas – symmetrical and unsymmetrical shapes, Determination of Centroids by Integration, Theorems of Pappus-Guldinus, Distributed Loads on Beams, Center of Gravity of a Three-Dimensional Body, Centroid of a Volume, Composite Bodies, Determination of Centroids of Volumes by Integration. Moments of Inertia of Areas and Mass - Determination of the Moment of Inertia of an Area by Integration, Polar Moment of Inertia, Radius of Gyration of an Area, Parallel-Axis Theorem, Moments of Inertia of Composite Areas, Moments of Inertia of a Mass - Moments of Inertia of Thin Plates, Determination of the Moment of Inertia of a Three-Dimensional Body by Integration.

UNIT IV  FRICTION 8

UNIT V  DYNAMICS OF PARTICLES 12

L – 45 + T – 15 TOTAL: 60 PERIODS
OUTCOMES:
• Upon completion of this course, students will be able to construct meaningful
  mathematical models of physical problems and solve them.

TEXT BOOK

REFERENCES

GE7151 COMPUTING TECHNIQUES
(Common to all branches of Engineering and Technology) 3 0 0 3

OBJECTIVES:
• To learn programming using a structured programming language.
• To provide C programming exposure.
• To introduce foundational concepts of computer programming to students of different
   branches of Engineering and Technology.

UNIT I INTRODUCTION
Introduction to Computers – Computer Software – Computer Networks and Internet - Need for logical thinking – Problem formulation and development of simple programs - Pseudo code - Flow Chart and Algorithms.

UNIT II C PROGRAMMING BASICS

UNIT III ARRAYS AND STRINGS

UNIT IV POINTERS
Macros - Storage classes –Basic concepts of Pointers– Pointer arithmetic - Example Problems - Basic file operations

UNIT V FUNCTIONS AND USER DEFINED DATA TYPES

OUTCOMES
At the end of the course, the student should be able to:
• Write C program for simple applications
• Formulate algorithm for simple problems
• Analyze different data types and arrays
• Perform simple search and sort.
• Use programming language to solve problems.

TEXTBOOKS:

REFERENCES:

CY7261 APPLIED CHEMISTRY LABORATORY

OBJECTIVE
• To make the student acquire practical skills in the wet chemical and instrumental methods for quantitative estimation of nitrite in water, cement, oil, coal, Phenol

LIST OF EXPERIMENTS
1. Determination of Redwood / Saybolt numbers, kinematic viscosity and viscosity index of lubricating oils
2. Determination of flash point, fire point, cloud and pour point of oils
3. Determination of acid value, iodine value of oils and saponification value.
4. Determination of COD of water samples
5. Determination of total, temporary & permanent hardness of water by EDTA method. Estimation of HCl using Na₂CO₃ as primary standard and determination of alkalinity in water sample.
6. Determination of purity of washing soda and strength of a commercial acid
7. Estimation of available chlorine in hypochlorite solution
8. Estimation of strength of hydrogen peroxide
10. Determination of Calorific value using Bomb calorimeter

TOTAL: 60 PERIODS

OUTCOME
• Familiarization with equipment like viscometers, flash and fire point apparatus etc
• Familiarization of methods for determining COD
• Familiarization of a few simple synthetic techniques for soap

TEXT BOOKS
OBJECTIVES

- To understand the basic programming constructs and articulate how they are used to develop a program with a desired runtime execution flow.
- To articulate where computer programs fit in the provision of computer-based solutions to real world problems.
- To learn to use user defined data structures.

LIST OF EXPERIMENTS

1. Search, generate, manipulate data using MS office/ Open Office
2. Presentation and Visualization – graphs, charts, 2D, 3D
3. Problem formulation, Problem Solving and Flowcharts
4. C Programming using Simple statements and expressions
5. Scientific problem solving using decision making and looping.
6. Simple programming for one dimensional and two dimensional arrays.
7. Solving problems using String functions
8. Programs with user defined functions
9. Program using Recursive Function
10. Program using structures and unions.

TOTAL: 60 PERIODS

OUTCOMES

At the end of the course, the student should be able to:

- Write and compile programs using C programs.
- Write program with the concept of Structured Programming
- Identify suitable data structure for solving a problem
- Demonstrate the use of conditional statement.

LABORATORY REQUIREMENTS FOR BATCH OF 30 STUDENTS

30 Systems with C compiler

MA7357  PROBABILITY AND STATISTICS  L  T  P  C
(Branch specific course)  4  0  0  4

OBJECTIVES:

- To make the students acquire a sound knowledge in statistical techniques that model engineering problems.
- The Students will have a fundamental knowledge of the concepts of probability.

UNIT I  RANDOM VARIABLES
Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma, Weibull and Normal distributions - Functions of a random variable.

UNIT II  TWO-DIMENSIONAL RANDOM VARIABLES
Joint distributions – Marginal and conditional distributions – Covariance – Correlation and Linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

UNIT III  TESTS OF SIGNIFICANCE
Sampling distributions - Tests for single mean, proportion, Difference of means (large and small samples) – Tests for single variance and equality of variances – $\chi^2$- test for goodness of fit –
Independence of attributes – Non-parametric tests: Test for Randomness and Rank - sum test (Wilcoxon test).

UNIT IV DESIGN OF EXPERIMENTS 12
Completely randomized design – Randomized block design – Latin square design - $2^2$ - factorial design - Taguchi’s robust parameter design.

UNIT V STATISTICAL QUALITY CONTROL 12
Control charts for measurements ($\bar{X}$ and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits - Acceptance sampling.

TOTAL : 60 PERIODS

OUTCOMES:
- Students will be able characterize probability models using probability mass (density) functions & cumulative distribution functions.
- The students can independently participate in the processes of analysis, planning, formulating strategies of development, decision-making, governing and management, and independent making of tactical and strategic decisions related to the statistics.

TEXT BOOKS:

REFERENCES:

EE7254 PRINCIPLES OF ELECTRICAL AND ELECTRONICS ENGINEERING L T P C 3 0 0 3

OBJECTIVES:
To impart knowledge on
- Electric circuit laws , single and three phase circuits and wiring
- Working principles of Electrical Machines
- Various electronic devices and measuring instruments

UNIT I ELECTRICAL CIRCUITS 9
Basic principles involved in power generation, transmission and distribution, Ohms Law, Kirchoff’s Law , steady state solution of DC circuits , Thevinin’s Theorem, Norton’s Theorem, Superposition Theorem.

UNIT II AC CIRCUITS 9
Introduction to AC circuits – waveforms and RMS value – power and power factor, single phase and three-phase balanced circuits, housing wiring, industrial wiring, materials of wiring.
UNIT III  ELECTRICAL MACHINES  
9  
Principles of operation and characteristics of DC machines. Transformers (single and three phase ), Synchronous machines, three phase and single phase induction motors.

UNIT IV  ELECTRONIC DEVICES & CIRCUITS  
9  

UNIT V  MEASUREMENTS & INSTRUMENTATION  
9  
Introduction to transducers: pressure, temperature, position, electrical measurements, Classification of instruments – moving coil and moving iron Ammeter and Voltmeter – multimeters – dynamometer type Wattmeter – three-phase power measurements – energy meter – megger – instrument transformers (CT and PT )

OUTCOMES:
Ability to
- Understand electric circuits and working principles of electrical machines
- Understand the concepts of various electronic devices
- Choose appropriate instruments for electrical measurement for a specific application

REFERENCES

TT 7301  FUNDAMENTALS OF POLYMER CHEMISTRY  
L T P C  
3 0 0 3

OBJECTIVES:
To enable the students to understand the
- Various polymerization techniques
- Fibre forming polymer characteristics and evaluation techniques
- Processing of regenerated fibres
- Need of various additives in polymer processing

UNIT I  
Introduction to natural and synthetic polymers; terms and fundamental concepts; step- growth polymerization, Carother’s equation, functionality, crosslinking; PET manufacturing; chain growth polymerization, free radical polymerization, kinetics of free-radical initiation, termination, chain transfer, Mayo’s equation, cage effect, auto acceleration inhibition and retardation

UNIT II  
Polypropylene manufacturing; acrylic manufacturing; atom transfer radical polymerization, ionic polymerization, ring opening polymerization; Nylon-6 manufacturing; co-polymerization and its importance; copolymer equation, reactivity ratio, tailor making of copolymer properties; techniques of chain polymerization; bulk, solution, emulsion, micro emulsion and suspension polymerization; chemical modification of fibres; polymer solution, Flory’s theory; Interaction parameter
UNIT III
Molecular weight and its distribution by: end group analysis, osmometry, light scattering, ultra centrifugation, gel permeation chromatography, intrinsic viscosity; spectroscopic methods of polymer characterization using FT-IR, UV-VIS and NMR spectroscopy, DTA, TGA and DSC

UNIT IV
Compounding of polymers - fillers, plasticizers, antioxidants, UV stabilizers, colouring agents and flame retardants; polymer processing - compression, moulding, injection, extrusion, calendaring and film casting; preparation and properties of polyesters, polyamides, epoxy and silicone polymers; conductive polymers, super absorbent polymers.

UNIT V
Recycling, remoulding, depolymerisation, incineration, biodegradable polymers

OUTCOMES:
Upon completion of this course, the student shall be able to
- Understand the various techniques in polymerization
- Understand synthesis of few important polymers used in textile industry
- Correlate the physical properties of polymer and additives with the microstructure and properties of polymer.

REFERENCES
UNIT II  GINNING AND BLOWROOM MACHINERY  
Description and working of different types of gins; ginning performance on yarn quality; objectives, principle and description of opening, cleaning and blending machines used in blowroom; chute feed; cleaning efficiency, production calculations.

UNIT III  CARDING MACHINE  
Objectives and principle of carding; detailed study of flat card; autolevelling; card clothing and its maintenance; production calculation

UNIT IV  COMBER  
Objectives and detailed study of comber preparatory machines; objectives and principles of combing; sequence of combing operation; combing efficiency and production calculation

UNIT V  DRAWFRAME AND ROVING MACHINE  
Tasks of drawing machine; drafting systems used in modern drawing machines; autolevelling; draft and production calculation; objectives of roving machine; working of roving machine; bobbin builder mechanism ; draft, twist and production calculations; safety measures at pre-spinning processes – equipments used, safety practices

OUTCOMES:  
Upon completion of this course, the student shall be able to  
- Understand the processes involved in the conversion of fibre to roving  
- Understand the functioning of different types of pre spinning machines  
- Select suitable machine and process variables at different pre-processes of yarn spinning to produce better quality yarn with maximum productivity and  
- Design processes for producing yarn of required parameters.

REFERENCES  

TT7303  TECHNOLOGY OF PRE WEAVING PROCESS  
L T P C  
3 0 0 3  
OBJECTIVES:  
- To enable the students to understand the theory of preparation of yarn for fabric formation and functioning of various preparatory machines
UNIT I  BASICS OF WINDING  9
Objects of winding; principles of cheese and cone winding machines; uniform build of yarn package; types of drums – half accelerated and fully accelerated drums; control of balloons; Classification of yarn faults and its removal; concepts in yarn clearing – mechanical, optical and electronic clearers; knotters and splicers

UNIT II  PROCESS CONTROL IN WINDING  9
Faults in wound packages, their causes and remedies; winding synthetic and blended yarns; weft winding; winding for colouration; quality of knots and splices; study of modern automatic winders. Winding performance; productivity; maintenance; quality control; material handling

UNIT III  WARPING AND SIZING  9
Objectives of warping, material flow in beam warping and creels used in warping machines; sectional warping machines; objectives of sizing; sizing materials and recipe used for different types of fibres; size preparation equipment; sizing machines; sizing filament yarns; concept of single end sizing, combined dyeing and sizing. Control concepts in modern sizing; energy conservation in sizing; Sizing defects and production calculations

UNIT IV  PROCESS CONTROL IN WARPING AND SIZING  13
Process control in warping (production calculation, machine and labour productivity, control of end breaks, quality and hard waste in warping); Control systems used in sizing machine

UNIT V  DRAWING-IN  5
Need for drawing-in operation; manual and automatic drawing- in, leasing, knotting and pinning machines; selection and care of reeds, healds and drop pins, control of cross ends and extra ends and calculations; safety measures at pre-weaving processes – equipments used, safety practices

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the student shall know various preparatory processes and controlling of process variables at preparatory to achieve the fabric with required qualities.

REFERENCES

TT7351  CHARACTERISTICS OF TEXTILE FIBRES  L T P C  4 0 0 4

OBJECTIVES:
To enable the students to understand the
- Structure and morphology of textile fibres
- Physical characteristics textile fibres
UNIT I  STRUCTURE OF FIBRES  12
Classification of fibres; study of morphological structures of fibers; physical properties of fibres.
order and disorder in fibre structure; molecular conformations – planar zig-zag, helical, lamellar,
and sphrulite conformations.

UNIT II  STRUCTURE INVESTIGATION TECHNIQUES  6
Transmission and Scanning electron microscopes-principle; construction and working; X-ray
diffraction techniques – estimation of crystallinity; Infrared radiation and dichroism techniques;
chemical element and group identification by transmittance and optical density methods, molecular
orientation estimation

UNIT III  MOISTURE ABSORPTION CHARACTERISTICS  12
Theories of moisture sorption; Moisture absorption behavior of natural and man-made fibres;
influence of fibre structure, humidity and temperature on the moisture absorption; conditioning of
Heat of sorption – integral and differential, their relation; factors influencing heat of sorption -
measurement of heat of sorption

UNIT IV  TENSILE AND ELONGATION CHARACTERISTICS OF FIBRES  18
Tensile characteristics – study of strength, elongation, work of rupture, initial modulus, work factor
and yield point – determination of yield point. Stress-strain relations of natural and manmade fibres -
influence of fibre structure, humidity and temperature on tensile characteristics. Time effects-
Study of creep phenomena. Elastic recovery and its relation to stress and strain of fibres;
mechanical conditioning of fibres and its influence on elastic recovery. Load cycling and extension
cycling-their effect on elastic recovery. Introduction about torsional and flexural rigidity of fibers

UNIT V  OPTICAL, FRICTIONAL, AND THERMAL CHARACTERISTICS  12
Reflexion and Lustre-objective and subjective methods of measurement - refractive index and its
measurement - birefringence, factors influencing birefringence - Absorption and dichroism
Friction – static, limiting and kinetic friction, its measurement, comparison of fibres, directional
friction in wool – friction. Thermal transitions of fibres - thermal conductivity, thermal expansion
and contraction, Tg, melting; static electricity in textile fibres

OUTCOME:
Upon completion of this course, the student shall be able to

- Correlate the physical properties of fibre to its microstructure and its influence on other
  characteristics
- Choose appropriate fibre for the required property

REFERENCES
   1870812379
   ISBN:0824794737
EE7261 ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY  

OBJECTIVE:
- To train the students in performing various tests on electrical drives, sensors and circuits.

LIST OF EXPERIMENTS:
1. Load test on separately excited DC shunt generator
2. Load test on DC shunt motor
3. Load test on S Transformer
4. Load test on Induction motor
5. Regulation of 3 Alternator
6. Study of CRO
7. Logic gates
8. Operational amplifiers
9. Time constant of RC circuit
10. Characteristics of LVDT
11. Calibration of Rotometer
12. RTD and Thermistor
13. Flapper Nozzle system

TOTAL: 60 PERIODS

TT 7311 PRE SPINNING PROCESS LABORATORY  

OBJECTIVES:
To enable the students to
- Get practical experience in the pre spinning machines
- Learn material passage in the machine and identify the parts of machine
- Do production, draft and twist calculations.

LIST OF EXPERIMENTS
1. Construction details of blow room machines and material passage
2. Cleaning efficiency and production calculations in blow room
3. Construction details of carding machine and the material passage
4. Draft and production calculations in carding machine
5. Wire point specifications and settings in carding machine
6. Construction details of drawing machine, material passage, draft and production calculations
7. Construction details of comber and material passage
8. Combing cycle, draft and production calculations
9. Construction details of roving machine, material passage
10. Draft, Twist and production calculations in roving machine
11. Study of builder mechanism of roving machine
12. Determination of degree of openness of fibre at blow room

TOTAL: 60 PERIODS
13. Determination of neps present in the card and comber web

OUTCOMES:
Upon completion of this course, the student shall be able to
- Understand the material passage in the machine, draw gearing diagram, identify the components of blow room, carding machine, draw frame, comber and speed frame
- Calculate draft, twist and production rate
- Calculate the number of teeth in change wheels for the required draft and twist

TOTAL: 60 PERIODS

MA7354 NUMERICAL METHODS

OBJECTIVES:
- To provide the mathematical foundations of numerical techniques for solving linear system, eigenvalue problems, interpolation, numerical differentiation and integration and the errors associated with them;
- To demonstrate the utility of numerical techniques of ordinary and partial differential equations in solving engineering problems where analytical solutions are not readily available.

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS

UNIT II INTERPOLATION AND APPROXIMATION
Interpolation with unequal intervals - Lagrange interpolation – Newton’s divided difference interpolation – Cubic Splines - Interpolation with equal intervals - Newton’s forward and backward difference formulae – Least square method - Linear curve fitting.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS
Finite difference methods for solving two-point linear boundary value problems - Finite difference techniques for the solution of two dimensional Laplace’s and Poisson’s equations on rectangular domain – One dimensional heat-flow equation by explicit and implicit (Crank-Nicholson) methods - One dimensional wave equation by explicit method.

OUTCOMES:
- Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions.
- Apply numerical methods to obtain approximate solutions to mathematical problems.

TOTAL: 60 PERIODS
• Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.
• Analyse and evaluate the accuracy of common numerical methods.

TEXT BOOKS:

REFERENCES:

CH7351 SOLID MECHANICS FOR TECHNOLOGISTS L T P C
3 0 0 3

AIM
To give them knowledge on structural, Mechanical properties of Beams, columns.

OBJECTIVES
• The students will be able to design the support column, beams, pipelines, storage tanks and reaction columns and tanks after undergoing this course. This is precursor for the study on process equipment design and drawing.

UNIT I STRESS, STRAIN AND DEFORMATION OF SOLIDS

UNIT II TRANSVERSE LOADING ON BEAMS

UNIT III DEFLECTIONS OF BEAMS
Double integration method – Macaulay’s method – Area – moment theorems for computation of slopes and deflections in beams.

UNIT IV STRESSES IN BEAMS

UNIT V TORSION AND COLUMNS
Torsion of circular shafts – derivation of torsion equation (T/J = fs/R = C8/L) – stress and deformation in circular and hollow shafts – stresses and deformation in circular and hollow shafts
– stepped shafts – shafts fixed at both ends – stresses in helical springs – deflection of springs – spring constant. Axially loaded short columns – columns of unsymmetrical sections
– Euler’s theory of long columns – critical loads for prismatic columns with different end conditions – effect of eccentricity.

TOTAL : 45 PERIODS

OUTCOMES:
• Solve the problems related to the structural components under various loading conditions

TEXT BOOKS

REFERENCES

OBJECTIVES:
To enable the students to learn the
• Basics of weaving machine and important motions of looms
• Selection and control of process variables during fabric formation

UNIT I  INTRODUCTION TO WEAVING
Yarns quality requirements for high speed automatic shuttle looms and shuttle less loom; warp and weft preparation for high speed looms; principle of weaving with hand and power looms, passage of material, motions in loom – primary, secondary and auxiliary motions, plain power loom driving, timing of motions.

UNIT II  SHEDDING MOTIONS
Shed geometry and shedding requirement; types of shed; shedding mechanisms - positive and negative; principles of tappet, dobby and jacquard shedding mechanisms; reversing mechanisms; limitations of various shedding mechanisms; conventional and modern dobby and jacquard mechanism.

UNIT III  WEFT INSERTION AND BEAT UP
Shuttle picking and checking mechanisms, shuttle flight and timing; weft feeder – types, principles of weft insertions in shuttle less looms; mechanism of weft insertion by projectile, rapier loom and jet looms – air and water; multi-phase weaving systems; kinematics of sley, sley eccentricity; beat up mechanism in modern looms

UNIT IV  SECONDARY AND AUXILLARY MOTIONS LOOMS
Take up and let - off motions used in plain power looms; cloth formation, weaving condition-factors and control; warp protector and warp and weft stop motion; plain power loom accessories; automatic weft replenishment in shuttle looms – pinn changing and shuttle changing looms; mechanisms involved in automatic pinn changing – feelers, cutters, design of shuttle, three try motions; multi shuttle looms- box changing principle, automatic pinn changing in multi shuttle loom; weft arrival control and automation in shuttle less looms; selvedges in shuttle less looms; quick style change.
UNIT V  PROCESS CONTROL & SPECIAL WEAVING PROCESS  12
Techno economics of shuttle less loom weft insertion systems; loom monitoring and control; loom stoppages and efficiency; fabric defects and value loss; fabric shrinkage in the loom - causes and control; fabric engineering; filament weaving – silk & texturised yarns; principles and mechanisms in weaving - pile fabrics, tapes and tri-axial fabrics; safety measures to be taken at weaving industry.

TOTAL: 60 PERIODS

OUTCOMES:
Upon completion of this course, the student shall be able to
- Understand the functioning of weaving machine and its important motions
- Select and control the process variables at loom
- Understand the principle of producing special fabrics

REFERENCES

TT7403  TECHNOLOGY OF YARN SPINNING  L T P C
3 0 0 3

OBJECTIVES:
To enable the students to understand the
- Theory of yarn formation by different spinning systems
- Construction of yarn spinning machines

UNIT I  RING SPINNING  13
Principle of yarn formation in ring spinning machines; working of ring spinning machine; cop building; design features of important elements used in ring spinning machine; draft, twist and production calculations in ring spinning machine; end breakage rate – causes and remedies

UNIT II  CONDENSED YARN SPINNING  5
Condensed yarn spinning – principle, different methods, properties; comparison with ring spun yarn

UNIT III  YARN PLYING  9
Merits of plying of yarns; methods followed for plying – TFO, ring twisting; selection of twist level for plying; calculation of resultant count of plied yarns; types of fancy yarns, method of production
UNIT IV  ROTOR SPINNING  9
Principle of open end spinning; principle of yarn production by rotor spinning system; design features of important elements used in rotor spinning; comparative study on properties of rotor yarn

UNIT V  OTHER SPINNING SYSTEMS  9
Friction and air-jet spinning methods – principle of yarn production, raw material used, structure, properties and applications; principle of yarn production by self-twist, air vortex, core, wrap and other spinning systems; safety measures at spinning machines – equipments used, safety practices

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the student shall be able to
• Understand the theory of formation of yarn by ring, rotor, friction, airjet and other spinning systems
• Understand the spinning system to be used for different raw materials and to produce yarn for specific end use.

REFERENCES

TT7401  TECHNOLOGY OF MANUFACTURED FIBRE PRODUCTION  L T P C
3 0 0 3

OBJECTIVES:
• To make the students understand different methods of production of manmade fibres and post spinning operations

UNIT I  POLYMER RHEOLOGY  9
Transport phenomena in fibre manufacturing- heat and mass; polymer rheology-Newtonian and non-Newtonian fluids; necessary conditions of fibre forming polymer; melt instabilities.

UNIT II  MELT SPINNING  9
Melt Spinning- polymer selection and preparation, equipments, testing of filament, properties and applications of polyester, polyamide and polypropylene fibres; process control

UNIT III  SOLUTION SPINNING  9
Solution spinning- polymer selection and preparation, equipments, testing of filament, properties and applications of acrylic, polyurethane and regenerated cellulose fibres; process control

Attested

DIRECTOR
UNIT IV  POST SPINNING OPERATIONS  9
Neck drawing, drawing systems, influence of drawing on structure and properties of fibres; types of heat setting, influencing parameters on heat setting, influence of heat setting on fibre behaviour; spin finish application; texturizing; process control

UNIT V  ADVANCES IN FIBRE SPINNING  9
Liquid crystal spinning; gel spinning; profile fibres, hollow & porous fibres; speciality fibres-polyglycolic acid, polylactic acid, chitosan fibres preparation properties and applications; safety rules to be followed in fibre production industry

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the student shall know
• Rheology of polymers and production of fibres and filaments by different methods
• Post spinning operations carried out for the fibres/filaments produced and
• Advances in fibres spinning

REFERENCES

TT7451  WOVEN FABRIC STRUCTURE  L T P C
3 0 0 3

OBJECTIVES:
To enable the students to learn about different structures of woven fabric and design the structure for different applications

UNIT I  Basic weaves – plain, twill, satin, sateen and their derivatives – loom requirements  9

UNIT II  Ordinary and Brighten Honey Comb; Huck-a-Back and its modifications; Mock Leno; crepe weaves; colour theory – light and pigment theory; modification of colour; application of colours; colour and weave effects – loom requirements  9

UNIT II  Bedford cords - plain and twill faced, wadded; welts and piques, wadded piques; backed fabrics - warp and weft, reversible and non-reversible fabrics; extra warp and extra weft figuring - single and double colour – loom requirements  13

UNIT IV  Pile fabrics; warp pile - wire pile, terry pile, loose backed; weft pile – plain back and twill back velveteen, lashed pile, corduroy, weft plush – loom requirements  9
UNIT V
Double cloth, types of stitches; Damasks; Gauze and Leno principles – loom requirements; 3D fabrics

OUTCOMES:
Upon the completion of this course the student will be able to
- Understand different structures of woven fabric
- Design the structure for different end uses
- Construct the draft and peg-plan which are required to convert the design into fabric

REFERENCES

TT7411  FIBRE SCIENCE LABORATORY  L T P C 0 0 2 1

OBJECTIVES:
To enable the students to understand the
- Identification of fibres by different methods
- Method of characterization of fibres

LIST OF EXPERIMENTS
1. Identification of natural, regenerated and synthetic fibres
2. Determination of density of various fibres by density gradient column
3. Determination of denier of synthetic fibres by gravimetric method
4. Determination of Moisture Regain and Moisture content of fibres
5. Determination of wax content and spin finish of natural and synthetic fibres
6. Identification of fibres and Determination of the blend proportion of
   a. Natural/ regenerated cellulose
   b. Cellulose/ protein fibres
   c. Cellulose/polyester fibres
   d. Natural cellulose/ regenerated cellulose/polyester
7. Analysis of thermal transitions of various fibres by Thermo gravimetric method.
   Comparison of low melting point and high melting point fibres and also its glass transition temperature
8. Analysis of end groups of polymers and fibres by using FTIR spectrometer
9. Sample preparation by wet spinning and determination of its properties
   a. Viscose
b. Acrylic

10. Analysis of XRD patterns of various fibres and determination of crystallinity index

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

- Identify the fibres using different methods
- Analyse the graphs, charts of TGA, FTIR spectrometer and X-ray diffractometer

TOTAL: 30 PERIODS

TT7412 SPINNING PROCESS LABORATORY

OBJECTIVES:

- To enable the students to understand the material passage in the spinning machines, important parts of machines, draft, twist and production calculations
- To train the students to handle machine and operate them practically

LIST OF EXPERIMENTS

1. Construction details of ring spinning machine and material passage
2. Draft, Twist and production calculations in ring spinning machine
3. Study of builder mechanism of ring spinning machine
4. Selection of ring travellers
5. Construction details of rotor spinning machine and material passage
6. Draft, Twist and production calculations in rotor spinning machine
7. Production of carded web using miniature card
8. Production of sliver using miniature drawing machine
9. Production of different yarn samples using ring spinning machine
10. Production of different yarn samples using rotor spinning machine

TOTAL: 30 PERIODS

OUTCOMES:

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

- Calculate draft, twist and production rate of ring and rotor spinning machines
- Understand the formation of yarn by ring and rotor spinning systems
- Produce yarn using ring and rotor spinning system

TT7461 FABRIC ANALYSIS LABORATORY

OBJECTIVES:

To enable the students to analyse different fabrics for structure and constructional details

LIST OF EXPERIMENTS

1. Visualization of commercially available woven, knitted and nonwoven fabrics
2. Analysis of construction details of the following fabric structure
   i. Plain and its derivatives
   ii. Twill and its derivatives
   iii. Satin (Regular and irregular)
   iv. Sateen (Regular and irregular)
   v. Honeycomb (ordinary and Brighton)
   vi. Huck-a-back
   vii. Extra warp and extra weft figuring
   viii. Pile fabrics (warp and weft)
   ix. Backed fabrics
   x. Gauze and Leno
xi. Double cloth
xii. Crepe
xiii. Tapestry
xiv. Mock-leno
xv. Bedford cord.
xvi. Single jersey
xvii. Double jersey structures

3. Analysis of blend composition in the yarn of the fabric
4. Analysis of finish on the fabric

TOTAL: 60 PERIODS

OUTCOMES:
Upon completion of this practical course, the student will be able to
- Analyse the fabric and determine the constructional details
- Draw design, draft and peg plan of the structure of the fabrics

TT7502 

KNITTING TECHNOLOGY

OBJECTIVES:
To make the students to understand the
- Fundamentals of knitting
- Types of knitting processes in detail
- Functioning of different components of knitting machine

UNIT I INTRODUCTION
Reasons for the growth of the knitting industry; comparison of fabric properties - woven, knits and bonded fabrics; classification of knitting processes – weft knit & warp knit; yarn quality requirements for knitting; preparation of staple yarns for weft and warp knitting

UNIT II FUNDAMENTALS OF KNITTING
General definitions and principles of knitting; types of knitting needles – Bearded, Latch & Compound needle; elements of knitted loop structure

UNIT III WEFT KNITTING
Basic weft knitted structures and their production - plain, rib, interlock and purl; fundamentals of formation of knit, tuck and float stitches; factors affecting the formation of loop; effect of loop length and shape on fabric properties; analysis of various types of weft knitted structure; weft knitted fabric geometry; basic principles and elements of flat knitting machines; different types of flat knitting machines- manual, mechanical and computer controlled; production of various weft knitted structures using flat knitting machines;

UNIT IV WEFT KNITTING MACHINES
Construction, characteristics and working of circular knitting machines used for the production of basic structures; production of derivatives of weft knitted structures; needle control in circular knitting machines; quality control in knitted fabric production; production calculation; safety measures to be taken at knitting industry; process control in weft knitting.

UNIT V WARP KNITTING
Basic principles; elements of warp knitted loop – open loop, closed loop; warp knitting elements- chain link, chain links for simple patterns, guide bar movement mechanism; Tricot and Rachel warp knitting machines; principles of double needle bar patterning, terry pile fabric production; let off system; run in value based on the lapping diagram; take up system; theoretical concepts of warp knitted loop configuration; uses of warp knitted fabrics in technical applications.

TOTAL: 60 PERIODS
OUTCOMES:
Upon completion of this course, the student shall know the
- Principle of knitting in different types of knitting machines
- Structure and properties of fabrics produced by different knitting machines

REFERENCES

TT7501 CHEMICAL PROCESSING OF TEXTILE MATERIALS I L T P C 3 0 0 3

OBJECTIVES:
To enable the students to learn about chemical structure of fibres, pre-treatments involved in the wet processing of textiles and finishing treatment of textile fabrics

UNIT I 9
Chemical structure of fibres; action of chemicals on fibres; natural and added impurities in textiles; singeing and desizing of natural and synthetic fibres and its blends; heat setting.

UNIT II 9
Scouring, bleaching and mercerization of cotton, bio-scouring of cotton; carbonization, scouring and bleaching of wool; degumming of silk

UNIT III 9
Loose stock machine; hank and package processing machines; yarn singeing machine; woven and knitted fabric singeing machines; stretching devices; shearing and raising machines; kiers; mangles; jigger; winch; jet and soft flow machines; yarn mercerizer, chain and chainless mercerizers; continuous scouring and bleaching machines; washing ranges, hydro extractors; detwisters; dryers; stenters

UNIT IV 9
Calendaring, crease proofing, shrink proofing and softening; wool finishing.

UNIT V 9
Water and oil repellent finishes; fire retardant finish; antibacterial finish; Application of Nanotechnology in finishing; assessment of finishes; safety measures to be taken at the textile chemical processing industry.
TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the student shall have the knowledge of
- Chemical structure of the fibres
- Necessity and requirements of pretreatments in wet processing of textiles
- Various finishing treatments done on fabric

REFERENCES

TT7503 PROCESS CONTROL IN SPINNING LT P C 3 0 0 3

OBJECTIVES:
To enable the students to understand and apply process and quality control measures during spinning of yarn

UNIT I LEVELLING
Different levelling methods adopted in the pre spinning machines; assessment and control of autoleveling; influence of the uniformity of the intermediate products on the yarn quality; effect of machines and processing parameters on product uniformity; importance of fibre-mix homogeneity on yarn quality; types and levels of mixing in the preparatory processes; assessment of fibre-blend variations.

UNIT II NEP AND HOOK REMOVAL
Causes of nep and hook formation in the fibre-opening processes; improving the removal of neps in the carding and combing machines; fibre hook straightening during the preparatory operations; measurement of nep and hooklevel

UNIT III WASTE CONTROL
Control of waste in blowroom, card and combers; influence of machine and processing parameters on waste removal; controlling the lint content in waste; control of pneumafil waste, hard waste in ring frame; cleaning efficiency

UNIT IV PRODUCTION CONTROL
Factors affecting the production limits of the spinning machinery; achieving maximum production in the given machinery; new concepts in achieving higher production in the spinning machinery; role
of machinery maintenance and humidity control on production efficiency; computation of the productivity indices.

UNIT V      YARN QUALITY ANALYSIS & MAN-MADE FIBRE PROCESSING
Analysis and control of within length and between length variations and spectrogram; yarn faults classifications; causes and remedies for yarn faults and defects; optimum processing conditions required for man-made fibres like polyester, viscose in the spinning machinery.

OUTCOMES:
Upon completion of this course, the student shall be able to understand the

- Quality control measures in terms of levelling of material, neps and waste during the process
- Factors influencing production rate and efficiency of the spinning machines
- Analysis of quality of yarn
- Special measures to be taken while processing manmade fibres

REFERENCES

TT7504      QUALITY EVALUATION OF FIBRES AND YARNS

OBJECTIVES:
To make the students understand the principle and method of working of equipments used for testing of fibres and yarns

UNIT I      INTRODUCTION
Definition of quality; importance of quality assessment; method of developing quality and productivity norms; selection of samples for quality assessment – random and biased samples, squaring technique and zoning technique for fibre selection; yarn sampling - use of random numbers; sampling for various types of yarn tests.

UNIT II     FIBRE LENGTH AND STRENGTH ANALYSIS
Fibre testing, the fibre quality index and spinnability; fibre length and length uniformity- measuring techniques; tensile strength testing modes – CRT, CRE, CRL and ARL; fibre strength, importance, relation to yarn strength; measurement techniques
UNIT III  FIBRE FINENESS, MATURITY AND TRASH ANALYSIS  9
Fibre fineness – definition, comparison of various fibres, its importance in yarn manufacture, measurement techniques; cotton fibre maturity, estimation by microscopic method, maturity ratio and index, estimation by other methods – optical, air flow differential dyeing, its importance in spinning; fibre trash – influence on quality, measurement, principle and estimation microdust for rotor spinning; high volume instrument for total fibre quality measurement

UNIT IV YARN COUNT, TWIST AND STRENGTH  9
Yarn numbering systems-Indirect and direct systems, count conversions; count measuring systems; twist in single and ply yarns, twist directions, twist factor, twist and yarn strength; twist measurement and breaking twist angle measurement; single yarn strength; lea count- strength product (CSP) and Corrected Count Strength Product (CCSP)

UNIT V YARN MASS EVENNESS AND SURFACE QUALITY  9
Yarn mass evenness parameters, measurement; Yarn fault classification; Yarn Appearance; yarn abrasion resistance – importance and measuring technique; yarn hairiness – importance and assessment techniques; yarn friction– static and dynamic friction, methods of measurement

OUTCOMES:
Upon completion of this course, the student shall be able to

- Understand the principle of equipments used for testing of fibres and yarns
- Apply knowledge gained through this course, while operating the equipments
- Analyze and interpret the results obtained from quality evaluating systems of fibre and yarn

REFERENCES

TT7551 TECHNOLOGY OF BONDED FABRICS  L T P C
3 0 0 3

OBJECTIVES:
To enable the students to learn about the

- Fundamentals of bonded fabrics
- Different method of web formation and bonding
UNIT I  FUNDAMENTALS OF BONDED FABRICS
Definitions and classification of bonded fabrics; fibres, fibre preparations and their characteristics for the production of bonded fabrics, uses; methods of bonded fabric production

UNIT II  WEB FORMATION WITH STAPLE FIBRES
Production of staple-fibre web by dry and wet methods; influence of web laying methods on fabric properties; quality control of web

UNIT III  MECHANICAL, CHEMICAL AND THERMAL BONDING
Bonded fabric production by mechanical bonding - needling, stitching, water jet consolidation; thermal Bonding technologies; chemical bonding – binder polymers and bonding technologies

UNIT IV  POLYMER – LAID WEB AND FABRIC FORMATION
Manufacture of Spun bonded fabrics, fibre orientation in spun bonded fabrics and characterization of filament arrangement; manufacture of melt blown fabrics – fibre formation and its attenuation; effect of processing parameters on fabric characteristics

UNIT V  FINISHING AND APPLICATION OF BONDED FABRICS
Dry and Wet finishing; characterisation, structure - property relationship in bonded fabrics; End uses of bonded fabrics; safety measures to be taken at the nonwoven industry; process control in the manufacture of bonded fabrics.

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course the student will be able to
- Explain different types of nonwovens and their method of production
- Explain different type of finishes applied on the nonwovens and their end uses
- Choose appropriate web preparation and bonding techniques for getting desired properties in fabric.

REFERENCES

TT 7511  FABRIC MANUFACTURE LABORATORY  L T P C
0 0 4 2

OBJECTIVES:
To enable the students to practically understand the mechanisms of loom and knitting machines

LIST OF EXPERIMENTS
1. Analysis of Yarn faults
2. Control of production, package density, yarn faults in cone / cheese winding machine
3. Determination of depth of shed and heald shaft movements in tappet shedding mechanism
4. Preparation of pattern card for dobby shedding mechanism and way in which adjust the depth of shed
5. Study of jacquard shedding mechanism
6. Power required to insert the weft through shuttle in over and under picking mechanism
7. Study of picking mechanism in shuttleless loom
8. Control of sley eccentricity and Beat-up force in weaving
9. Study of let-off mechanisms
10. Determination of pick space through 5 and 7 wheel take-up mechanisms
11. Study of weft replenishment mechanism in shuttle looms
12. Method of achieving the required colour patterns in 4 X 1 drop box motion
13. Study of warp protector mechanism
14. Study of plain, rib and interlock circular knitting machines
15. Study of flat knitting machines

TOTAL: 60 PERIODS

OUTCOMES:
Upon completion of this practical course, the students will be able to
- Test and analyse the yarn faults
- Understand the mechanism of weaving and knitting machines

TT7512 FIBRE AND YARN QUALITY EVALUATION LABORATORY L T P C

OBJECTIVES:
To enable the students to practically determine the properties of fibres and yarns

LIST OF EXPERIMENTS
Determination of
1. Fibre fineness
2. Fibre length
3. Fibre maturity
4. Fibre trash content
5. Bundle fibre strength
6. Roving, sliver and yarn linear density
8. Single yarn strength
9. Yarn lea strength
10. Yarn single and ply yarn twist
11. Yarn impact strength
12. Yarn to yarn abrasion
13. Unevenness of yarn
14. Assessment of yarn appearance
15. Testing of synthetic filaments
16. Classification of yarn faults

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this practical course, the students will be able to
- Determine the fineness, length and maturity properties of fibre
- Determine the linear density, strength, abrasion resistance and evenness of yarn
- Classify yarn faults
OBJECTIVE:
To enable the students to understand the theory of dyeing and printing of woven fabrics, knitted fabrics and garments

UNIT I  COLOUR SCIENCE  9
Theories of colour measurement, Beer–Lambert’s law and Kubelka-Munk theory and their application in colour assessment and colour matching; whiteness and yellowness indices.

UNIT II  THEORY OF DYING  9
Dyeing equilibrium; dye-fibre interaction; adsorption isotherm; dye affinity; heat of dyeing; half dyeing time.

UNIT III  DYEING  13
Basic characteristics of dyes and pigments; classification of dyes and principle of application of dyes; Chemistry and technology of application of direct, reactive, disperse, acid and basic dyes; processing of denims; determination of fastness properties.

UNIT IV  PRINTING  9
Methods and styles of printing; printing machines; constituents of printing paste; printing with direct, reactive, acid and disperse dyes; printing with pigments

UNIT V  KNITS AND GARMENTS  5
Dimensional stabilization of tubular and open width knits; garment dyeing and printing; garment washing

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will know the
- Theory of colour
- Different classes of dyes and methods of dyeing and printing
- Chemical processing of knits and garments

REFERENCES
OBJECTIVES:
- To enable the students to understand the basics of pattern making, cutting and sewing
- To expose the students to various problems & remedies during garment manufacturing

UNIT I
15
Anthropometry, mass-production, mass-customization; pattern making, grading

UNIT II
15
Marker planning, spreading & cutting; Different types of seams and stitches; single needle lock stitch machine - mechanism and accessories; needle – functions, special needles, needle size, numbering, needlepoint; sewing thread-construction, material, thread size, packages

UNIT III
15
Raw material, in process and final inspection, labels, linings, interlinings, wadding, lace, braid, elastic, hook and loop fastening, shoulder pads, eyelets and laces, zip fasteners, buttons

UNIT IV
15
Garment pressing - categories and equipment, packing; care labeling of apparels

TOTAL: 60 PERIODS

OUTCOME:
Upon completion of the course, the students will know about pattern making, marker planning, cutting and sewing of apparels

REFERENCES
OBJECTIVES:
To enable the students to learn about
- Mechanics of elements of textile machinery
- Design of cams, cone drums and other important elements used in the textile machinery

UNIT I
Equations of forces, motion and energy; energy stored in rotating masses.

UNIT II
Clutches and brakes – types, application in textile machines; gears, gear trains; power transmission – different modes, advantages and limitations, applications

UNIT III
Differential and variable speed drives – principles, application in textile machines; design of cone drums – piano feed regulation, roving machine builder mechanism;

UNIT IV
Friction – calculations; bearings, design of drive transmitting shafts, balancing of rotating masses; principles of pneumatic controls used in textile machinery

UNIT V
Design of winder drums; kinematics of shedding; design of tappets; beat up force, sley eccentricity; power for picking

OUTCOMES
Upon completion of the course students will
- Have knowledge of types of gears, gear trains and their applications
- Be able to design cams, tappets and cone drums used in the spinning machinery
- Be able to understand the design aspects of machine elements for specific requirements

REFERENCES

OBJECTIVES:
To enable the students to learn about the constructional details of fabrics, evaluation of fabric properties and their importance

UNIT I
CONSTRUCTION CHARACTERISTICS
Basic fabric particulars – Measurement of ends and picks per inch, count of warp and weft, determination of the type of weave, measurement of length, width, thickness and density (GSM); warp and weft crimp measurements for spun and filament yarn fabrics, the cover factor calculations; fabric sampling techniques.
UNIT II STRENGTH CHARACTERISTICS
Tensile strength measurement – ravelled strip test and grab test, mechanical and electronic measuring systems; tear strength – importance, measuring systems; bursting strength and its measurement; ballistic impact strength; Universal tensile tester - principle and operation

UNIT III SURFACE CHARACTERISTICS
Fabric stiffness – principle of measurement of flexural rigidity; drapeability – measurement of drape coefficient; crease recovery - measurement techniques; wrinkle recovery assessment using standard grades; principle and functioning of air permeability testers; water repellency, contact angle and fabric shrinkage testing; fabric abrasion resistance – measuring technique; fabric pilling resistance – methods of determination

UNIT IV LOW STRESS AND FUNCTIONAL CHARACTERISTICS
Fabric bending hysteresis testing; shear hysteresis measurements; fabric compression and decompression behaviour; fabric surface roughness and friction measurements; fabric tensile hysteresis measurements; fabric flame resistance testing methods; moisture and thermal characteristics

UNIT V FABRIC INSPECTION AND GARMENT QUALITY
Fabric inspection – manual, semi-automatic and automatic inspection systems; classification of fabric defects; independent product quality certification, acceptable quality level, MIL standards and final inspection; quality assessment of garments - cutting, sewing, pressing, finishing and packaging defects.

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, students would be able to

• Evaluate the constructional parameters of fabrics
• Understand the principle of equipments used for measurement of fabric characteristics
• Analyze various reports generated during quality evaluation of fabrics
• Understand the evaluation of garment quality

REFERENCES

HS7551 EMPLOYABILITY SKILLS

COURSE DESCRIPTION
This course aims to help the students acquire the employability skills necessary for the workplace situations. It also attempts to meet the expectations of the employers by giving special attention to language skills, presentation skills, group discussion skills and soft skills. This will be achieved
through expert guidance and teaching activities focusing on employability skills.

COURSE OBJECTIVES

- To enhance the employability skills of students with a special focus on presentation skills, group discussion skills and interview skills
- To help them improve their reading skills, writing skills, and soft skills necessary for the workplace situations
- To make them employable graduates

CONTENTS

UNIT I  READING AND WRITING SKILLS  9
Reading: skimming & scanning strategies – note making skills – interpreting visual material (charts & tables) – critical reading – fast reading necessary for reading letters & files - preparing job applications - writing covering letter and résumé - applying for jobs online - email etiquette – writing official letters (placing an order, letters to consumers, etc.) writing reports – collecting, analyzing and interpreting data

UNIT II  SOFT SKILLS  9
Hard skills & soft skills – soft skills: self-management skills & people skills - training in soft skills - persuasive skills – sociability skills – interpersonal skills – team building skills – leadership skills – problem solving skills – adaptability - stress management – motivation techniques – life skills -

UNIT III  PRESENTATION SKILLS  9
Preparing slides with animation related to the topic – organizing the material – Introducing oneself to the audience – introducing the topic – answering questions – individual presentation practice—presenting the visuals effectively – 5 minute presentation

UNIT IV  GROUP DISCUSSION SKILLS  9
Participating in group discussions – understanding group dynamics - brainstorming the topic — questioning and clarifying – GD strategies (expressing opinions, accepting or refusing others opinions, turn taking) – activities to improve GD skills – viewing recorded GD - mock GD

UNIT V  INTERVIEW SKILLS  9

LEARNING OUTCOMES

- Students will be able to make presentations and participate in group discussions with high level of self-confidence.
- Students will be able to perform well in the interviews
- They will have adequate reading and writing skills needed for workplace situations

TOTAL : 45 PERIODS

REFERENCES:

EXTENSIVE READING

WEB RESOURCES
1. www.humanresources.about.com
2. www.careerride.com

TT7561 TEXTILE CHEMICAL PROCESSING LABORATORY

OBJECTIVE:
To train the students in pre-treatment, dyeing, printing and testing of textile materials

LIST OF EXPERIMENTS
2. Peroxide Bleaching of Cotton Yarn/Fabric.
3. Degumming of silk.
4. Identification of dyes.
7. Dyeing of polyester using disperse dyes.
8. Dyeing of polyester and cotton blend.
11. Determination of Whiteness and Yellowness index.

TOTAL:60 PERIODS

OUTCOME:
Upon completing this practical course, the student would be able to
- Desize, scour, bleach, dye, print and finish the fabric with different types of chemicals and colourants.
- Evaluate the fabrics for fastness and chemical process related properties.

TT7661 FABRIC QUALITY EVALUATION LABORATORY

OBJECTIVE:
To make the students practically learn the various fabric evaluation procedures to determine the characteristics of fabric.

LIST OF EXPERIMENTS
Determination of
1. Fabric tensile strength
2. Fabric bursting strength
3. Fabric tear strength
4. Fabric flexural rigidity and bending modulus
5. Drapability of fabrics
6. Fabric crease recovery
7. Fabric wrinkle recovery
8. Fabric abrasion resistance
9. Fabric pilling resistance
10. Fabric air permeability
11. Fabric compression and decompression characteristics
12. Fabric surface roughness and friction coefficient
13. Seam strength and seam slippage

TOTAL: 30 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
- Measure important characteristics of fabrics and garments
- Interpret the results obtained during evaluation of fabrics

TT7701 STRUCTURAL MECHANICS OF YARNS AND FABRICS

OBJECTIVE:
To enable the students to understand the
- Fundamentals of the yarn structure, measures of structural parameters and factors influencing them
- Geometry of woven, knitted and nonwoven fabrics and understand the deformation of fabric under stress

UNIT I GEOMETRY OF TWISTED YARNS
Idealized helical yarn structure; relationship between yarn parameters twist contraction; idealized packing; measurement of packing density and radial packing density of yarn;

UNIT II FIBRE MIGRATION
Ideal migration, tracer fibre technique, characterization of migration behaviour, mechanisms of migration, effect of various parameters on migration behaviour.

UNIT III MECHANICS OF CONTINUOUS FILAMENT AND STAPLE YARNS
Analysis of tensile behaviour of yarn – fibre strain and modulus; prediction of breakage; Analysis of tensile behaviour of spun yarn– deduction based on fibre obliquity and slippage; influence of fibre length, fineness and friction on tensile behaviour; strength prediction model for blended yarns

UNIT IV GEOMETRY OF FABRIC STRUCTURE
Geometry of Plain weaves; Peirce and Olofsson models; Jamming of threads; Balance of crimp; geometry of knitted structures; structure of felts and stitch bonded fabrics

UNIT V FABRIC DEFORMATION
Fabric deformation under tensile stress; prediction of modulus; other fabric deformation – compression, shear, bending and buckling; load-extension of warp knit fabrics; mechanical behaviour of needle felts

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course the student will be able to explain
- Ideal helical model of yarn and different structural parameters
- Method of measuring structural parameters of yarn
- Effect of different parameters affecting the structure of yarn
- Models proposed for geometry of fabrics
- Characteristics of fabric on deformation

60
REFERENCES

TT7652  FINANCIAL MANAGEMENT FOR TEXTILE AND APPAREL INDUSTRIES  L T P C
3 0 0 3

OBJECTIVES:
To enable the students to understand
- Basics of financial management that are required for the textile industry
- Determination of cost of yarn, fabric and garment

UNIT I
Costing - concepts; classification of costs; preparation of cost sheet; costing of yarn, fabric and garment; cost profit volume analysis, breakeven analysis

UNIT II
Depreciation – method of computing depreciation; techniques of investment analysis - payback period method, accounting rate of return, Discounted Cash Flow methods - IRR, NPV, PI

UNIT III
Capital structure; Sources and cost of capital; working capital management

UNIT IV
Tools for financial analysis and control- profit and loss account, balance sheet; financial ratio analysis - illustrations from textile unit

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students shall be able to
- Determine the cost of yarn, fabrics and garments
- Construct cost sheet
- Understand the economic feasibility of capital investment, sources of capital and cost of capital
- Interpret the financial statements

REFERENCES
OBJECTIVES:
To enable the students understand the characteristics of textile materials and their selection for different applications viz., transport, sports, medical, protective and geo applications.

UNIT I
Design and characteristics required in textiles for transport applications; applications of textile reinforced composites in transport sector; quality requirement of yarns used in fishing industry like nets, ropes; conveyor belts, power transmission belts.

UNIT II
Design and characteristics required in textiles for medical and hygiene applications; antimicrobial, disposable and reusable products; textiles in sports wear

UNIT III
Garment design and choice of materials in protection from hazards due to mechanical, extreme climate, nuclear, biological, chemical and flame

UNIT IV
Use of geo textiles in filtration, drainage, separation and reinforcement application in construction; type of fibre and fabric to be used in such applications; evaluation of geo textiles; use of textile materials in permanent and temporary civil construction - tents, awnings, sound and thermal insulation; textile abrasives; textiles for aerosol filtration

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students shall be able to select fibre, yarn, fabric and construct the product for specific end uses.

REFERENCES

62
OBJECTIVES:
To enable the students to learn about the
- Important characteristics of the fabric responsible for its comfort properties and
- Different phenomena which take place in the fabric related to the comfort properties of the fabric

UNIT I
Comfort – types and definition; human clothing system, comfort perception and preferences

UNIT II
Psychological comfort; neuro-physiological comfort-basis of sensory perceptions; measurement techniques - mechanical stimuli and thermal stimuli

UNIT III
Thermo physiological comfort – thermoregulatory mechanisms of the human body, role of clothing on thermal regulations

UNIT IV
Heat and moisture transfer – moisture exchange, wearer’s temperature regulations, effect of physical properties of fibres, behaviour of different types of fabrics

UNIT V
Fabric tactile and mechanical properties - fabric prickliness, itchiness, stiffness, softness, smoothness, roughness, and scratchiness; predictability of clothing comfort performance

OUTCOMES:
Upon completion of this course, the student shall be able to
- Understand different phenomena such as perception of comfort, fabric mechanical properties and, heat and moisture interaction and
- Correlate the property of the fabric with comfort to the wearer

REFERENCES
OBJECTIVES:
To enable the students to learn about:
- Various operations research (OR) methods that can be applied in the textile industry
- Expressing of problems arising in the textile industry in appropriate Operations Research formats
- Methods of solving such Operations Research problems

UNIT I
9
Introduction – History of Operations Research, Scope of Operation Research, applications and limitations; The linear programming problem – construction, solution by graphical method, the Simplex method and its extension by the Big M method; Sensitivity analysis; Application of the LP technique in the field of Textile technology.

UNIT II
9
The Transportation problem – construction, initial basic feasible solution – North West Corner rule, lowest cost entry method, Vogel’s Approximation Method; the optimality test - MODI method, stepping stone method; replacement analysis

UNIT III
9
The Assignment problem – construction, solution by Hungarian method, application in the textile industry; sequencing problems; integer programming – construction, solving by cutting plane method

UNIT IV
9
Decisions theory - decisions under assumed certainty, decision under risk, decision under uncertainty, illustrations from textile industry; simulation-theory, models, queuing system; inventory control - EOQ models-deterministic models –probabilistic models;

UNIT V
9
Project planning and control models: CPM, PERT – network representation, determining critical path, project duration; crashing of project duration; resource levelling

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to:
- Design Operations Research problems from the cases arising in the Textile Industry,
- Solve the above Operations Research problems by providing optimized solutions for them

REFERENCES
OBJECTIVES:
- To enable the students to understand about total quality management, different TQM tools and techniques and Quality standards
- To train the students to apply TQM tools in textile industry

UNIT I INTRODUCTION

UNIT II TQM PRINCIPLES

UNIT III TQM TOOLS & TECHNIQUES I

UNIT IV LEAN MANUFACTURING, QUALITY SYSTEMS

OUTCOMES:
Upon completion of the course, the students will be able to
- Understand the principle of TQM, different TQM tools and techniques
- Develop innovative tools to implement TQM in the textile industry
- Understand lean manufacturing system applied to textile industry

**REFERENCE BOOKS**


**TT7002 CHARACTERISATION OF POLYMERS**

**OBJECTIVES:**
To enable the students to learn about
- Molecular structure of the fibres
- Characterization of fibres for physical and chemical properties.

**UNIT I MOLECULAR WEIGHT**
Polymer solution thermo dynamics; molecular weight and molecular dimensions by end group analysis, osmometry, light scattering, viscometry, gel permeation chromatography.

**UNIT II MOLECULAR STRUCTURE**
Infrared, NMR, UV–visible, Raman and mass spectroscopy

**UNIT III THERMAL PROPERTIES**
Thermal properties by differential scanning calorimetry, differential thermal analysis, thermogravimetry, thermo-mechanical analyzer, dynamic mechanical and dielectric analysis

**UNIT IV CHROMATOGRAPHIC TECHNIQUES**
Chromatographic techniques – adsorption chromatography – TLC, GC, LC – HPLC, GPC – hyphenated techniques

**UNIT V OTHER METHODS**
Optical and electron microscopy; SEM, TEM, X-ray scattering from polymers, birefringence, crystallinity by density measurements.

**OUTCOMES:**
Upon completion of this course, the student will be able to understand
- Characterization of textile polymers for molecular weight, structural parameters and other important properties
- Interpretation of results obtained from different instruments for characterizing the polymers

**TOTAL: 45 PERIODS**
REFERENCES

TT7003 COATED TEXTILES L T P C
3 0 0 3

OBJECTIVES:
To enable the students to understand need for coating of textiles, different methods of coating of textile fabrics

UNIT I
Rubber-Natural and Synthetic, polyvinyl Chloride, polyurethanes, acrylic polymers; adhesive treatment, radiation-cured coatings; materials and trends; textile fibres-spinning, woven fabrics, knitted fabrics, nonwoven fabrics

UNIT II
Rheological behaviour of fluids; rheology of plastisols; hydrodynamic analysis of coating; clothing comfort, impermeable coating, breathable fabrics

UNIT III
Coating features, methods of coating- knife coating, roll coating, dip coating, transfer coating, rotary screen printing, calendaring, hot-melt coating; general characteristics- tensile strength, elongation, adhesion, tear resistance, weathering behaviour, microbiological degradation, yellowing

UNIT IV
Synthetic leather, architectural textiles, fluid containers, tarpaulins, automotive air bag fabrics, carpet backing; textile foam laminates for automotive interiors; flocking fabrics for chemical protection; thermochromic fabrics, temperature adaptable fabrics, camouflage nets metal and conducting polymer, coated fabrics

UNIT V
Test methods for coated fabric evaluation; environmental norms for the chemicals used in coating industry.

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the students would be able to understand
• Need of coating of textiles for different applications
• Methods of coating of textiles
• Testing of coated fabrics

REFERENCES

TT7005 HIGH PERFORMANCE FIBRES L T P C

OBJECTIVES:
To enable the students to learn about
- Various high performance fibres which are used as technical textiles
- Production of high performance fibres

UNIT I LINEAR POLYMER FIBRES
Aramid fibres - polymer preparation, spinning, structure and properties and applications; polyethylene fibres – manufacture, fibre characteristics, properties, yarn and fabric processing and applications

UNIT II CARBON FIBRE
Manufacture of PAN-based, pitch-based carbon fibres - physical properties and applications.

UNIT III GLASS AND CERAMIC FIBRES
Glass fibres - fibre manufacture, properties; glass-fibre composites and other applications; manufacture of ceramic fibres, silicon carbide-based fibres, other non-oxide fibres, alumina-based fibres, other polycrystalline oxide fibres, single-crystal oxide fibres

UNIT IV CHEMICAL AND THERMAL RESISTANCE FIBRES
Chlorinated fibres, fluorinated fibres, polyetherketones, polyphenylene sulphide, polyetherimide - properties and applications; thermo plastic and thermoset polymers, aromatic polyamides and polyaramids, semicarbon fibres, polybenzimidazole

UNIT V SPECIALITY FIBRES
Speciality fibres - hollow and profile fibres; blended and bi-component fibres; super absorbent fibres; film fibres

OUTCOMES:
Upon completion of the course, the students will have knowledge on
- Various high performance fibres and their production
- Properties and applications of high performance fibres

REFERENCES
### TT7006  LONG STAPLE SPINNING TECHNOLOGY  L T P C  3 0 0 3

**OBJECTIVES:**
To enable the students to understand the method of production of yarn using long staple spinning system

#### UNIT I  FIBRE CLEANING AND BLENDING
5
Impurities in the long-staple fibre like wool and their removal; methods adopted to process raw flax and jute; blending methods followed for long staple fibres

#### UNIT II  FIBRE INDIVIDUALISATION
9
Fibre individualization in the carding machine; working principle and details of different type of carding machine-worsted carding, semi –worsted carding, woolen carding, flax carding and jute carding; card clothing and its maintenance; carding performance

#### UNIT III  COMBING
9
Objective of combing; basic principles of combing; details of wool combing preparation and combing operation; worsted top finishing

#### UNIT IV  DRAWING
9
Principle of long-staple drafting; effect of doubling; drafting irregularities; working details of worsted, semi worsted, jute and flax drawing; operating principle of roving machine

#### UNIT V  YARN SPINNING
13
Mule spinning –drafting, twisting, backing-off, winding on; description of centrifugal spinning; flyer spinning; ring spinning – twisting, rings and travellers; condenser yarn spinning; cap spinning; open end spinning –general features of rotor and friction spinning as applicable to long-staple fibres; double-rove spinning; self-twist spinning system

**TOTAL:** 45 PERIODS

**OUTCOMES:**
Upon completion of this course, the students will be able to understand
- Different types of long staple spinning systems
- Machines used in long staple spinning system

**REFERENCES**

### TT7007  MEDICAL TEXTILES  L T P C  3 0 0 3

**OBJECTIVES:**
To enable the students to learn about
- Different types of biomaterials and
- Biomedical application of different textile structures
UNIT I
Metals, ceramics, polymers used for biomedical applications – manufacture, features and limitations; cell-biomaterial interaction

UNIT II
Non-implantable materials: Wound dressing requirements of wound dressing, types, properties and applications; bandages - types, evaluation and applications

UNIT III
Implantable biomedical devices: vascular grafts, sutures - types, properties and applications; extra-corporeal materials; scaffolds for tissue engineering

UNIT IV
Healthcare and hygiene products: surgical gowns, masks, respirators, wipes, antibacterial textiles, super absorbent polymers

UNIT V
Safety, Legal and ethical issues involved in using medical textile materials

OUTCOMES:
Upon completion of this course, the student shall know the
- Types of materials available for biomedical applications
- Functional requirements of textile structures for specific end use and
- Selection and characterization of textile materials used for biomedical applications

REFERENCES

TT009 TEXTILE COSTING

OBJECTIVES:
To enable the students to learn about preparation of cost sheet, costing of yarn, fabric and garments

UNIT I
Cost accounting, elements of cost, classification of cost elements – examples from textile industry, methods of costing; cost sheet preparation
UNIT II

Cost profit volume analysis, breakeven analysis; standard costing, analysis of variance

UNIT III

Costing of yarn – material, labour, power and overhead expenses, allocation of overhead costs; costing of fabric; costing of garment

UNIT IV

Foreign exchange mechanisms, exchange rates; foreign exchange exposure management – risks, strategies to reduce risk; working capital management

UNIT V

Budget, types of budgets, budgeting and control in textile industry

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the student shall be able to
- Calculate the cost of yarn, fabrics and garments
- Understand the concept of preparation of cost sheet, budget and breakeven analysis

REFERENCES

TT 7010 TEXTILE REINFORCED COMPOSITES

OBJECTIVES:
To enable the students to learn about
- Reinforcements, matrices used for the composites
- Technique for making composites
- Manufacture and testing of composites and
- Application of composites

UNIT I INTRODUCTION
Fibre reinforced polymers materials, properties; resins - thermoset and thermo plastics, additives release agents; composite material classification and its properties; reinforcement – matrix interface wettability

UNIT II PREPREGS AND PREFORMS
Introduction; manufacturing techniques, property requirements; textile preforms - weaving, knitting and braiding; geometrical aspects- fibre orientation, volume fraction, weight fraction and voids.
UNIT III TECHNIQUES FOR MANUFACTURE OF COMPOSITES

Introduction, manufacturing processes – open mould process, closed mould process and continuous process; metal matrix composites, ceramic matrix composites – types, importance and processing

UNIT IV MECHANICAL PROPERTIES OF TEXTILE COMPOSITES

Testing of reinforced plastics – tensile, flexural, impact, interlaminar shear and compression properties

UNIT V APPLICATION OF POLYMER COMPOSITES

Composites - application in aerospace, construction industry, and sports products; electrical, polymer composite for biomedical and vibration damping

OUTCOMES:
Upon completion of this course, the student shall be able to
- Select different types of textile reinforcements and matrices used for the manufacture of composites and their behavior
- Evaluate the characteristics of composites

REFERENCES

TT7072 COLOUR SCIENCE L T P C
3 0 0 3

OBJECTIVES:
To enable the students to understand the theory of colour and measurement of colour

UNIT I LIGHT-MATTER INTERACTION
Electromagnetic spectrum – the optical region, interaction of light with matter a) Transparent case – Beer’s Law and Lambert’s Law b) Opaque case – reflection absorption and scattering, the concept of “Radiative Transfer Theory” and its simplification into the Kubelka – Munk model

UNIT II HUMAN COLOUR VISION
Colour sensation – physiological and psychological mechanism of colour vision; colour vision theories; defects in colour vision; colour vision tests; additive and subtractive colour mixing, and confusion in colour perception

UNIT III COLOUR ORDER SYSTEMS
Description of colour, various colour order systems, CIE numerical system for colour definition and its components – illuminants, the versions of the standard observer, the colour scales, chromaticity diagram.

UNIT IV NUMERICAL COLOUR MATCHING
Reflectance and K/S value, relationship between dye concentrations and a) reflectance values and b) K/S values, reflectance and K/S curves of dyed samples; CIE model for computer colour matching and the calculation of colour recipes; non CIE models for colour matching, limitations of computer colour matching

TOTAL: 45 PERIODS
UNIT V  METAMERISM AND COLOUR DIFFERENCE ASSESSMENT

Metamerism – types and its assessment, metamerism in textile materials; colour differences – visual assessment, standard conditions, methods and problems, assessment of colour difference, non-linearity of subjective perception of colour, need for specific colour difference systems, setting up of objective pass/fail standards.

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the students shall be able to

• Understand the theory of colour
• Numerical colour matching

REFERENCES

TT7074  SUPPLY CHAIN MANAGEMENT FOR TEXTILE INDUSTRY  L T P C
3 0 0 3

OBJECTIVES:

• To provide an insight on the fundamentals of supply chain networks, tools and techniques.
• To train the students to new and recent developments in supply chains, e-business and information technology

UNIT I
Basic principles of supply chain management and logistics, supply chain models, supply chain for volatile market; supply chain drivers and metrics in apparel industries; roll of supply chain in the textile and apparel industries’ financial stability.

UNIT II
Planning supply and demand in apparel production house, managing economies of scale, supply cycle and inventory levels; managing uncertainty in supply chain, safety pricing and inventory; make Vs buy decision, make Vs hire decision; geographical identification of suppliers, supplier evaluation, supplier selection, contract negotiations and finalisation.
UNIT III
Distribution network and design for global textile and apparel products, models of distribution – facility location and allocation of capacity, uncertainty on design and network optimisation; the role of transportation in supply chain, modes of transportation, characteristics of transportation, transport design options for global textile and apparel network, trade-off in transport design, risk management in transportation, transport decision in practice for textile and apparel industries.

UNIT IV
Coordination in supply chain - the bullwhip effect, forecasting, obstacles to coordination in supply chain; supply chain management for apparel retail stores, high fashion fad; supply chain in e-business and b2b practices

UNIT V
Import - Export management, documentation, insurance, packing and foreign exchange; methods of payments – domestic, international, commercial terms; dispute handling modes and channels; supply chain and Information system; Customer relationship management

OUTCOMES:
Upon completion of this course, the student shall have the
- Knowledge of the framework and scope of supply chain networks and functions
- Capacity to develop clear, concise and organized approach to operations management

REFERENCES
UNIT IV 13
Marketing – strategies, global brand building; logistics & SCM; role of export finances & EXIM banking, ECGC, Indian council of arbitration, FEMA; impact of foreign trade on Indian economy

UNIT V 13
Exim policy - customs act, acts relating to export/import of textile and apparel; Indian customs formalities - export documentation for excisable goods, import documentation, clearance of import goods; concepts - 100% export oriented units, export processing zones, special economic zones; duty drawback procedure; import/export incentives; licenses; case study

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the student shall have the knowledge on
- International market for textile products
- Global marketing strategies and
- EXIM policy and procedures

REFERENCES

GE 7351 ENGINEERING ETHICS AND HUMAN VALUES L T P C 3 0 0 3

OBJECTIVES
- To emphasise into awareness on Engineering Ethics and Human Values.
- To understand social responsibility of an engineer.
- To appreciate ethical dilemma while discharging duties in professional life.

UNIT I HUMAN VALUES 3

UNIT II ENGINEERING ETHICS 9
uses of ethical theories. Valuing Time – Co-operation – Commitment –

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION
Engineering as experimentation - engineers as responsible experimenters - codes of ethics –
Importance of Industrial Standards - a balanced outlook on law – anticorruption- occupational
crime - the challenger case study.

UNIT IV ENGINEER’S RIGHTS AND RESPONSIBILITIESON
Collegiality and loyalty – Respect for authority – Collective Bargaining – Confidentiality- Conflict of
and risk - risk benefit analysis and reducing risk - the Three Mile Island, Bhopal Gas plant and
chernobyl as case studies.

UNIT V GLOBAL ISSUES
Multinational corporations - Environmental ethics - computer ethics - weapons development -
engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral
leadership-Sample code of conduct.

OUTCOMES
• Students will have the ability to perform with professionalism, understand their rights, legal,
ethical issues and their responsibilities as it pertains to engineering profession with engaging
in life-long learning with knowledge of contemporary issues.

TEXT BOOKS
2005.
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, “Engineering Ethics –
Concepts and Cases”, Wadsworth Thompson Leatning, United States, 2000 (Indian
New Delhi, 2004.

REFERENCES
Jersey, 2004
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, “Engineering Ethics –
Concepts and Cases”, Wadsworth Thompson Leatning, United States, 2000
4. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and
Engineers”, Oxford Press, 2000

SMART TEXTILES

OBJECTIVES:
To enable the students understand the concept and construction of smart fabrics, intelligent
textiles and interactive garments

UNIT I
An overview on smart textiles, electrically active polymers materials- application of non-ionic
polymer gel and elastomers for artificial muscles; heat storage and thermo regulated textiles and
clothing, thermally sensitive materials, cross – linked polymers of fibre substrates as
multifunctional and multi-use intelligent material; mechanical properties of fibre Bragg gratings,
optical responses of FBG (Fibre Bragg grating) sensors under deformation ; smart textile
composites integrated with optic sensors
UNIT II
Adaptive and responsive textile structures, bio-processing for smart textiles and clothing, tailor made intelligent polymers for biomedical application

UNIT III
Smart fabrics – passive, active, very smart; classification of smart materials, concept of wearable computing, basic structure of fabric used for integrating different electronic sensors

UNIT IV
Smart interactive garments for combat training, hospital and patient care; smart garments in sports and fitness activities; smart garments for children; smart home textiles

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the students shall have the knowledge on
- Construction of smart textiles
- Wearable electronics and smart interactive garments

REFERENCES

AT7552 GARMENT PRODUCTION MACHINERY

OBJECTIVE:
To acquaint students of the basic production machinery and equipments used in garment construction

UNIT I FABRIC INSPECTION, SPREADING AND CUTTING MACHINES
Fabric inspection machinery; spreading machines – manual, semi automatic and fully automatic machines; mechanism of straight knife, rotary, band knife, die, laser, plasma, water jet and ultrasonic cutting machines; notches, drills and thread markers; computer interfaced cutting machines; fusing and molding machines; safety measures

UNIT II SEWING MACHINES
Lock stitch and chain stitch sewing machine – types, driving arrangement, function of elements, stitch formation, timing, settings and feed mechanism; needles-geometry and types; selection of machine and process parameters for different applications; Button fixing and button holing machine; safety measures

UNIT III MULTI THREAD SEWING MACHINES
Overlock, flatlock, feed-off the arm, zig-zag and embroidery machines– driving arrangement, function of elements, stitch formation, timing, settings and feed mechanism; safety measures

UNIT IV FINISHING MACHINES
Pressing machineries – buck pressing, iron pressing, block or die pressing, form pressing, steamers; folding and packing machines; safety measures
OUTCOMES:
Upon completion of the course, the students would understand

- Fundamental principle and working of machines used for spreading and cutting
- Different types of basics sewing, multithread sewing, and finishing machines used for garment manufacture

TOTAL: 45 PERIODS

REFERENCES

AT7071 PRODUCTION AND APPLICATION OF SEWING THREADS

OBJECTIVES:
To enable the students to understand the requirements and production of sewing threads for different applications

UNIT I
13
Sewing threads – property requirements for different applications; ticket numbering; characterization of sewing threads; sewability of the thread, seam efficiency index

UNIT II
14
Types of sewing thread – spun threads, core spun threads, filament threads; production, properties and applications; fancy yarns – types and production; metallic yarns

UNIT III
13
Characteristics and application of high performance sewing threads - aramid threads, ceramic threads, polypropylene threads, polyethylene threads, polytetrafluoroethylene threads, fibreglass threads, other sewing threads – tencel, acrylic, linen, elastic, soluble; embroidery threads

UNIT IV
5
Sewing defects related to sewing threads – Assessment and control

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to understand

- Production of sewing thread
- Characterization of sewing thread and
- Selection of sewing thread for different end uses.

REFERENCES
AT7651  INDUSTRIAL ENGINEERING IN APPAREL INDUSTRY  L T P C
3 0 0 3

OBJECTIVES:
To enable the students to learn about
• Basics of industrial engineering
• Different tools of industrial engineering and its application in apparel industry

UNIT I
Industrial Engineering - evolution, functions, role of industrial engineer; work study - introduction, procedure

UNIT II
Methods study – introduction, approach to method study; techniques of recording; method analysis techniques; principles of motion economy; method study in garment manufacture

UNIT III
Ergonomics - importance, division; ergonomic principles - designing of workplace, working processes, handling material, tools and environment; ergonomic conditions related to garment industry

UNIT IV
Work measurement– introduction; time study – equipment and procedure; standard data; work sampling techniques; incentive wage system; work measurement applied to garment industry; calculation of standard allowance minutes (SAM)

UNIT V
Site selection for garment industry; plant layout - types of layouts suitable for garment industry, methods to construct layout; line balancing

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the students will be able to apply the following methodologies in garment industry
• Method study, work measurement
• Estimation of SAM
• Layout study and line balancing
• Ergonomics applied to garment industry

REFERENCES
AT7072  PROTECTIVE TEXTILES  L T P C  3 0 0 3

OBJECTIVES:
To enable the students understand the selection of fibre, yarn, fabric and design of garments for different protective applications

UNIT I  FIBRES, YARNS AND FABRICS FOR PROTECTIVE GARMENTS  13
Characteristic requirements of fibre, yarn and fabric for flame proof, heat resistant, ballistic resistance, electrical conduction, bacterial protection, radiation protection and radiation contamination protection

UNIT II  CHEMICAL FINISHES FOR PROTECTIVE FABRICS  5
Mechanism, Chemistry, Materials and methods - Flame retardant, Liquid repellent, Antistatic, Antibacterial, UV protection and mite protection finishes

UNIT III  PROTECTIVE FABRICS IN DIFFERENT APPLICATIONS  9
Protective fabrics used in the medical field and in hygiene; military combat clothing; protective fabrics against biological and chemical warfare; textiles for high visibility; antigravity suit

UNIT IV  PROTECTIVE GARMENT CONSTRUCTION  9
Garment construction - method of construction of garments according to various protective end uses; use of accessories for protective garment; ergonomics of protective clothing

UNIT V  EVALUATION OF PROTECTIVE TEXTILES  9
Standards and test method for protective fabric performance - flame retardant finishes, liquid repellent finishes, antistatic, liquid repellent, antibacterial, UV protection, mite protection; manikins-thermal manikins, segmented thermal manikins; evaporative resistance measurement-moisture permeability index, skin model; concept of dynamic manikins; permeation resistance test-index of penetration and index of repellency; liquid tight integrity and gas tight integrity

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students shall
• Select fibres, yarns and fabrics for different protective applications
• Construct protective garments
• Evaluate protective textiles
REFERENCES

AT 7751        APPAREL MARKETING AND MERCHANDISING        L T P C
                               3 0 0 3

OBJECTIVES:  
To acquaint the students of the concepts of business, design merchandising, sourcing and export documentation

UNIT I      INTRODUCTION TO APPAREL BUSINESS
Apparel business practices; business operations in Asian countries. Business practices of Indian apparel export and retail houses.

UNIT II  MARKETING FOR APPAREL AND TEXTILE PRODUCTS
Marketing for the 21st century, core concepts and orientation towards market place, strategies and planning, market research and forecast, customers, consumer markets and business markets, market segments and brand building, brand positioning and competition

UNIT III  DESIGN MERCHANDISING
Concepts of merchandising, apparel product lines, dimensions of product change, determination and development of product line and product range. Creative design of garments and accessories, new product development and seasons of sale, costing, coordination and communication with the production house and export house

UNIT IV  SOURCING
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 quality in sourcing, quick response and supplier partnership in sourcing, JIT technology.

UNIT V  EXPORT DOCUMENTATION AND POLICIES
Government policies, guide lines for apparel export and domestic trade, tax structures and government incentives in apparel trade. Export documents and its purposes, banking activities.
Letter of credit, logistics and shipping, foreign exchange regulation, export risk management and insurance. Export finance, Special economic zones.

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the student shall be able to
- Apply the concept of marketing and merchandizing in the apparel industry in India
- Understand the procedure involved in the export of apparel

REFERENCES

GE7071 DISASTER MANAGEMENT  L T P C  3 0 0 3

OBJECTIVES:
- To provide students an exposure to disasters, their significance and types.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
- To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
- To enhance awareness of institutional processes in the country and
- To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

UNIT I INTRODUCTION TO DISASTERS
Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don’ts during various types of Disasters.

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR)
Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stakeholders- Institutional Processes and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT
Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV DISASTER RISK MANAGEMENT IN INDIA
Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.
OUTCOMES:
The students will be able to

- Differentiate the types of disasters, causes and their impact on environment and society
- Assess vulnerability and various methods of risk reduction measures as well as mitigation.
- Draw the hazard and vulnerability profile of India, Scenarios in the Indian context,
- Disaster damage assessment and management.

TEXTBOOKS:

REFERENCES
1. Govt. of India: Disaster Management Act, Government of India, New Delhi, 2005
Rights – National and State Human Rights Commission – Judiciary – Role of NGO’s, Media, Educational Institutions, Social Movements.

TOTAL : 45 PERIODS

OUTCOME:
- Engineering students will acquire the basic knowledge of human rights.

REFERENCES:

TT7004 FUNCTIONAL FINISHES

OBJECTIVES:
To enable the students understand different types of finishes, method of application and characteristics of finished fabrics

UNIT I
Formaldehyde and non-formaldehyde based resin finishing, mechanism and types of resins deployed, methods of application, assessment of resins and finished goods.

UNIT II
Wetting and wicking; surface energy – concept, measurement and relevance to repellency; repellents applied to textile substrates; application of repellents by different techniques, assessment of the repellency in fabrics; detergency and soil release concepts, soil release agents, mechanism of soil retention & soil release, application of soil release finishes and its assessment; antistatic finishes mechanism, agents applied and its assessment.

UNIT III
Terminology related to flammability, flame retardant mechanisms, flame retarding chemicals for textile materials and testing of flame retardant finishes; mechanical finishes -calendaring, compacting, raising, sanforising, peach finishing, heat setting, foam finishing and various techniques for foam application, drawbacks of foam finishing.

UNIT IV
UV radiation; factors affecting UV protection; UV protection finishes; measurement of UV protection; antimicrobial finishes- classification, chemistry and application of antimicrobial finishes, evaluation of antimicrobial finishes.

UNIT V
Micro encapsulation techniques; softening finish; plasma finishing and application of nanotechnology in finishing

TOTAL = 45 Hours

OUTCOMES:
Upon completion of this course, the students would be able to explain
- Need for application of functional finishes on textile fabrics
- Method of application of finishes
- Characteristics of finished fabrics

REFERENCES
OBJECTIVES:
To enable the students understand the theory of 3D weaving and different methods of production

UNIT I  INTRODUCTION 3
Introduction to composite; forms of textile reinforcements and composite properties; classification of 3D woven fabrics; 3D woven structural requirements for composite and non composite applications; stitched 3D fabric production machines; Angle-interlock structure.

UNIT II  WOVEN MULTILAYER 3D FABRIC PRODUCTION 3
Multilayer 3D fabric – design concepts, production techniques, production issues, near net shape production techniques; woven 3D spacer fabrics - techniques in spacer fabric weaving, properties, application and limitations

UNIT III  NON INTERLACED 3D FABRIC PRODUCTION 3
Non crimp fabrics - loom modifications required, various shedding techniques; weft insertion techniques; properties, application and limitations

UNIT IV  ORTHOGONALLY INTERLACED 3D FABRICS PRODUCTION 3
3D shedding concept, shedding devices - dual direction shedding and other shedding devices; picking techniques; beat-up techniques; combined picking and beating up techniques – mechanisms; composite modular joint- types and weaving techniques; properties, application and limitations

UNIT V  CIRCULAR AND MULTI AXIAL 3D WEAVING 3
Circular 3D weaving technique; Triaxial weaving; modification of Triaxial weaving- Quart-axial and extended weaving, loom arrangements; multilayer multi axial fabrics; other shedding devices; fabric properties, application and limitations

TOTAL: 45 PERIODS
OUTCOMES:
Upon completion of this course, the students would be able to understand method of production of different types of 3D fabrics

REFERENCES:

AT7451 INTRODUCTION TO PATTERN ENGINEERING

OBJECTIVES:
- To introduce students the human anthropometrics from the scientific and technological viewpoint
- To equip students with comprehensive pattern making skills

UNIT I BASICS OF ANTHROPOMETRICS AND SIZING SYSTEM
Anthropometry measurements, human anatomy, landmark terms, perception of body appearance, its relation to clothing, clothing sizing systems, illusions created by clothing, body ideals-Eight head theory, body proportions, height and weight distribution.

UNIT II BODY MEASUREMENTS AND PATTERN TERMINOLOGIES
Important body measurements across all age groups, methods of measuring body dimensions, standard measurement chart-designation and control dimensions. Functions of pattern making tools, preparation of dress form, pattern grain line, balance line terms, notches, seam allowance, jog seam, dart points, pleats, flares, gather and true bias, trueing, blending.

UNIT III DRAFTING
Types of pattern making - drafting and draping methods; principles of pattern making, pattern details; basic blocks for men and women

UNIT IV PATTERNS FOR COLLARS AND SLEEVES
Collar classification and terms, basic shirt collar, peter pan collar, sailor collar, mandarin collar, built-up neck lines, cowls, sleeve cap, sleeve cuffs, puff, petal, lantern and leg-of-mutton sleeves

UNIT V FLAT PATTERN TECHNIQUES
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

OUTCOMES:
On completion of this course, the students shall have knowledge on
- Clothing sizing system
- Methods of body measurements
- Drafting and pattern preparation

TOTAL: 45 PERIODS
AT7551 ADVANCED PATTERN ENGINEERING

OBJECTIVES:
To enable the students to develop better understanding on pattern construction, grading and pattern alteration techniques to provide good fit

UNIT I FOUNDATIONS FOR TOPS
Basic shirt foundation-front bodice draft, back bodice draft, sleeve draft, adding seam allowance and pattern information; kimono, raglan foundation; pattern for princess line foundation, strapless princess bodice foundation

UNIT II FOUNDATIONS FOR BOTTOM WEAR
Pant foundation - front and back, waist band; jean foundation, pant derivatives;

UNIT III PATTERNS FOR POCKET, PLACKET AND FACINGS
Pocket classification, plackets; facing patterns for cut-out necklines and armholes

UNIT IV PATTERNS FOR KNITS, ACTION WEAR AND SWIMWEAR
Knit top foundations, bodysuit foundations and variations; swimwear—maillot, bikini, little-boy, and full-figure swim foundations; pattern for bias-cut dresses;

UNIT V PATTERN ALTERATIONS AND GRADING
Pattern alteration - fit for bodice, trouser and skirt; grading process, grade rules and types of grading system

OUTCOMES:
Upon completion of the course, the students shall have knowledge on the
- Pattern making with respect to sleeves, collar and pockets
- Foundations for tops and bottom wear construction
- Pattern preparation for knits, swim and action wear
- Pattern alteration and grading

REFERENCES

GE7251 ENVIRONMENTAL SCIENCE AND ENGINEERING

OBJECTIVES:
To the study of nature and the facts about environment.
- To find and implement scientific, technological, economic and political solutions to environmental problems.
• To study the interrelationship between living organism and environment.
• To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
• To study the dynamic processes and understand the features of the earth's interior and surface.
• To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY
Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.
Field study of common plants, insects, birds
Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION
Definition, causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards- soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.
Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES
Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.
Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT

OUTCOMES:
Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.

- Public awareness of environment at infant stage.
- Ignorance and incomplete knowledge has lead to misconceptions.
- Development and improvement in standard of living has lead to serious environmental disasters.

TEXT BOOKS:

REFERENCES:

OBJECTIVES:
- To understand the global trends and development methodologies of various types of products and services
- To conceptualize, prototype and develop product management plan for a new product based on the type of the new product and development methodology integrating the hardware, software, controls, electronics and mechanical systems
- To understand requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them into design specification
- To understand system modeling for system, sub-system and their interfaces and arrive at the optimum system specification and characteristics
- To develop documentation, test specifications and coordinate with various teams to validate and sustain up to the EoL (End of Life) support activities for engineering customer

UNIT I FUNDAMENTALS OF PRODUCT DEVELOPMENT
UNIT II REQUIREMENTS AND SYSTEM DESIGN
9

UNIT III DESIGN AND TESTING
9

UNIT IV SUSTENANCE ENGINEERING AND END-OF-LIFE (EOL) SUPPORT
9

UNIT V BUSINESS DYNAMICS – ENGINEERING SERVICES INDUSTRY
9

TOTAL: 45 PERIODS

OUTCOMES:
 Upon completion of the course, the students will be able to:
• Define, formulate and analyze a problem
• Solve specific problems independently or as part of a team
• Gain knowledge of the Innovation & Product Development process in the Business Context
• Work independently as well as in teams
• Manage a project from start to finish

TEXTBOOKS:
1. Book specially prepared by NASSCOM as per the MoU.

REFERENCES:
UNIT I

Enterprise Resource Planning – principle, framework, scope; application of ERP in textile manufacturing industry - business concepts, costing, order booking, MRP, purchase, production planning, production orders, inventory control, packing, shipping, scheduling, sample preparation and approval, business reports

UNIT II

ERP in textile processing – master creation, raw material receipt, batch creation, sample process and approvals, recipe creation, dyes and chemicals issue, production tracking, quality control, dispatch, invoice, machine repairs and maintenance, reports

UNIT III

ERP in retail management – style template, finished goods barcoding, stock taking, stock inward, retail order booking, stock allocation, scan and pack, dispatch, invoice, point of sale, reports

Total number of periods (Theory + Lab): 15+60

TEXT BOOKS:


REFERENCES: