1. **Programme Educational Objectives (PEOs)**

Bachelor of Textile Chemistry curriculum is designed to prepare the graduates having attitude and knowledge to

a) Have powerful base to pursue a successful professional and technical career

b) Have strong foundation in basic sciences, mathematics, engineering and experimentation skills to comprehend the manufacturing processes and provide practical and innovative solutions.

c) Have knowledge on the theory and practices in the field of textile chemistry and allied areas to manage textile chemical processing industry and provide techno-economic solutions to the problems.

d) Engross in life-long learning to keep abreast with emerging technology

e) Practice and inspire high ethical values and maintain high technical standards

2. **Programme Outcome (POs)**

1. Ability to apply knowledge of mathematics, science and engineering in textile wet processing and product design.

2. Ability to apply knowledge on fiber, yarn, fabric manufacture, fabric structure, chemical processing and testing of textiles in the field of textile wet processing.

3. Ability to apply the knowledge on theory of colouration, chemistry of dyes on product development

4. Ability to identify and solve technological problems in textile wet processing industry

5. Ability to analyze and apply knowledge in the field of design and production of textile products using computational platforms and software tools.

6. Commitment to implement the professional and ethical values.

7. Use the techniques, skills, and modern tools necessary for practicing in the textile wet processing industry.

8. Ability to communicate effectively and work in interdisciplinary groups.

9. Ability to review, comprehend and report technological development.

3. **PEOs / POs Mapping**

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Year IV
**ANNA UNIVERSITY, CHENNAI**  
**AFFILIATED INSTITUTIONS**  
**REGULATIONS 2017**  
**B. TECH. TEXTILE CHEMISTRY**  
**CHOICE BASED CREDIT SYSTEM**  
**I TO VIII SEMESTERS (FULL TIME) CURRICULA AND SYLLABI**

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**Note:** Internship for a duration of two weeks during the Semester summer vacation should be undergone by the students for which assessment will be done during VII semester.
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* - Course from the curriculum of the other UG Programmes

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Note: Internship for a duration of two weeks during the Semester summer vacation should be undergone by the students for which assessment will be done during VII semester.
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* - Course from the curriculum of the other UG Programmes  
** - vide IV semester and VI semester

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**TOTAL CREDITS: 185**

**PROFESSIONAL ELECTIVES**

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### EMPLOYABILITY ENHANCEMENT COURSES (EEC)

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### SUMMARY

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OBJECTIVES:
- To develop the basic reading and writing skills of first year engineering and technology students.
- To help learners develop their listening skills, which will, enable them listen to lectures and comprehend them by asking questions; seeking clarifications.
- To help learners develop their speaking skills and speak fluently in real contexts.
- To help learners develop vocabulary of a general kind by developing their reading skills

UNIT I SHARING INFORMATION RELATED TO ONESELF/FAMILY& FRIENDS 12
Reading - short comprehension passages, practice in skimming-scanning and predicting
Writing - completing sentences - developing hints. Listening - short texts- short formal and informal conversations. Speaking - introducing oneself - exchanging personal information
Language development- Wh- Questions- asking and answering-yes or no questions- parts of speech. Vocabulary development- prefixes- suffixes- articles.- count/ uncount nouns.

UNIT II GENERAL READING AND FREE WRITING 12
Reading - comprehension-pre-reading-post reading- comprehension questions (multiple choice questions and /or short questions/ open-ended questions)-inductive reading- short narratives and descriptions from newspapers including dialogues and conversations (also used as short Listening texts)- register Writing – paragraph writing- topic sentence- main ideas- free writing, short narrative descriptions using some suggested vocabulary and structures –Listening-telephonic conversations. Speaking – sharing information of a personal kind—greeting – taking leave- Language development – prepositions, conjunctions Vocabulary development- guessing meanings of words in context.

UNIT III GRAMMAR AND LANGUAGE DEVELOPMENT 12
Reading- short texts and longer passages (close reading) Writing- understanding text structure- use of reference words and discourse markers-coherence-jumbled sentences Listening – listening to longer texts and filling up the table- product description- narratives from different sources. Speaking- asking about routine actions and expressing opinions. Language development- degrees of comparison- pronouns- direct vs indirect questions- Vocabulary development – single word substitutes- adverbs.

UNIT IV READING AND LANGUAGE DEVELOPMENT 12
Reading- comprehension-reading longer texts- reading different types of texts- magazines Writing- letter writing, informal or personal letters-e-mails-conventions of personal email Listening- listening to dialogues or conversations and completing exercises based on them. Speaking- speaking about oneself- speaking about one’s friend- Language development- Tenses- simple present-simple past- present continuous and past continuous- Vocabulary development- synonyms-antonyms- phrasal verbs

UNIT V EXTENDED WRITING 12
Reading- longer texts- close reading –Writing- brainstorming -writing short essays – developing an outline- identifying main and subordinate ideas- dialogue writing-Listening – listening to talks- conversations- Speaking – participating in conversations- short group conversations-Language development-modal verbs- present/ past perfect tense - Vocabulary development- collocations- fixed and semi-fixed expressions
OUTCOMES:
At the end of the course, learners will be able to:

- Read articles of a general kind in magazines and newspapers.
- Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English.
- Comprehend conversations and short talks delivered in English.
- Write short essays of a general kind and personal letters and emails in English.

TEXT BOOKS:

REFERENCES

MA8151 ENGINEERING MATHEMATICS – I

OBJECTIVES:
- The goal of this course is to achieve conceptual understanding and to retain the best traditions of traditional calculus. The syllabus is designed to provide the basic tools of calculus mainly for the purpose of modelling the engineering problems mathematically and obtaining solutions. This is a foundation course which mainly deals with topics such as single variable and multivariable calculus and plays an important role in the understanding of science, engineering, economics and computer science, among other disciplines.

UNIT I DIFFERENTIAL CALCULUS
Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules - Maxima and Minima of functions of one variable.

UNIT II FUNCTIONS OF SEVERAL VARIABLES
UNIT III INTEGRAL CALCULUS

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


TOTAL : 60 PERIODS

OUTCOMES:

After completing this course, students should demonstrate competency in the following skills:

- Use both the limit definition and rules of differentiation to differentiate functions.
- Apply differentiation to solve maxima and minima problems.
- Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus.
- Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.
- Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.
- Determine convergence/divergence of improper integrals and evaluate convergent improper integrals.
- Apply various techniques in solving differential equations.

TEXT BOOKS:

2. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, New Delhi, 2015. [For Units I & III - Sections 1.1, 2.2, 2.3, 2.5, 2.7(Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1(Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

REFERENCES:

OBJECTIVES:
- To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT I  PROPERTIES OF MATTER  9

UNIT II  WAVES AND FIBER OPTICS  9

UNIT III  THERMAL PHYSICS  9

UNIT IV  QUANTUM PHYSICS  9

UNIT V  CRYSTAL PHYSICS  9
Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - crystal imperfections: point defects, line defects – Burger vectors, stacking faults – role of imperfections in plastic deformation - growth of single crystals: solution and melt growth techniques.

OUTCOMES:
Upon completion of this course,
- the students will gain knowledge on the basics of properties of matter and its applications,
- the students will acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics,
• the students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers,
• the students will get knowledge on advanced physics concepts of quantum theory and its applications in tunneling microscopes, and
• the students will understand the basics of crystals, their structures and different crystal growth techniques.

TEXT BOOKS:

REFERENCES:

CY8151 ENGINEERING CHEMISTRY

OBJECTIVES:
• To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
• To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.
• Preparation, properties and applications of engineering materials.
• Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.
• Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.

UNIT I WATER AND ITS TREATMENT

UNIT II SURFACE CHEMISTRY AND CATALYSIS
Catalysis: Catalyst – types of catalysis – criteria – autocatalysis – catalytic poisoning and catalytic promoters - acid base catalysis – applications (catalytic convertor) – enzyme catalysis–
Michaelis – Menten equation.

UNIT III ALLOYS AND PHASE RULE

UNIT IV FUELS AND COMBUSTION

UNIT V ENERGY SOURCES AND STORAGE DEVICES
Nuclear fission - controlled nuclear fission - nuclear fusion - differences between nuclear fission and fusion - nuclear chain reactions - nuclear energy - light water nuclear power plant - breeder reactor - solar energy conversion - solar cells - wind energy. Batteries, fuel cells and supercapacitors: Types of batteries – primary battery (dry cell) secondary battery (lead acid battery, lithium-ion-battery) fuel cells – H₂-O₂ fuel cell.

OUTCOMES:
- The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
- To know the basics of algorithmic problem solving
- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures — lists, tuples, dictionaries.
- To do input/output with files in Python.

UNIT I ALGORITHMIC PROBLEM SOLVING
Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II DATA, EXPRESSIONS, STATEMENTS
Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROL FLOW, FUNCTIONS
Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES
Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, mergesort, histogram.

UNIT V FILES, MODULES, PACKAGES
Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

OUTCOMES:
Upon completion of the course, students will be able to
- Develop algorithmic solutions to simple computational problems
- Read, write, execute by hand simple Python programs.
- Structure simple Python programs for solving problems.
- Decompose a Python program into functions.
- Represent compound data using Python lists, tuples, dictionaries.
• Read and write data from/to files in Python Programs.

TOTAL : 45 PERIODS

TEXT BOOKS:

REFERENCES:

GE8152 ENGINEERING GRAPHICS

OBJECTIVES:
• To develop in students, graphic skills for communication of concepts, ideas and design of Engineering products.
• To 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 FREEHAND SKETCHING 7+12
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- Freehand sketching of multiple views from pictorial views of objects

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACE 6+12
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 traces
  Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III  PROJECTION OF SOLIDS  5+12
Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method.

UNIT IV  PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES  5+12
Sectioning of above 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.

UNIT V  ISOMETRIC AND PERSPECTIVE PROJECTIONS  6+12
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 - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

TOTAL: 90 PERIODS

OUTCOMES:
On successful completion of this course, the student will be able to
  • familiarize with the fundamentals and standards of Engineering graphics
  • perform freehand sketching of basic geometrical constructions and multiple views of objects.
  • project orthographic projections of lines and plane surfaces.
  • draw projections and solids and development of surfaces.
  • visualize and to project isometric and perspective sections 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. The examination will be conducted in appropriate sessions on the same day.

**GE8161 PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY**

**OBJECTIVES:**
- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, dictionaries.
- Read and write data from/to files in Python.

**LIST OF PROGRAMS**
1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton’s method)
3. Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Linear search and Binary search
6. Selection sort, Insertion sort
7. Merge sort
8. First n prime numbers
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Simulate elliptical orbits in Pygame
13. Simulate bouncing ball using Pygame

**PLATFORM NEEDED**
Python 3 interpreter for Windows/Linux

**OUTCOMES:**
Upon completion of the course, students will be able to
- Write, test, and debug simple Python programs.
- Implement Python programs with conditionals and loops.
- Develop Python programs step-wise by defining functions and calling them.
- Use Python lists, tuples, dictionaries for representing compound data.
- Read and write data from/to files in Python.

**TOTAL :60 PERIODS**
OBJECTIVES:
- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics, properties of matter and liquids.

LIST OF EXPERIMENTS: PHYSICS LABORATORY (Any 5 Experiments)
1. Determination of rigidity modulus – Torsion pendulum
2. Determination of Young’s modulus by non-uniform bending method
3. (a) Determination of wavelength, and particle size using Laser
   (b) Determination of acceptance angle in an optical fiber.
5. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer
6. Determination of wavelength of mercury spectrum – spectrometer grating
7. Determination of band gap of a semiconductor
8. Determination of thickness of a thin wire – Air wedge method

TOTAL: 30 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
- apply principles of elasticity, optics and thermal properties for engineering applications.

CHEMISTRY LABORATORY: (Any seven experiments to be conducted)

OBJECTIVES:
- To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.
- To acquaint the students with the determination of molecular weight of a polymer by viscometry.

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-Phenantrline / 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.
16. Conductometric titration of strong acid vs strong base.
OUTCOMES:
- The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

TOTAL: 30 PERIODS

TEXTBOOKS:

HS8251 TECHNICAL ENGLISH L T P C
4 0 0 4

OBJECTIVES:
The Course prepares second semester engineering and Technology students to:
- Develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.
- Foster their ability to write convincing job applications and effective reports.
- Develop their speaking skills to make technical presentations, participate in group discussions.
- Strengthen their listening skill which will help them comprehend lectures and talks in their areas of specialisation.

UNIT I INTRODUCTION TECHNICAL ENGLISH
Listening - Listening to talks mostly of a scientific/technical nature and completing information-gap exercises
Speaking – Asking for and giving directions
Reading – reading short technical texts from journals, newspapers
Writing - purpose statements – extended definitions – issue-writing instructions – checklists-recommendations
Vocabulary Development - technical vocabulary
Language Development –subject verb agreement - compound words.

UNIT II READING AND STUDY SKILLS
Listening- Listening to longer technical talks and completing exercises based on them
Speaking – describing a process
Reading – reading longer technical texts
Writing - interpreting charts, graphs
Vocabulary Development-vocabulary used in formal letters/emails and reports
Language Development-impersonal passive voice, numerical adjectives.

UNIT III TECHNICAL WRITING AND GRAMMAR
Listening- Listening to classroom lectures/talks on engineering/technology
Speaking – introduction to technical presentations
Reading – longer texts both general and technical, practice in speed reading
Writing-Describing a process, use of sequence words
Vocabulary Development- sequence words
Language Development- embedded sentences

UNIT IV REPORT WRITING
Listening- Listening to documentaries and making notes.
Speaking – mechanics of presentations
Reading – reading for detailed comprehension
Writing- email etiquette
job application – cover letter –Résumé preparation (via email and hard copy)
Vocabulary Development- finding suitable synonyms-paraphrasing
Language Development- clauses- if conditionals.
UNIT V GROUP DISCUSSION AND JOB APPLICATIONS 12

Listening- TED/Ink talks; Speaking –participating in a group discussion -Reading– reading and understanding technical articles Writing– Writing reports- minutes of a meeting- accident and survey-Vocabulary Development- verbal analogies Language Development- reported speech .

TOTAL :60 PERIODS

OUTCOMES: At the end of the course learners will be able to:

- Read technical texts and write area- specific texts effortlessly.
- Listen and comprehend lectures and talks in their area of specialisation successfully.
- Speak appropriately and effectively in varied formal and informal contexts.
- Write reports and winning job applications.

TEXT BOOKS:

REFERENCES
2. Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007

Students can be asked to read Tagore, Chetan Bhagat and for suplementary reading.

MA8251 ENGINEERING MATHEMATICS – II 4 0 0 4

OBJECTIVES :
- This course is designed to cover topics such as Matrix Algebra, Vector Calculus, Complex Analysis and Laplace Transform. Matrix Algebra is one of the powerful tools to handle practical problems arising in the field of engineering. Vector calculus can be widely used for modelling the various laws of physics. The various methods of complex analysis and Laplace transforms can be used for efficiently solving the problems that occur in various branches of engineering disciplines.

UNIT I MATRICES 12

UNIT II VECTOR CALCULUS 12
Gradient and directional derivative – Divergence and curl - Vector identities – 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 FUNCTIONS 12
Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions $w = z + c, cz, \frac{1}{z}, z^n$ - Bilinear transformation.

UNIT IV COMPLEX INTEGRATION 12

UNIT V LAPLACE TRANSFORMS 12

TOTAL: 60 PERIODS

OUTCOMES:
After successfully completing the course, the student will have a good understanding of the following topics and their applications:

- Eigenvalues and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices.
- Gradient, divergence and curl of a vector point function and related identities.
- Evaluation of line, surface and volume integrals using Gauss, Stokes and Green’s theorems and their verification.
- Analytic functions, conformal mapping and complex integration.
- Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.

TEXT BOOKS:

REFERENCES:
OBJECTIVES:

- To introduce the physics of various materials relevant to different branches of technology

UNIT I  PREPARATION OF MATERIALS


UNIT II  CONDUCTING MATERIALS


UNIT III  SEMICONDUCTING MATERIALS


UNIT IV  DIELECTRIC AND MAGNETIC MATERIALS


UNIT V  NEW MATERIALS AND APPLICATIONS


OUTCOMES:

At the end of the course, the students will able to

- gain knowledge on phase diagrams and various material processing methods,
- acquire knowledge on basics of conducting materials, superconductors and their applications
- get knowledge on the functioning of semiconducting materials and their applications in...
LED and solar cells,
- understand the functioning of various dielectric and magnetic materials,
- have the necessary understanding on various advanced materials.

TEXT BOOKS:

REFERENCES

CY8292 CHEMISTRY FOR TECHNOLOGISTS  
L T P C  
3 0 0 3

UNIT I UNIT PROCESSES 9
Nitration, Sulphonation, Halogenation, Esterification, Amination, Saponification and Hydrogenation – Role of the above unit processes in such industries as petroleum, drugs, pharmaceuticals and organic synthesis.

UNIT II REACTION MECHANISMS 9
Free radical, substitutions, electrophilic, addition, aromatic electrophilic substitutions, nucleophilic additions, condensation reactions, nucleophilic substitutions in aliphatic and aromatic compounds, cyclo-additions, rearrangements-Beckmann and Fries rearrangement reactions.

UNIT III OILS, FATS, SOAPS & LUBRICANTS 9
Chemical constitution, Chemical analysis of oils and fats – acid, saponification and iodine values, Definitions, determinations and significance. Definition, mechanism of lubrication, preparation of petrolubes, desirable characteristics – viscosity, viscosity index, carbon residue, oxidation stability, flash and fire points, cloud and pour points, aniline point. Semisolid lubricant – greases, preparation of sodium, lithium, calcium and axle greases and uses, consistency test and drop point test. Solid lubricants – graphite and molybdenum disulphide.

UNIT IV CHEMICALS AND AUXILIARIES 9
Preparation, properties and uses of bleaching powder, sodium hypochlorite, hydrogen peroxide, chlorine dioxide. Estimation of available chlorine in hypochlorite bleach liquor. Determination of strength of hydrogen peroxide.
UNIT V   COLORANTS
Theory of color and constitution: chromophore and auxochrome, classification of dyes based on application. Chemistry and synthesis of azo dye (Methyl red, Methyl orange and Congo red)

TOTAL: 45 PERIODS

TEXTBOOKS:

REFERENCES:

BE8251   BASIC ELECTRICAL AND ELECTRONICS ENGINEERING   L T P C
3 0 0 3

OBJECTIVES:
- To explain the basic theorems used in Electrical circuits and the different components and function of electrical machines.
- To explain the fundamentals of semiconductor and applications.
- To explain the principles of digital electronics
- To impart knowledge of communication.

UNIT I   ELECTRICAL CIRCUITS & MEASURMENTS

UNIT II   ELECTRICAL MACHINES

UNIT III   SEMICONDUCTOR DEVICES AND APPLICATIONS
UNIT IV DIGITAL ELECTRONICS 9

UNIT V FUNDAMENTALS OF COMMUNICATION ENGINEERING 9

OUTCOMES:

- ability to identify the electrical components and explain the characteristics of electrical machines.
- ability to identify electronics components and understand the characteristics

TEXT BOOKS:

REFERENCES:

TT8251 BASICS OF TEXTILE TECHNOLOGY L T P C
3 0 0 3

OBJECTIVES

- To enable the students to learn about the basics of fibre forming, yarn production, fabric formation, coloration of fabrics and garment manufacturing

UNIT I BASICS OF FIBRE SCIENCE AND SPINNING 13
Definition of fibre, classification of textile fibers; polymer and polymerization; fibre production principles – wet spinning, dry spinning, melt spinning, gel spinning, dope spinning; characteristics of cotton, viscose, wool, silk, polyester, nylon, polypropylene; sequence of machineries in short staple yarn spinning from ginning to cone winding and their objectives.

UNIT II BASICS OF FABRIC PRODUCTION 13
Woven fabric – warp, weft, weaving, path of warp; looms – classification, handloom and its parts, powerloom, automatic looms, shuttleless looms, special type of looms; preparatory
machines for weaving process and their objectives; basic weaving mechanism - primary, secondary and auxiliary mechanisms; knitting – classification, principle, types of fabrics; nonwoven process – classification, principle, types of fabrics.

UNIT III          BASICS OF CHEMICAL PROCESSING               9
Objectives of the processes - singeing, desizing, scouring, bleaching, mercerization; dyeing - classification of dyes, types of dyeing techniques; printing – types and styles of printing; finishing treatments – chemical and mechanical finishing.

UNIT IV          BASICS OF GARMENT MANUFACTURING           5
Anthropometry, basic principles of pattern making and grading, marker planning, spreading, cutting, sorting, sewing, finishing and packing.

UNIT V          BASIC FIBRE, YARN AND FABRIC PROPERTIES      5
Essential fibre properties- cotton and polyester; yarn numbering systems; essential yarn properties; fabric specifications and essential fabric properties

TOTAL : 45 PERIODS

OUTCOMES:
- The students will have the knowledge on the basics of fibre forming polymers, weaving the yarns into fabric, coloration of the fabrics and manufacturing of garments.

TEXT BOOKS:

REFERENCES:

GE8261                                ENGINEERING PRACTICES LABORATORY        L  T  P  C
                                          0 0 4 2

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 & MECHANICAL)

I  CIVIL ENGINEERING PRACTICE  13

Buildings:
(a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:
(a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
(b) Study of pipe connections requirements for pumps and turbines.
(c) Preparation of plumbing line sketches for water supply and sewage works.
(d) Hands-on-exercise:
   Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
(e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:
(a) Study of the joints in roofs, doors, windows and furniture.
(b) Hands-on-exercise:
   Wood work, joints by sawing, planing and cutting.

II  MECHANICAL ENGINEERING PRACTICE  18

Welding:
(a) Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.
(b) Gas welding practice

Basic Machining:
(a) Simple Turning and Taper turning
(b) Drilling Practice

Sheet Metal Work:
(a) Forming & Bending:
(b) Model making – Trays and funnels.
(c) Different type of joints.

Machine assembly practice:
(a) Study of centrifugal pump
(b) Study of air conditioner

Demonstration on:
(a) Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.
(b) Foundry operations like mould preparation for gear and step cone pulley.
(c) Fitting – Exercises – Preparation of square fitting and V – fitting models.

GROUP B (ELECTRICAL & ELECTRONICS)

III  ELECTRICAL ENGINEERING PRACTICE  13

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Stair case wiring
4. Measurement of electrical quantities – voltage, current, power & power factor in RLC
5. Measurement of energy using single phase energy meter.

**IV ELECTRONICS ENGINEERING PRACTICE**

1. Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CR.
2. Study of logic gates AND, OR, EX-OR and NOT.
4. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.

**TOTAL: 60 PERIODS**

**OUTCOMES:**
On successful completion of this course, the student will be able to
- fabricate carpentry components and pipe connections including plumbing works.
- use welding equipments to join the structures.
- Carry out the basic machining operations
- Make the models using sheet metal works
- Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundary and fittings
- Carry out basic home electrical works and appliances
- Measure the electrical quantities
- Elaborate on the components, gates, soldering practices.

**LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:**

**CIVIL**

1. Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings. 15 Sets.
2. Carpentry vice (fitted to work bench) 15 Nos.
4. Models of industrial trusses, door joints, furniture joints 5 each
5. Power Tools: (a) Rotary Hammer 2 Nos
   (b) Demolition Hammer 2 Nos
   (c) Circular Saw 2 Nos
   (d) Planer 2 Nos
   (e) Hand Drilling Machine 2 Nos
   (f) Jigsaw 2 Nos

**MECHANICAL**

1. Arc welding transformer with cables and holders 5 Nos.
2. Welding booth with exhaust facility 5 Nos.
3. Welding accessories like welding shield, chipping hammer, wire brush, etc. 5 Sets.
4. Oxygen and acetylene gas cylinders, blow pipe and other welding outfit. 2 Nos.
5. Centre lathe 2 Nos.
6. Hearth furnace, anvil and smithy tools 2 Sets.
7. Moulding table, foundry tools 2 Sets.
9. Study-purpose items: centrifugal pump, air-conditioner .......... One each.

**ELECTRICAL**

1. Assorted electrical components for house wiring .......... 15 Sets
2. Electrical measuring instruments .......... 10 Sets
3. Study purpose items: Iron box, fan and regulator, emergency lamp .......... 1 each
5. Power Tools: (a) Range Finder .......... 2 Nos
   (b) Digital Live-wire detector .......... 2 Nos

**ELECTRONICS**

5. Study purpose items: Telephone, FM radio, low-voltage power supply

**CY8261**

**APPLIED CHEMISTRY LABORATORY**

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**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 (Any ten 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.
6. Estimation of HCl using Na₂CO₃ as primary standard and determination of alkalinity in water sample.
7. Determination of purity of washing soda and strength of a commercial acid
8. Estimation of available chlorine in hypochlorite solution
9. Estimation of strength of hydrogen peroxide
11. Determination of Calorific value using Bomb calorimeter

**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**

OBJECTIVE:

- This course aims at providing the required skill to apply the statistical tools in engineering problems.
- To introduce the basic concepts of probability and random variables.
- To introduce the basic concepts of two dimensional random variables.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of classifications of design of experiments which plays very important roles in the field of agriculture and statistical quality control.

UNIT I PROBABILITY AND RANDOM VARIABLES


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 TESTING OF HYPOTHESIS

Sampling distributions - Estimation of parameters - Statistical hypothesis - Large sample tests based on Normal distribution for single mean and difference of means - Tests based on t, Chi-square and F distributions for mean, variance and proportion - Contingency table (test for independent) - Goodness of fit.

UNIT IV DESIGN OF EXPERIMENTS

One way and Two way classifications - Completely randomized design – Randomized block design – Latin square design - 2^2 factorial design.

UNIT V STATISTICAL QUALITY CONTROL

Control charts for measurements (X and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits - Acceptance sampling.

OUTCOMES:

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

- Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
- Understand the basic concepts of one and two dimensional random variables and apply in engineering applications.
- Apply the concept of testing of hypothesis for small and large samples in real life problems.
- Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.
- Have the notion of sampling distributions and statistical techniques used in engineering and management problems.
TEXT BOOKS:

REFERENCES:

TT8391 ENGINEERING MECHANICS FOR TEXTILE TECHNOLOGISTS L T P C 3 2 0 4

OBJECTIVE:
- To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering

UNIT I BASICS AND STATICS OF PARTICLES 15

UNIT II EQUILIBRIUM OF RIGID BODIES 15
Free body diagram – Types of supports –Action and reaction forces –stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon’s theorem – Single equivalent force -Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions

UNIT III PROPERTIES OF SURFACES AND SOLIDS 15
UNIT IV DYNAMICS OF BODIES

UNIT V FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS
Friction force – Laws of sliding friction – equilibrium analysis of simple systems with sliding friction –wedge friction-. Rolling resistance -Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion of simple rigid bodies such as cylinder, disc/wheel and sphere.

TOTAL: 75 PERIODS

OUTCOMES:
- Ability to explain the differential principles applies to solve engineering problems dealing with force, displacement, velocity and acceleration.
- Ability to analyse the forces in any structures.
- Ability to solve rigid body subjected to dynamic forces.

TEXT BOOKS:

REFERENCES:

CY8291 ORGANIC CHEMISTRY

OBJECTIVE:
- To enable the students to learn the type of components in which organic reactions take place and also to know the preparation of the essential organic compounds.

UNIT I ORGANIC REACTION MECHANISM
Electrophilic reactions-Friedel crafts reaction, Riemer Tiemenn reaction, Beckmann rearrangements; nucleophilic reactions- aldol condensation, perkin reaction, benzoin condensation; free radical reaction-halogenation of alkane, addition of HBr on alkene in presence of peroxide; allylic halogenation - using N-Bromo Succinamide (NBS), thermal halogenation of alkene CH₃ – CH = CH₂.

UNIT II CARBOHYDRATES
Introduction – mono and disaccharides – important reactions – polysaccarides – starch and cellulose – derivatives of cellulose – carboxy methyl cellulose and gun cotton – structural aspects of cellulose
UNIT III POLYNUCLEAR AROMATICS AND HETEROCYCLES 9
Classification of polynuclear aromatics. Naphthalene preparation, properties and uses.
Classification of heterocyclic compounds. Furan, thiophene, pyrrole, pyridine, quinoline, isoquinoline - preparation, properties and uses.

UNIT IV AMINO ACIDS AND PROTEINS 9
Classification, preparation (Strecker, Skraup, Gabriel phthalimide) and properties of Amino acids.

UNIT V DRUGS & DYES 9
Classification and properties of drugs. Penicillin sulpha drugs, mode of action, synthesis of sulphanilamide, chloroquine and chloroamphenicol.

TOTAL: 45 PERIODS

OUTCOMES:
- At the end of the course students will have knowledge on various reaction mechanism, preparation of organic compounds and their properties.

TEXTBOOKS:

REFERENCES:

TT8351 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 AND MORPHOLOGY 18
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; 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 II 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 fibres – mechanism of conditioning and factors influencing conditioning. Moisture diffusion in fibres. Heat of sorption – integral and differential, their relation; factors influencing heat of sorption - measurement of heat of sorption

UNIT III TENSILE CHARACTERISTICS 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 IV OPTICAL AND FRICTIONAL CHARACTERISTICS 6
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.

UNIT V THERMAL CHARACTERISTICS 6
Thermal transitions of fibres - thermal conductivity, thermal expansion and contraction, Tg, melting; static electricity in textile fibres

TOTAL:60 PERIODS

OUTCOMES:
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

TEXT BOOKS:

REFERENCES:

FT8301 TECHNOLOGY OF SPINNING PROCESSES L T P C 3 0 0 3

OBJECTIVE:
- To enable the students to understand various processes involved in conversion of fibre to yarn by ring spinning system and other modern spinning systems.

UNIT I OPENING AND CLEANING 9
Linear density systems for textile materials; Ginning – objectives, types, working principle and ginning performance on yarn quality; opening and cleaning – objectives of blow room machines, principle of opening, cleaning and blending machines, contamination clearers and safety devices; chute feed system

UNIT II CARDING AND DRAWING 9
Carding – objectives, principles of carding, working of carding machine; drawing machine– objectives, drafting system – types and applications, principles of auto levellers

UNIT III COMBING AND ROVING 9
Comber preparation – objectives, principles of sliver lap ribbon lap and super lap formers; comber - principle of combing, sequence of combing operation; roving machine – objectives, working principle and operation

UNIT IV RING SPINNING AND YARN PLYING 9
Ring spinning machine – objectives, working principle and operation; condensed yarn spinning – principles, merits; two-folding of yarns –package preparation, working principle, resultant count calculation; fancy yarn – types, method of production and applications

UNIT V NEW SPINNING PROCESS 9
Principles of yarn formation and material flow – rotor, friction, air-jet and air vortex spinning machines ; core, wrap spinning system, comparison of yarn properties

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the student shall understand
- Process sequence for producing different types of yarns
- Principle of machines used for production of yam

TEXT BOOKS:
REFERENCES:

FT8491 FABRIC MANUFACTURING L T P C
3 0 0 3

OBJECTIVES:
- To teach preparatory processes and machinery for weaving
- To teach weaving and non-woven technologies of fabric manufacturing and the machinery used.

UNIT I

UNIT II

UNIT III
UNIT IV

Non-Woven fabrics - Types – different methods of production of non wovens, Properties and application of non woven fabrics.

OUTCOMES:
After successful completion of this course, the students should be able to acquire knowledge on,
- Processes and machinery for weaving,
- Warp & weft knitting and non-woven technologies of fabric manufacturing and the machinery used.

TEXT BOOKS:

REFERENCES:

TC8311 YARN AND FABRIC MANUFACTURING LABORATORY

OBJECTIVES:
To enable the students to
- Get practical experience in the yarn spinning, weaving preparatory and weaving machines
- Learn material passage and identify the parts of machines of spinning and weaving machines

LIST OF EXPERIEMENTS
1. Material passage and production calculation in
   - Blow room scutcher
   - Carding machine
   - Comber
   - Draw frame
   - Speed frame
2. Material passage, draft, twist and production calculation in ring frame
3. Material passage and production calculation in winding machine
4. Timing diagram of weaving machine
5. Shedding mechanisms - Tappet, dobbey
6. Jacquard mechanism
7. Picking mechanism and calculation of shuttle speed
8. Beat-up mechanism
9. Let-off and take-up mechanism
10. Auxiliary mechanisms
TOTAL: 60 PERIODS

OUTCOMES:
Upon completion of this practical course, the students shall be able to
- Understand the material passage in the machine, draw gearing diagram, identify the components of spinning and weaving machines
- Calculate draft, twist and production rate of spinning machines
- Understand the mechanism of weaving machine

LAB EQUIPMENTS
LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS

1. Blow room Line – 1 No.
2. Carding machine – 1 No.
3. Drawing machine – 1 No.
4. Comber preparatory and combing machines – 1 No.
5. Roving machine – 1 No.
6. Ring Frame – 1 No.
7. Cone / Cheese winding machine – 1 No.
8. Pirn winding machine – 1 No.
9. Loom with tappet shedding – 1 No.
10. Loom with dobby shedding – 1 No.
11. Loom with jacquard – 1 No.
12. Loom with dropbox – 1 No.

TT8361 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 fibres by feel, microscopic view, burning behavior and solubility
   - Natural cellulose fibres
   - Natural protein fibres
   - Regenerated cellulose fibres
   - Polyamide fibres
   - Polyester fibres
   - Polyolefin 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 the percentage of spin finish of synthetic fibres
6. Determination of wax content of the cotton fibres
7. Determination of the blend proportion
   - Natural/ regenerated cellulose
   - Cellulose/ protein fibres
   - Cellulose/polyester fibres
8. Thermo gravimetric analysis of fibres using thermograms
9. FTIR analysis of polymers and fibres from spectrum

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

- Identify the given fibres using cross section, dissolution in solvent and burn test practically.
- Determine important properties of fibres
- Determine blend proportion of different fibres in a blended material

LABORATORY EQUIPMENT
LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS
1. Microscope – 1 No.
2. Weighing balance – 1 No.
3. Conditioning Chamber – 1 No.

HS8381  INTERPERSONAL SKILLS/LISTENING AND SPEAKING  L T P C
0 0 2 1

OBJECTIVES: The Course will enable learners to:

- Equip students with the English language skills required for the successful undertaking of academic studies with primary emphasis on academic speaking and listening skills.
- Provide guidance and practice in basic general and classroom conversation and to engage in specific academic speaking activities.
- improve general and academic listening skills
- Make effective presentations.

UNIT I
Listening as a key skill- its importance- speaking - give personal information - ask for personal information - express ability - enquire about ability - ask for clarification Improving pronunciation - pronunciation basics taking lecture notes - preparing to listen to a lecture - articulate a complete idea as opposed to producing fragmented utterances.

UNIT II
Listen to a process information- give information, as part of a simple explanation - conversation starters: small talk - stressing syllables and speaking clearly - intonation patterns - compare and contrast information and ideas from multiple sources- converse with reasonable accuracy over a wide range of everyday topics.

UNIT III
Lexical chunking for accuracy and fluency- factors influence fluency, deliver a five-minute informal talk - greet - respond to greetings - describe health and symptoms - invite and offer - accept - decline - take leave - listen for and follow the gist- listen for detail

UNIT IV
Being an active listener: giving verbal and non-verbal feedback - participating in a group discussion - summarizing academic readings and lectures conversational speech listening to and participating in conversations - persuade.
UNIT V
Formal and informal talk - listen to follow and respond to explanations, directions and instructions in academic and business contexts - strategies for presentations and interactive communication - group/pair presentations - negotiate disagreement in group work.

TOTAL: 30 PERIODS

OUTCOMES: At the end of the course Learners will be able to:
- Listen and respond appropriately.
- Participate in group discussions
- Make effective presentations
- Participate confidently and appropriately in conversations both formal and informal

TEXT BOOKS:

REFERENCES

TT8452 SOLID MECHANICS FOR TEXTILE TECHNOLOGISTS L T P C 3 0 0 3

OBJECTIVE:
- To teach the students on design of 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
Torsion of circular shafts – derivation of torsion equation \( T/J = fs/R = Cθ/L \) – stress and deformation in circular and hollow shafts – stepped shafts – shafts fixed at both ends – stresses in helical springs – deflection of springs – spring constant.

TOTAL: 45 PERIODS

OUTCOME:
- Upon completion of the program the student will be able to design the support columns, beams in a textile industrial point of view. And also they can overcome defects in the existing construction.

TEXT BOOKS:

REFERENCE:

TT8451  PRODUCTION OF MANUFACTURED FIBRE  L T P C
3 0 0 3

OBJECTIVES:
- To enable the students to learn about the polymer rheology and the laws, and various spinning techniques of polymers
- To expose the students to advances in the spinning process

UNIT I  POLYMER RHEOLOGY
Transport Phenomena in Fibre Manufacturing- Heat and mass; Polymer rheology-Newtonian and non-newtonian fluids, factors affecting shear viscosity; conditions of fibre forming polymers; Melt instabilities.

UNIT II  MELT SPINNING
Melt Spinning- Polymer Selection and Preparation, equipment, properties and applications of polyester, polyamide and polypropylene fibers.

UNIT III  SOLUTION SPINNING
Solution spinning- Polymer Selection and Preparation, equipment, properties and applications of acrylic, polyurethane and regenerated cellulose fibres.

UNIT IV  POST SPINNING OPERATIONS
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 behavior; Spin finish composition and application; texturising.
UNIT V  DEVELOPMENTS IN FIBER SPINNING

Liquid crystal spinning; Gel spinning; Profile fibres, hollow & porous fibres; Speciality fibres polyglycolic acid, polylactic acid, chitosan fibres preparation properties and applications.

TOTAL: 45 PERIODS

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

- Polymer rheology and the laws
- Various spinning techniques of polymers parameter involved in spinning synthetic yarn
- Need of various post spinning operations
- Advances in the spinning process

TEXT BOOKS:

REFERENCES:

TC8401  PRINCIPLES AND THEORY OF DYEING  L T P C
3 0 0 3

OBJECTIVES:
- To expose the students about the mechanics of dyeing
- To enable the students to learn about colour, combinations of colours, their source and measurement
- To expose the students to the factors influencing the dyeing

UNIT I  CHEMICAL KINETICS

UNIT II  ADSORPTION AND CATALYSIS

UNIT III  ELECTROCHEMISTRY

UNIT IV FIBER PROPERTIES AND ITS EFFECT ON DYEING 9

UNIT V FACTORS INFLUENCING DYEING 9

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
• Explain the mechanics of dyeing
• Explain the factors influencing dyeing
• Work in the dye houses of textile processing industry

TEXT BOOKS:

REFERENCES:

FT8691 TEXTILE QUALITY EVALUATION L T P C
3 0 0 3

OBJECTIVE:
• To infuse understanding of yarn, fabric and apparel testing methods

UNIT I CONSTRUCTION CHARACTERISTICS 9
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 Area density (GSM); warp and weft crimp measurements for spun and filament yarn fabrics, the cover factor calculations; Fabric sampling techniques

UNIT II STRENGTH CHARACTERISTICS 9
UNIT III  COMFORT AND SURFACE CHARACTERISTICS  9
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  SPECIAL CHARACTERISTICS  5
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 AND GARMENT INSPECTION  13

TOTAL: 45 PERIODS

OUTCOMES:
The student will have knowledge on
- Methods by which the physical and mechanical properties of textile materials and products are measured and investigated
- Sampling and yarn quality parameters testing
- Fabric and garment quality parameters testing

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
- To enable the students to learn about the raw materials & purification of intermediates for dyes preparation
- To explain the students about the basic chemistry & mechanism in dye & dye intermediates preparation

UNIT I INTRODUCTION TO DYES
Coal tar – fractional distillation and their products. Aromatic hydrocarbons from petroleum. Introduction to primary and intermediate chemicals for dyes. Relation between Colour and Chemical Constitution. CI Name and Number.

UNIT II UNIT PROCESSES
Unit processes in organic synthesis such as halogenation, nitration, Sulphonation, esterification, alkylation, acetylation, hydroxylation, and diazotisation with suitable examples.

UNIT III AROMATIC INTERMEDIATES
Systematic study of important intermediates from benzene, chlorobenzene, toluene, nitrobenzene, aniline, phenol, salicylic acid, naphthalene and anthraquinone.

UNIT IV DYE INTERMEDIATES
Classification of dyes and intermediates. Introduction to azines, oxazines, thiazines, xanthine, acridine, Diphenyl and triphenyl methane dyes.

UNIT V DYES
Introduction to their chemistry and preparation of – Anthraquinone vat dyes, indigoid, solubilised vat dyes, reactive dyes, disperse dyes, Blueing and Fluorescent brightening agents.

TOTAL: 45 PERIODS

OUTCOME:
Upon completion of the course, the students will be able to
- Understand about the dyes and their intermediates which is an integral backbone of textile wet processing industry

TEXT BOOKS:
2. Shore,J. (Ed)., “Colorants and auxiliaries, Volume 1.;Colorants”, SDC, Blackwells, Leeds, 1990,

REFERENCES:
OBJECTIVE:
- To facilitate the students to learn about the pre-treatments of various kinds of textile materials involved in textile wet processing industries.

UNIT I  SINGEING & DESIZING  9

UNIT II  MERCERISATION  9

UNIT III  SCOURING  9

UNIT IV  BLEACHING  9

UNIT V  DEVELOPMENTS  9
Developments in grey preparation – combined processing enzymatic scouring & bleaching, cold bleaching; prograde process (liquid ammonia mercerization) Developments in desizing, Scouring, Bleaching and mercerizing, plasma based preparation, ozone bleaching.

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
- Design wet processing techniques such as singeing, desizing, mercerizing, scouring and bleaching of different textile materials at desired levels.
- Understand the process control of pre treatment processes
TEXT BOOKS:
3. Charles Tomasno, Chemistry and Technology of fabric Preparation and Finishing, North Carolina State University, USA, 1992

REFERENCES:

TC8411 WET PROCESSING PREPARATION LABORATORY L T P C
0 0 4 2

OBJECTIVE:
- To practice the students in the tests carried out at preparatory section of the wet processing of textile materials

LIST OF EXPERIMENTS
1. Determination of starch content in Enzyme desizing.
2. Determination of residual starch in acid desizing
3. Determination of scouring loss.
5. Comparison between bleached and bleached & optical brightened treated sample for whiteness and reflectance value.
6. Determination of the yellowing of hypochlorite bleached (soured/not soured, but washed) fabrics.
7. Effect of time/ temperature in bleaching with hypochlorite (whiteness and strength loss).
8. Effect of pH/ available chlorine in bleaching with hypochlorite (whiteness and strength loss)
9. Scouring & Bleaching of knitted cotton fabrics in winch
10. Scouring & Bleaching of woven blend fabrics in jigger.
12. Degumming & Bleaching of silk.
13. Scouring and Bleaching of wool using hydrogen peroxide.

TOTAL: 60 PERIODS

OUTCOMES:
Upon completion of this practical course, the students would be able to
- Determine the contents of chemicals
- Efficiency of different processes of wet processing preparatory
- Carryout scouring and bleaching of different textile materials

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS
1. Jigger – 1 No.
2. Winch – 1 No.
3. Water Bath with heating facility – 1 No.
4. Tensile Strength Tester – 1 No.
5. Computer colour Matching system – 1 No.
6. pH Meter – 3 Nos.
7. Weighing balance – 1 No.

TC8412 TEXTILE CHEMICAL ANALYSIS LABORATORY

OBJECTIVE:
- To practice the students in evaluation of chemicals and dyes used in textile wet processing industry

LIST OF EXPERIMENTS
1. Estimation of the Efficiency of the wetting agent.
2. Estimation of strength of oxidizing agent.
3. Estimation of strength of reducing agent.
4. Estimation of strength of dispersing agent.
5. Estimation of strength of Optical Brightening agent.
7. Evaluation of the inorganic substances in Textile processing.
8. Identification of dye powder.
9. Identification of the dye in the dyed fabric
10. Estimation of percentage purity of the dye solution.
11. Evaluation of the finishing chemicals

TOTAL: 60 PERIODS

OUTCOMES:
- On completion of this course, the students would be able to estimate different types of chemicals used for wet processing of textile materials.
- They would also be able to identify the dyes and estimate purity of dye solution.

LIST OF EQUIPMENTS FOR BATCH OF 30 STUDENTS
1. Beaker Dyeing machine – 1 No.
2. Dye Bath – 1 No.
3. Weighing Balance – 1 No.
4. Stop Watch – 1 No.
5. Soxhlet Apparatus – 1 No.

HS8461 ADVANCED READING AND WRITING

OBJECTIVES:
- Strengthen the reading skills of students of engineering.
- Enhance their writing skills with specific reference to technical writing.
- Develop students’ critical thinking skills.
- Provide more opportunities to develop their project and proposal writing skills.
UNIT I
Reading - Strategies for effective reading-Use glosses and footnotes to aid reading comprehension- Read and recognize different text types-Predicting content using photos and title Writing-Plan before writing- Develop a paragraph: topic sentence, supporting sentences, concluding sentence –Write a descriptive paragraph

UNIT II
Reading-Read for details-Use of graphic organizers to review and aid comprehension Writing-State reasons and examples to support ideas in writing- Write a paragraph with reasons and examples- Write an opinion paragraph

UNIT III
Reading- Understanding pronoun reference and use of connectors in a passage- speed reading techniques Writing- Elements of a good essay-Types of essays- descriptive-narrative-issue-based-argumentative-analytical.

UNIT IV
Reading- Genre and Organization of Ideas Writing- Email writing- visumes – Job application-project writing-writing convincing proposals.

UNIT V
Reading- Critical reading and thinking- understanding how the text positions the reader-identify Writing- Statement of Purpose- letter of recommendation- Vision statement

TOTAL: 30 PERIODS

OUTCOMES:
At the end of the course Learners will be able to:
- Write different types of essays.
- Write winning job applications.
- Read and evaluate texts critically.
- Display critical thinking in various professional contexts.

TEXT BOOKS:

REFERENCES
OBJECTIVES:
- To study the nature and facts about environment.
- To finding and implementing 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
14
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
8
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 – solid 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
10
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


UNIT V HUMAN POPULATION AND THE ENVIRONMENT


TOTAL: 45 PERIODS

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 environmental is at infant stage.
- Ignorance and incomplete knowledge has lead to misconceptions
- Development and improvement in std. of living has lead to serious environmental disasters

TEXT BOOKS:

REFERENCES:

TC8501 CHEMISTRY OF TEXTILE AUXILIARIES

OBJECTIVES:
- To provide the knowledge on classification and types of textile auxiliaries
- To provide the knowledge on importance and basic functions of textile auxiliaries
- To enable the students to know about the chemistry of textile auxiliaries
UNIT I
Auxiliaries: Importance and functions; Surfactants: Mode of action and classification of surfactants – cationic, anionic, nonionic and amphoteric surfactants.

UNIT II
Auxiliaries associated with De-sizing, scouring, Bleaching of cellulosic fibres, Protein fibres and synthetic fibres.

UNIT III
Auxiliaries associated with Dyeing with Direct Dyes, Reactive, Vat, Azoic colors, Sulphur dyes, Acid dyes, Metal complex dyes, Basic and Disperse dyes.

UNIT IV
Auxiliaries associated with printing: Direct Style of Printing, Discharge style of Printing, Resist style of printing.

UNIT V
Auxiliaries used in Resin Finishing, Stiff finishing, soft finishing, Water repellent, Water Proof, Flame retardant, Soil release.

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
- Understand about the textile auxiliaries which would enable the student to work in the textile auxiliaries manufacturing companies.
- Perform research and development in the field of textile auxiliaries.

TEXT BOOKS:

REFERENCE:

TC8502 DYEING OF SYNTHETIC MATERIALS

OBJECTIVES:
To enable the students to
- Understand the colouration of synthetic textiles in the field of mass colouration and dyeing
- Solve the shop floor problems in the colouration process and to expose the students to the latest developments in colouration of synthetic textiles

UNIT I
Mass Colouration of Polyester, Nylon, Acrylic and polypropylene, Advantages & Disadvantages of Mass Colouration; Difference between Mass Colouration and Dyeing.
UNIT II
Polyester Dyeing: carrier, HTHP and thermosol methods of dyeing. CD polyester dyeing, micro
denier PET dyeing. Practical problems and their solutions. Stripping of dyed PET

UNIT III
Dyeing of Polyester Blends: Various shop floor practices of dyeing of polyester/cellulosic-
blended fabrics. Practical problems and their solutions. Various shop floor practices of dyeing of
polyester/wool blended fabrics. Practical problems and their solutions. Dyeing of polyester with

UNIT IV
Dyeing of nylon. Dyeing with acid dyes-High temperature dyeing. Low temperature dyeing of
Nylon 6,6 – Dyeing with disperses dyes. Barriness of dyeing – Dyeing of polyamide cellulosic
blends – polyamide/wool blends, polyamide/ polyester blends- Stripping of Nylon dyed material.
Practical problems and remedies in Nylon Dyeing. Dyeing of unmodified and modified
polypropylene.

UNIT V
Dyeing of Acrylic Fibres: – Dyeing with cationic dyes – Effect of fibre saturation value, pH-
Cationic, Anionic and polymeric retarder systems – stripping of cationic dyes, dyeing with
disperse dyes, dyeing of acrylic blends, differentially dyeable acrylic fibres.

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

- Understand the colouration of synthetic fibres and solving problems related to the
  process
- Perform research and development work in the field of colouration of synthetic textiles

TEXT BOOKS:
2. Vaidya, A.A., and Datye, K.V., “Chemical processing of Synthetic Fibres and Blends”,
   John Wiley and Sons, New Delhi, 1995

REFERENCES:

OBJECTIVES:
- To provide the knowledge on theory of dyeing of cellulosic fibrous material
- To provide the knowledge on classification, principle, shop floor practice & problems in
  the application of various dyes on cellulosic textiles
- To enable the students to understand machinery used for dyeing of cellulosic textile
  materials through class room discussion and field visits.

UNIT I
Basic concept of dye and pigment, Definition of affinity, substantivity, reactivity, exhaustion,
deepth of dyeing, percentage shade. Concepts of exhaust and padding techniques of dyeing.
Basic mechanisms of dyeing techniques such as mechanical deposition, chemical fixation.
Classification of dyes according to methods of application. Influence of pretreatment on dyeing properties.

UNIT II
Direct dyes: General properties, principles and method of application on cellulosic materials. Classification dyeing of cellulosic materials. Various after treatments to improve the wash fastness and light fastness. Practical problems and their remedies. Reactive dyes – Chemistry, concept of hot brand, cold brand, HE and vinyl sulphone reactive dyes, bifunctional and low salt reactive dyes, principle steps involved in dyeing of cellulosic materials. Practical problems remedy

UNIT III
Dyeing of Indigo (synthetic indigo. Dyeing of cellulose materials with phthalogen blue, mineral khaki, aniline black, pigments. Azoic colours – Chemistry and general properties of Azoic colours – Concept of napthols and bases.

UNIT IV

UNIT V

TOTAL: 45 PERIODS

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

- Dye the cellulosic textiles with different dyes
- Perform research and development in the field of dyeing of cellulosic textiles

TEXT BOOKS:

REFERENCES:

TC8504       DYEING OF PROTEIN MATERIALS     L T P C
            3 0 0 3

OBJECTIVES:
- To provide knowledge on theory dyeing of protein fibrous material
- To provide the knowledge on classification, principle, shop floor practice & problems in the application of various dyes on protein textiles
To make the students understand the machines used for dyeing the protein textile materials through discussion and field visits.

**UNIT I**


**UNIT II**


**UNIT III**

Reactive Dyes: Types of reactive dyes used for dyeing protein fibres – Type of chemical reactions involved in dyeing of wool and silk with reactive dyes – application of monochloro, dichloro triazine dyes on wool and silk – application of vinyl sulphone, difluoro, mono chloro primidyl dyes, bromo acrylamide dyes and bifunctional dyes on wool and silk. Striping and redyeing.

**UNIT IV**


**UNIT V**


**OUTCOMES:**

Upon completion of the course, the students will be able to

- Dye protein textiles using different types of dyes
- Perform research and development work in the field of dyeing of protein textiles

**TEXT BOOKS:**


**REFERENCES:**

OBJECTIVE:
- To enable the students to understand the fundamental concepts of printing of various kinds of fabrics using different colourants

UNIT I
Definition of printing – Difference between printing and dying – Pretreatment and Fabric requirements for printing – Design details of printing like repeat of design, squeegees, bolting cloth, Preparation of Screen – Table and Rotary machine – Ingredients in printing with functions and their concentration of usage.

UNIT II

UNIT III
Printing with reactive dyes by steaming method, curing and silicate padding method – Advantages and Disadvantages of above methods– Printing with Rapid fast and Rapidogen colours, Printing with solubilised Vat dyes. IKAT Printing

UNIT IV
Colour and White Discharge of cotton and viscose dyed materials – Problems associated with Discharge style printing. Brief study on Discharging agents and their usage and limitations of usage, Different styles of Resist printing of cellulose materials, conversion style of discharge printing

UNIT V
Printing paste formulations, printing of silk with various classes for dyes. Direct, discharge and resist styles of printing. Print paste formulations. Direct, discharge and resist styles of printing on woolen materials.

OUTCOMES:
Upon completion of the course, the students will be able to
- Understand the concepts of printing of fabrics
- Contribute more trends and new developments to the printing industry

TEXT BOOKS:
REFERENCES:

TC8511  DYEING OF SYNTHETIC TEXTILE LABORATORY  L T P C
0 0 4 2

OBJECTIVE:
- To practice the students in dyeing of synthetic textile materials

LIST OF EXPERIMENTS
1. Effect of water hardness & pH in dyeing of polyester with disperse dyes.
2. Dyeing of Polyester using carriers.
3. Dyeing of Polyester by HTHP methods.
5. Exhaust dyeing of Polyester/Cotton blended fabrics with disperse/reactive system.
7. Dyeing of Polyester/Cotton blended fabrics with pigments
8. Exhaust dyeing of Polyester/Viscose blended fabrics with disperse/reactive system.
10. Dyeing of Polyester/Wool blended fabrics using disperse/acid system.
11. Dyeing of Polyester/Wool blended fabrics using disperse/basic system.
14. Matching of shades with the help of computer colour matching system.
15. Dyeing of acrylic fibre with cationic dyes.
16. Dyeing of Nylon fabrics

TOTAL: 60 PERIODS

OUTCOMES:
Upon completion of this practical course, the students would be able to
- Dye polyester and blends of polyester with different dyes
- Dye Nylon, acrylic and other synthetic fibres
- Match the shades with the help of computer colour matching system

LIST OF EQUIPMENTS FOR BATCH OF 30 STUDENTS
1. Beaker Dyeing machine - 1 No.
2. Water Bath with heating facility - 1 No.
3. Weighing Balance - 1 No.
4. Hardness Meter - 1 No.
5. pH Meter - 1 No.
7. Padding mangle - 1 No.
8. Computer color matching system - 1 No.
9. Winch - 1 No.
10. HTHP Soft flow dyeing machine - 1 No.
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.
5. Dyeing of Cotton using Reactive dyes
6. Dyeing of Cotton using Vat dye
7. Dyeing of polyester using disperse dyes.
8. Dyeing of polyester and cotton blend.
9. Determination of wash, light, perspiration and rubbing fastness of dyed fabrics
11. Determination of Whiteness and Yellowness indices.
13. Water proof and Flame retardant finishing of cotton
15. Antimicrobial Finish Evaluation

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

LAB EQUIPMENTS FOR A BATCH OF 30 STUDENTS
- Stainless vats (500 ml) – 15 Nos.
- Water bath – 2 Nos.
- Stirrer – 3 Nos.
- Steam ager – 1 No.
- Pilot padding mangle – 1 No.
- HTHP Beaker dyeing machine – 1 No.
- Pilot curing chamber – 1 No.
- Fastness tester for Washing, Light, Perspiration & Rubbing – 1 No.
- Printing table – 3 Nos.
- Spectrophotometer – 1 No.

OBJECTIVES:
The course aims to:
- Enhance the Employability and Career Skills of students
- Orient the students towards grooming as a professional
- Make them Employable Graduates
- Develop their confidence and help them attend interviews successfully
UNIT I
Introduction to Soft Skills— Hard skills & soft skills - employability and career Skills—Grooming
as a professional with values—Time Management—General awareness of Current Affairs

UNIT II
Self-Introduction-organizing the material - Introducing oneself to the audience – introducing the
topic – answering questions – individual presentation practice— presenting the visuals
effectively – 5 minute presentations

UNIT III
Introduction to Group Discussion— Participating in group discussions – understanding group
dynamics - brainstorming the topic — questioning and clarifying –GD strategies- activities to
improve GD skills

UNIT IV
Interview etiquette – dress code – body language – attending job interviews- telephone/skype
interview -one to one interview &panel interview – FAQs related to job interviews

UNIT V
Recognizing differences between groups and teams- managing time-managing stress-
networking professionally- respecting social protocols-understanding career management-
developing a long-term career plan-making career changes

TOTAL: 30 PERIODS

OUTCOMES:
At the end of the course Learners will be able to:
• Make effective presentations
• Participate confidently in Group Discussions.
• Attend job interviews and be successful in them.
• Develop adequate Soft Skills required for the workplace

Recommended Software
1. Open Source Software
2. Win English

REFERENCES:
3. E. Suressh Kumar et al. Communication for Professional Success. Orient Blackswan: 
Hyderabad, 2015

TC8601 WET PROCESSING MACHINERY L T P C
3 0 0 3

OBJECTIVES:
To enable to students to learn about the
• Working principles of wet processing machineries
• Operations of machines and its maintenance schedules and expose the students to the
latest machineries used for wet processing.
UNIT I  
FIBRE AND YARN PROCESSING  
9

UNIT II  
FABRIC PROCESSING  
9

UNIT III  
PRINTING MACHINES AND DRYERS  
9

UNIT IV  
FINISHING MACHINES AND WASHERS  
9

UNIT V  
HOSIERY AND GARMENT PROCESSING  
9

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students would
- Know various machinery used in yarn and fabric dyeing
- Know various machinery used for printing and finishing of fabrics which would help them in working in dyeing and printing industry

TEXT BOOKS:

REFERENCES:

TC8602 TECHNOLOGY OF FINISHING

OBJECTIVES:
- To familiarize the students with the properties and application of various finishing agents on various textile materials through discussion, experimentation and observation.
- To enable the students to understand to solve the shop floor problems in the finishing
- To enable the students to understand different types of finishes required for different classes of textile materials of finishing and machines used for finishing through discussion and field visits.

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
Brief study about stiffening and softening of textile materials, Mechanism in the weight reduction of PET by using alkali Micro encapsulation techniques in finishing process, Nano finish, Self cleaning finish. Brief study about Plasma Treatment. Study about Bio finishing

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students would
- Know about the process of finishing of textile goods
- Understand the principle and method of application of various types of special finishes on textile fabrics

TEXT BOOKS:

REFERENCES:
1. Microencapsulation in finishing, Review of progress of Colouration, SDC, 2001 62

TC8603 INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS L T P C
3 0 0 3

OBJECTIVES:
- To enable the students to analyse the textiles and chemicals through various analytical instruments
- To enable the students to interpret the results from analytical instruments

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
Errors, Precision and Accuracy: Difinitions, Significant figures – Types of Errors – Methods of expressing accuracy and precision , Confidence limits.

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
Analyze the textiles and chemicals using different analytical instruments
Interpret the results from analytical instruments

TEXT BOOKS:

REFERENCES:

TC8604 GARMENT PRODUCTION AND PROCESSING L T P C
3 0 0 3

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

UNIT I PATTERN MAKING AND CUTTING 13

UNIT II SEWING 14

UNIT III GARMENT DYEING 9

UNIT IV GARMENT FINISHING 9

TOTAL: 45 PERIODS
OUTCOMES:
Upon completion of the course, the students will
- Know about pattern making, cutting and sewing of apparels
- Know about dyeing and finishing of garments

TEXT BOOKS:

REFERENCES:
3. NCUTE – Programme series, Finishing of Garments and Knits, held at Ichalkaranchi, IIT,Delhi.

TC8605 COMPUTER COLOUR MATCHING L T P C 3 0 0 3

OBJECTIVES:
To enable the students to understand various colour theories
- To simulate shade matching and predict recipes using CCM
- To discuss more about responsibilities of each department in garment industry and their working procedure

UNIT I

UNIT II
generation – color matching – Ratch correction – statistical analysis in QA & color matching applications

UNIT III
Sample preparation, presentation & measurement – Selection of spectrophotometer - Sample preparation & presentation – Textiles & dye application .The basic laboratory equipments for successful handling of computer color matching system – The CIE color specifications in textiles applications - The CIE color specifications of dyes – Change in Hue with increase in concentration – Chromaticity coordinates & chromaticity diagram – Dye gamut mapping – Setting tolerances – Studying the compatibility of dyes – Color difference assessment – Color difference assessment of self shades – color difference equations.

UNIT IV

UNIT V

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
- Understand colour theories, different measures of colour and specifications
- Predict recipes using CCM which would enable them to provide job opportunity in the field of testing and to carry out research.

TEXT BOOKS:

REFERENCES:
2. Colour Technology Tools,Techniques & Applications.
OBJECTIVE:
- To practice the students in finishing of textile materials for different requirements and end uses.

LIST OF EXPERIMENTS
1. Finishing of fabric using starch.
2. Finishing of fabric using softener
4. Resin finishing.
5. Water repellent Finishing.
7. Crease recovery finishing of cotton.
9. Comparison of different resins for crease recovery finishing of cotton.
10. Weight reduction of polyester.
12. Scroopy finish for silk.

TOTAL: 60 PERIODS

OUTCOMES:
Upon completing this course, the student would be able to
- Finish the fabric using starch, softners, resin, and water repellent, crease recovery finishes
- Finish the fabric for buckram finish and scroopy finish

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS
1. Padding mangle - 1 No.
2. Curing oven - 1 No.
3. Water Bath - 1 No.
5. Weighing Balance - 1 No.
7. Crease recovery tester - 1 No.
8. Jigger - 1 No.

OBJECTIVE:
- To practice the students in manufacturing of garments and chemical processing of garments

LIST OF EXPERIMENTS
2. Design and construct Ladies Skirt.
3. Design and construct T-Shirt for men.
4. Dyeing of garments
5. Printing of garments using plastisol ink.
6. Metallic prints on garments
7. discharge prints on garments
8. transfer printing on garments
9. Khadi printing on garments
10. Bio-polishing on garments
11. Wrinkle free finish on garments
12. Stain proof finish on garments

TOTAL: 60 PERIODS

OUTCOMES:
On completion of this course, the student would be able to
- Design and construct garments for children, women and men
- Print the garment with different colourants
- Finish the garment for different applications

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS

1. Garment dyeing machine – 1 No.
2. Sewing machine – 10 Nos.
4. Tumble dryer – 1 No.
5. Ironing Table – 1 No.
6. Table Screen printing Machine – 1 No.

TC8701 EFFLUENT TREATMENT AND POLLUTION CONTROL L T P C
3 0 0 3

OBJECTIVES:
- To impart awareness about the pollution created by different stages of wet processing
- To familiarize the students about the importance of water and its analysis
- To enable the students to understand about the waste water treatment plants and various treatments carried out

UNIT I
Constituents of water and their effect on Textile wet processing – Water pollution – programmes which includes WHO, ISO standards for raw water criteria – Effluent discharge standards for inland surface water public sewers, on land for irrigation, marine coastal areas and drinking water parameters – Quality requirements of water for cotton and synthetic Textile processing. Water softening .Water analysis- Colour, pH value, dissolved solids, suspended solids, total hardness (Calcium + Magnesium)- EDTA method, total iron-thiocyanate method, Alkalinity, acidity , chlorides dissolved oxygen , BOD and COD.

UNIT II

UNIT III

UNIT IV
Tertiary treatment – Evaporation (solar and steam). Membrane technologies (MF, UF, NF & RO) , Reverse osmosis, ion exchange and activated carbon treatment. Model schematic diagram for – Wastewater treatment plant for textile mills – Primary and Secondary units & Tertiary treatments, Quality parameters at entry and exit of RO. Chlorine trioxide treatment, ozone treatments, enzymatic decolourisation.

UNIT V

OUTCOMES:
Upon completion of the course, the students will be able to
- Understand the textile processing related causes for pollution
- Understand the effluent discharge standards and different processes involved in waste water treatment

Perform the research and development to produce zero discharge effluents

TEXT BOOKS:

REFERENCES:

TT8751 FINANCIAL MANAGEMENT IN TEXTILE INDUSTRY

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; ratio analysis - illustrations from textile unit

TOTAL: 45 PERIODS

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

• Explain the basics of financial management applied to textile industry
• Understand the economical feasibility of capital investment, sources of capital and cost of capital applied

TEXT BOOKS:

REFERENCES:
1. Bhave P.V. and Srinivasan V., "Costing Accounting to Textile Mills", ATIRA, Ahmadabad, 1976

TC8702 PROCESS AND QUALITY CONTROL IN TEXTILE WET PROCESSING 3 0 0 3

OBJECTIVES:
• To enable the students to learn about the process control at machinery involved in the chemical processing
• To familiarize the students about the importance of process control and quality control
• To enable the students to learn the various quality control tests involved in chemical processing

UNIT I
Definition of Process control and Quality control – Need for quality control in textile wet processing – Flow charts indicating Process control and Quality control tests to be carried out in Desizing, Scouring, Bleaching, Sourcing, Mercerizing, Dyeing, Printing and finishing, Process
and quality control measures adopted in different methods of desizing and scouring along with assessment of degradation of cotton.

UNIT II  
9
Process and quality control measures adopted in sodium hypochlorite, hydrogen peroxide, Sodium chlorite bleaching and mercerisation process for batch and continuous process

UNIT III
9

UNIT IV
9
Process and quality control measures in printing natural and synthetic fibers with different methods and styles of printing.

UNIT V
9
Process and quality control measures adopted in mechanical finishing- sanforizing, calendering process and chemical finishes.

OUTCOMES:
Upon completion of the course, the students will be able to
- Measure the quality particulars of textile material at different stages of chemical processing and know the standards carry out the various process and quality control measures during the chemical processing of textile materials

TEXT BOOKS:

REFERENCES:

TC8711  
PRODUCT DEVELOPMENT LABORATORY  
0 0 4 2

OBJECTIVE:
- To practice the students in developing the textile products based on wet processing

LIST OF EXPERIMENTS
1. Development of Low temperature peroxide bleached fabric
2. Development of combined desizing and scouring using enzymes
3. Development of dyed cotton fabric with Jigger
4. Development of dyed cotton fabric with Winch
5. Development of one bath dyeing of PET / cotton blends
6. Development of producing of aroma / Ayurvedic finishing on textile materials

OUTCOME:
- Upon completing this practical course, the student would be able to develop textile products using dyeing, finishing with special finishes

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS
1. Jigger - 1 No.
2. Winch - 1 No.
3. Padding mangle - 1 No.
5. Water Bath - 1 No.

TC8712 PROBLEM ANALYSIS AND CASE STUDIES IN WET PROCESSING LABORATORY

OBJECTIVE:
- To expose the students to analysis of problems related to chemical processing of textile materials.

LIST OF EXPERIMENTS
Analysis of case studies in
1. Desizing
2. Scouring
3. Bleaching
4. Mercerizing
5. Dyeing
6. Printing
7. Finishing

OUTCOME:
- Upon completing this practical course, the student would be able to analyse the problems and find solutions for problems related to wet processing of textile materials.

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS
1. Padding mangle - 1 No.
2. Beaker Dyeing Machine - 1 No.
3. Hot air oven - 1 No.
5. Table screen Printing - 1 No.
7. IR Dyeing Machine - 1 No.
8. Steamer - 1 No.
10. Tensile strength tester - 1 No.
12. Winch - 1 No.
13. Laundro Meter - 1 No.
OBJECTIVE:
- To make use of the knowledge gained by the student at various stages of the degree programme.

The students are assigned project work related to product / process development, solution to the technical problems in industry and current research at national and international level. The student is required to submit a report at the end of semester based on the findings. The evaluation is made as per the Regulations of University.

OBJECTIVE:
- To enable the students to understand the concepts of modern printing technologies in printing of various kinds of fabrics using different colourants

UNIT I

UNIT II
Fabric preparation, Ink jet ink compositions; Mechanism of ink jet technology; Parameters influencing ink transfer; Colour depth in digital printing; Inks for printing – practical formulations; Precautions before and while printing; Selections of ink jet printers for fabric printing; Fixation / development of prints; After treatments.

UNIT III

UNIT IV
Garment Printing. Various techniques of printing of garments, garment printing machineries and their recent developments. Recent developments in printing technology.

UNIT V
Computer aided design systems for textile printing - Recent developments in textile printing machinery including automation. Developments in thickeners, water based binders,

OUTCOMES:
Upon completion of the course, the students will be able to
- Understand the modern printing technologies available for printing textile fabrics.
- Contribute more trends and new development to the printing industry

TEXT BOOKS:
2. Tyler, Textile Digital Printing Technologies, Textile Institute Publication UKVol.37 No.4, 2005

REFERENCES:

TC8002 ANALYSIS OF TEXTILE CHEMICALS

OBJECTIVES:
- To enable the students to understand the importance of testing and analysis of various fibres and chemicals used in wet processing
- To expose the students to the analysis, estimation techniques for processing chemicals

UNIT I BASIC CONCEPTS
Need for an analytical laboratory – Testing for the quality of raw material for end product quality – Testing for toxic substances, Basic chemical calculations and solution stoichiometry.

UNIT II ANALYSIS OF CHEMICALS IN PRETREATMENT
UNIT III   ANALYSIS OF CHEMICALS IN DYEING AND PRINTING  9
Identification of dyes in powder form and from the dyed material. Estimation of the purity of
dyes Estimation of the Efficiency of a cationic dye-fixing agent – Evaluation of leveling agent.
Estimation of caustic and hydros contents in vat dye liquor – Evaluation of Carriers – Evaluation
of dispersing agent for its dispersion stability – Evaluation of oxidising and reducing agents
used in printing paste.

UNIT IV   ANALYSIS OF FINISHING CHEMICALS  9
Types of textile softeners – Evaluation of cationic softeners by Methylene Blue method and
Bromophenol Blue method – Evaluation of Bon-ionic softeners using ferric cyanide method and
Phosphomolybdic acid method and Ammonium cobalt Thiocyanate method – Evaluation of
anionic softeners – Evaluation of reactive softeners – Evaluation of Polyethylene emulsions by
Estimating total solids and active content Evaluation different resins by test is the treated
samples for total solids, total Formaldehyde and free Formaldehyde – Evaluation of fluorescent
brightening agent.

UNIT V   EVALUATION OF COMMON CHEMICALS  9
Estimation of the purity of the following chemicals, such as Hydrochloric acid, Sulfuric acid,
Sodium Hydroxide, Sodium carbonate, Sodium Bicarbonate, Sodium Chloride and Sodium
Sulphate – Estimation of Hydrogen peroxide content by iodimetry and permanaganometry –
Estimation of the oxalic acid – Analysis of Potassium dichromate for total chromium content –
Analysis of soap for moisture content unsaponifiable fat free alkyl and the total fatty acid –
Estimation of Sodium hydro sulphate. Analysis of Sodium sulphide for its reducing power.
Estimation of chemicals in mixtures viz Sodium carbonate/Sodium hydroxide and Sodium
carbonate/Sodium bicarbonate

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
- Analyse textile fibres and chemicals used for wet processing textile materials
- Analyse chemicals used for dyeing, printing and finishing

TEXT BOOK:

REFERENCE:
1. Reife, A., and Freeman, H.S.,(Ed)., “Environmental chemistry of dyes and pigment”,
2. John Shore, Colourants & Auxiliaries: Wiley and Sons Ltd, New York, Volume I &
   II,1999

TT8080   TEXTILE COSTING   L   T   P   C
3    0    0    3

OBJECTIVE:
- To impart the knowledge of costing techniques used in manufacturing of apparel
  products.
UNIT I 9
Cost accounting, elements of cost, classification of cost elements – examples from spinning and weaving mill; standard costing, analysis of variance; breakeven analysis, cost volume profit analysis

UNIT II 18
Costing of yarn – material, labour, power and overhead expenses; allocation of costs to yarns in spinning mill running with different counts; costing of fabrics

UNIT III 9
Working capital management in spinning, weaving and chemical processing unit – determination, sources, cost; Budget, types of budgets, budgeting and control in textile unit

UNIT IV 9
Detailed project report – elements, preparation for textile unit

TOTAL: 45 PERIODS

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

TEXT BOOKS:

REFERENCES:
Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II ENGINEERING ETHICS 9

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9
Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

UNIT V GLOBAL ISSUES 8

TOTAL: 45 PERIODS

OUTCOMES:
- Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.

TEXT BOOKS:

REFERENCES:
OBJECTIVE:
- To enable the students to learn about production, properties & application of various technical textile products viz., tyre cords, fabrics, belts, filter fabrics and medical textiles.

UNIT I HIGH PERFORMANCE FIBRE

UNIT II TYRE CORDS AND FABRICS
Requirements of tyre cord - suitability of various fibres-Polyester and Nylon tyre cords - manufacture of tyre cords - physical and mechanical property requirements of tyre cord fabrics-fabric design - Specifications - Rubberised textiles.

UNIT III BELTS
Conveyor belts - physical and mechanical properties-construction, manufacture of conveyor belts & power transmission belts. HOSE: Construction, applications and properties (physical and mechanical).

UNIT IV FILTER FABRICS
General consideration of filtration of solids from liquids, solid from gases, solids from solids, liquids from liquids, liquids from gases and gases from gases. PROTECTIVE CLOTHING: Fire protection-thermal protection - electro-magnetic protection - water proof fabrics - protection against microorganisms, chemicals and pesticides - protection against aerosols.

UNIT V MEDICAL TEXTILES

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
- Understand different high performance fibres and their properties
- Explain various method of production of technical textiles, their properties and applications

TEXT BOOKS:
REFERENCES:

OBJECTIVES:
- To acquire knowledge on constituents of composite materials
- To get exposure to various composite manufacturing technologies and testing of composites

UNIT I COMPOSITES REINFORCEMENT AND MATRICES

UNIT II COMPOSITES MANUFACTURING TECHNOLOGIES

UNIT III DESIGN OF STRUCTURE WITH COMPOSITES

UNIT IV MECHANICS AND TESTING OF COMPOSITES

UNIT V APPLICATIONS OF COMPOSITES

TOTAL: 45 PERIODS

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

- Select different types of textile reinforcements and matrices for the manufacture of composites for getting different characteristics and
- Evaluate the characteristics of composites

TEXT BOOKS:

REFERENCES:

TT8091 CLOTHING COMFORT

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

TEXT BOOKS:

REFERENCES:

TT8081 TEXTILE EXIM MANAGEMENT L T P C
3 0 0 3

OBJECTIVE:
- To give the students an exposure on international market for textile products, regulations with respect to export and import of textiles

UNIT I
International markets for yarns, woven fabrics; international market for cotton, silk, jute, wool and other fibres; export and import of textiles by India – current status, promotional activities

UNIT II
International markets for carpets and home textiles – product types, market potential and statistics, India - current status and promotional activities, role of export promotional councils

UNIT III

TOTAL: 45 PERIODS
International markets for woven piece goods, knitted garments, leather garments; statistics of international apparel market and trade; export incentives, role of AEPC, CII, FIEO, Textile Committee

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

UNIT V
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

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

TEXT BOOKS:

REFERENCES:

GE8075 INTELLECTUAL PROPERTY RIGHTS L T P C 3 0 0 3

OBJECTIVE:
- To give an idea about IPR, registration and its enforcement.

UNIT I INTRODUCTION
Introduction to IPRs, Basic concepts and need for Intellectual Property - Patents, Copyrights, Geographical Indications, IPR in India and Abroad – Genesis and Development – the way from WTO to WIPO –TRIPS, Nature of Intellectual Property, Industrial Property, technological Research, Inventions and Innovations – Important examples of IPR.

UNIT II REGISTRATION OF IPRs 10
Meaning and practical aspects of registration of Copy Rights, Trademarks, Patents, Geographical Indications, Trade Secrets and Industrial Design registration in India and Abroad

UNIT III AGREEMENTS AND LEGISLATIONS

UNIT IV DIGITAL PRODUCTS AND LAW

UNIT V ENFORCEMENT OF IPRs
Infringement of IPRs, Enforcement Measures, Emerging issues – Case Studies.

TOTAL: 45 PERIODS

OUTCOME:
- Ability to manage Intellectual Property portfolio to enhance the value of the firm.

TEXT BOOKS:

REFERENCES:

TT8791 OPERATIONS RESEARCH IN TEXTILE INDUSTRY

OBJECTIVES:
To enable the students to learn about
- Various operations research (OR) methods that can be applied in the textile industry
- Designing of OR problem related to textile industry
- Method of solving OR problems

UNIT I
Scope of operation research, applications, limitations; linear programming problems – construction, solutions by graphical method, simplex method, Big M method; sensitivity analysis; application of LP technique for mixing optimization in spinning mill

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

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

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

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

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
- Design operations research problems that can be applied to textile industry.
- Solve the OR problems

TEXT BOOKS:

REFERENCES:

TC8003 NONWOVEN FABRICS AND SPECIALITY FABRICS L T P C
3 0 0 3

OBJECTIVES:
To enable the students to learn about
- Production of fabrics by different non woven technologies
- Finishing and testing non woven and to expose the students to specialty fabrics, their construction and applications

UNIT I INTRODUCTION
UNIT II  BONDING

UNIT III  FINISHING AND TESTING

UNIT IV  APPLICATIONS AND PRODUCT DEVELOPMENT
Nonwovens for hygiene, medicine – safety, cleaning, household products, home apparels and technical applications. Re-utilization of nonwovens Concepts and definitions - Product development for garments, decorative fabrics, home textiles and technical textiles. Costing of nonwoven products. Techno economics

UNIT V  SPECIALITY FABRICS

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the student shall be able to
- Understand different methods of production and testing of nonwovens and
- Understand different types of specialty fabrics

TEXT BOOKS:

REFERENCES:
1. Irsak,C, " Nonwoven Textiles" Textile Institute", Manchester, 1999

TC8004  ADVANCED WET PROCESSING MACHINERY  L T P C
3 0 0 3

OBJECTIVES:
- To enable the students to learn about the working principles of wet processing machineries.
- To enable the students to know about the operations of machines and its maintenance schedules.
- To expose the students to latest wet processing machineries.

UNIT I
Advances in continuous processing of cotton and wool materials - Advances in heating systems hank and yarn dyeing machines (cheese and warp) - importance of winding in yarn dyeing — calculation of winding density - detailed maintenance schedule for cheese dyeing machines.

UNIT II
Advances in Beam dyeing - Advances in soft flow, over flow, jet dyeing machines — Developments in jiggers,—Detail maintenance schedule for beam dyeing, jet dyeing and jiggers.

UNIT III
Detail study and developments in vertical drying ranges - RF dryer, yarn dryer, tubular & open width knitted fabric dryer, Tumble dryer, developments in balloon padding, hydro extractor, rope opener, maintenance schedule for the above machines. Heating systems for hot air stenters, Clip & pin type of stenters; Jig stenters — over feeding system and its importance - Hot flue dryer — float dryer — maintenance schedule for the above machines.

UNIT IV

UNIT V

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the student shall be able to
- Understand about the advances in wet processing of textile materials
- Understand about advanced wet processing machinery used in the industry

TEXT BOOKS:

REFERENCES:

TC8005 ENERGY MANAGEMENT AND CONSERVATION IN TEXTILE INDUSTRY

OBJECTIVES:
To enable the students to learn about
- Consumption of energy at various sectors of textile industries
- Techniques of saving energy

UNIT I SOURCES OF ENERGY
Limitations of Natural resources. Unexploited energy sources and problems in their exploitation. Concept of energy management - need for energy conservation- global energy scenario with specific reference to India -Demand side Management (DSM).

UNIT II ENERGY CONSUMPTION

UNIT III ENERGY AUDIT
Concept - Types of audit - Instrumentation - methodology - analysis. Electrical and Thermal audit

UNIT IV ENERGY CONSERVATION

UNIT V NON-CONVENTIONAL ENERGY SOURCES

TOTAL: 45 PERIODS

OUTCOME:
- Upon completion of this course, the student would understand the consumption of energy at difference stage of processing, energy audit procedure, energy conservation and different types of non conventional energy sources available.

TEXT BOOKS:

REFERENCES:

GE8071 DISASTER MANAGEMENT

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 stake-holders- Institutional Processess 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.

UNIT V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS
Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS

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.

TEXT BOOKS:

REFERENCES:
1. Govt. of India: Disaster Management Act, Government of India, New Delhi, 2005

TT8073 ECO - FRIENDLY DYES, CHEMICALS AND PROCESSING

OBJECTIVES:
- To impart knowledge about the environmental and ecological aspects of various chemicals, dyes and auxiliaries used in processing.
• To make the students aware of the alternative chemicals and dyes that can replace the harmful chemicals.
• To update the students on the various rules, regulation that governs the textile processing industry.

UNIT I  INTRODUCTION  9

UNIT II  ECO-FRIENDLY PREPARATION, DYEING, PRINTING AND FINISHING  9

UNIT III  ECO-AUDIT  9

UNIT IV  ECO-NORMS AND ECO-LABELING  9

UNIT V  TESTING OF ECO-PARAMETERS  9

TOTAL: 45 PERIODS

OUTCOME:
• The study of this course would help the students to understand and comprehend the human and environmental hazards involved in day to day production activities in a textile wet processing mill. This also helps and supports the students in making socially responsible and economically viable solutions

TEXT BOOKS:

REFERENCES:

TT8072 COATED TEXTILES L T P C
3 0 0 3

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

UNIT I

UNIT II
Rheological Behavior of Fluids- Rheology of Plastisols-Hydrodynamic Analysis of Coating, Clothing Comfort- Impermeable Coating-Breathable Fabrics

UNIT III

UNIT IV

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

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
After successful completion of this course, the students should be able to
- Outline on medical textile industry
- Explain properties, types, applications of implantable, non-implantable and drug delivery textiles
- Discuss on property requirements, applications and testing of biopolymers and Tissue engineering
- Summarize different types and its properties of wound care and reusable medical textiles
- Compare the characteristics of different smart medical textiles and its applications.

UNIT I INTRODUCTION
Medical textiles – classification, current market scenario in international and national level – government initiatives; antimicrobial fibres and finishes; nano fibrous materials and films; super absorbent polymers; operating room garments; personal health care and hygiene products and their testing methods; applications of non-wovens in medicine; textiles in infection prevention control.

UNIT II BIOPOLYMERS, TESTING AND TISSUE ENGINEERING
Biopolymers: classification and their properties, requirements, and applications, testing methods; In vitro tests – direct contact, agar diffusion & elution methods – in vivo assessment of tissue compatibility. Tissue engineering: properties and materials of scaffolds- relationship between textile architecture and cell behavior – applications of textile scaffolds in tissue engineering.

UNIT III IMPLANTABLES, NON-IMPLANTABLES AND DRUG DELIVERY
Bandages-types, properties and applications; compression garments-types, properties and applications; sutures: types and properties; implantable textiles: hernia mesh – vascular prostheses – stents; Extra corporeal materials: Cartilage nerves – liver ligaments, kidney, tendons, cornea; Drug delivery textiles: classification – mechanism various fabrication methods – characterization – applications.

UNIT IV WOUND CARE AND REUSABLE MEDICAL TEXTILES
Wound: types and healing mechanism- textile materials for wound dressing – bio active dressing – anti microbial textiles dressing – composite dressing — testing of wound care materials; Wound compression textiles; Reusable medical textiles: types, advantages, physical properties and performance — reusable processing methods.

UNIT V SMART MEDICAL TEXTILES AND LEGAL ISSUES
Smart textiles – types, characteristics – smart textiles in wound care; applications of phase change and shape memory materials – monitoring pregnancy, children and cardio patients – mobile health monitoring ; electronics in medical textiles; Smart textiles in rehabilitation and
applications; textile sensors for healthcare ;legal and ethical values involved in the medical textile materials.

TOTAL: 45 PERIODS

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

TEXT BOOKS:

REFERENCES:

GE8074 HUMAN RIGHTS L T P C
3 0 0 3

OBJECTIVE:
- To sensitize the Engineering students to various aspects of Human Rights.

UNIT I

UNIT II

UNIT III
Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

UNIT IV
Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V

TOTAL: 45 PERIODS
OUTCOME:

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

REFERENCES:


GE8077 TOTAL QUALITY MANAGEMENT

OBJECTIVE:

- To facilitate the understanding of Quality Management principles and process.

UNIT I INTRODUCTION


UNIT II TQM PRINCIPLES

Leadership - Quality Statements, Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS AND TECHNIQUES I

The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types.

UNIT IV TQM TOOLS AND TECHNIQUES II

Quality Circles - Cost of Quality - Quality Function Deployment (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

UNIT V QUALITY MANAGEMENT SYSTEM


TOTAL: 45 PERIODS

OUTCOME:

- The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.
TEXT BOOK:

REFERENCES:
4. ISO9001-2015 standards

GE8072 FOUNDATION SKILLS IN INTEGRATED PRODUCT DEVELOPMENT 

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 in to 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

UNIT III DESIGN AND TESTING
UNIT IV SUSTENANCE ENGINEERING AND END-OF-LIFE (EOL) SUPPORT


UNIT V BUSINESS DYNAMICS – ENGINEERING SERVICES INDUSTRY


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:

TC8006 NANO TECHNOLOGY IN TEXTILE PROCESSING

OBJECTIVES:
- To understand the concepts of nanotechnology.
- To know the applications of nanotechnology in textiles.
- To gain knowledge on the characterization of nano textiles.

UNIT I INTRODUCTION
Nano Technology: definition and basic concepts, particle size, nano particles; Different types of process: Top down approach, bottom up approach; Synthesis of nano materials used in textiles.

UNIT II NANO FIBRES AND NANO PARTICLES
Nano fibres: Definition, properties and applications such as filtration, tissue engineering; Electro spinning of nano fibres: capillary method, charge injection method; Production of noncontinuous
or short yarns: Rotating collector method, Gap alignment method; carbon nano fibres, metal and metal oxide nano particles such as nano silver, nano silica, nano titanium, nano zinc oxide, nano magnesium oxide.

UNIT III APPLICATIONS AND NANO FINISHING 9
Applications of nano technology in textile materials and polymers; Nano finishing through water and oil repellent, self cleaning, anti microbial, UV protective, nano architecture, nanopel, nano care, nano touch, nano feel, lotus effect.

UNIT IV CHARACTERIZATION OF NANO TEXTILES 9

UNIT V CNT, NANOCOMPOSITES AND NANO COATING 9
Synthesis of carbon nanotubes: principle methods, arc discharge, laser ablation, chemical vapour deposition (CVD); Polymeric Nano Composites: definition, types, characterization, applications; Nanotechnologies for coating and structuring of textiles: Anti-adhesive nano coating of fibres and textiles, water and oil repellent coatings by plasma treatment, self cleaning super hydrophobic surfaces, layer by layer self assembly, sol-gel coating.

TOTAL: 45 PERIODS

OUTCOME:
- Knowledge on concepts of Material science and material handling aspects of nanomaterials and polymers learned

TEXT BOOKS:

REFERENCES:

TT8491 KNITTING TECHNOLOGY L T P C
3 0 0 3

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

UNIT I  INTRODUCTION TO 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 KNIT STRUCTURES

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.

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. 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 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: 45 PERIODS

OUTCOMES:

Upon completion of this course, the student shall be able to understand the
• Principle of knitting by different types of knitting machines
• Structure and properties of fabric produced by different knitting machines

TEXT BOOKS:


REFERENCES:


GE8073  FUNDAMENTALS OF NANOSCIENCE  L T P C  3 0 0 3

OBJECTIVE:
- To learn about basis of nanomaterial science, preparation method, types and application

UNIT I  INTRODUCTION  8
Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering-Classifications of nanostructured materials- nano particles- quantum dots, nanowires-ultra-thinfilms-multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).

UNIT II  GENERAL METHODS OF PREPARATION  9
Bottom-up Synthesis-Top-down Approach: Co-Precipitation, Ultrasonication, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE.

UNIT III  NANOMATERIALS  12

UNIT IV  CHARACTERIZATION TECHNIQUES  9

UNIT V  APPLICATIONS  7

TOTAL: 45 PERIODS

OUTCOMES:
- Will familiarize about the science of nanomaterials
- Will demonstrate the preparation of nanomaterials
- Will develop knowledge in characteristic nanomaterial

TEXT BOOKS:

REFERENCES:

TT8092  
DENIM MANUFACTURING  
L T P C  
3 0 0 3

OBJECTIVES:
To enable the students to learn about
- Requirement of fibre, yarn
- Production of fabric, dyeing and finishing
- Stitching for denim garments

UNIT I  
An overview on denim and jeans; fiber qualities for denim yarn production; yarns for denim production and their characteristics

UNIT II  
Indigo dye and its reduction; dyeing technology of denim yarns; non-indigo dyes for denims; weaving and finishing of denim fabrics.

UNIT III  
Denim garment manufacture - types of garments and production sequence, seams and stitches, sewing threads and needles, sewing machines, fastenings, trims, pressing and Inspection.

UNIT IV  
Dry and wet finishes to produce effects and colours on denim garments; novel denims

UNIT V  
Dyeing of denim garments; digital printing of denim garments; comfort aspects of denim

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the students shall know about
- Fibres and yarns used for production of denim garments
- Weaving and chemical processing of denim fabrics
- Stitching and finishing of denim garments
TEXT BOOKS:

REFERENCES:

TT8851 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 5
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 9
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 13
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 9
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 9
Dry and Wet finishing; Characterization, structure - property relationship in bonded fabrics; End uses 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 fabric and their end uses
- Choose appropriate bonded technique for getting desired properties in fabric.

TEXT BOOKS:

REFERENCES:

MG8791 SUPPLY CHAIN MANAGEMENT L T P C
3 0 0 3

OBJECTIVE:
• To provide an insight on the fundamentals of supply chain networks, tools and techniques.

UNIT I INTRODUCTION 9
Role of Logistics and Supply chain Management: Scope and Importance- Evolution of Supply Chain - Decision Phases in Supply Chain - Competitive and Supply chain Strategies – Drivers of Supply Chain Performance and Obstacles.

UNIT II SUPPLY CHAIN NETWORK DESIGN 9

UNIT III LOGISTICS IN SUPPLY CHAIN 9
Role of transportation in supply chain – factors affecting transportation decision – Design option for transportation network – Tailored transportation – Routing and scheduling in transportation.

UNIT IV SOURCING AND COORDINATION IN SUPPLY CHAIN 9
Role of sourcing supply chain supplier selection assessment and contracts- Design collaboration - sourcing planning and analysis - supply chain co-ordination - Bull whip effect – Effect of lack of co-ordination in supply chain and obstacles – Building strategic partnerships and trust within a supply chain.

UNIT V SUPPLY CHAIN AND INFORMATION TECHNOLOGY 9
The role IT in supply chain- The supply chain IT frame work Customer Relationship Management – Internal supply chain management – supplier relationship management – future of IT in supply chain – E-Business in supply chain.

TOTAL: 45 PERIODS

OUTCOME:
• The student would understand the framework and scope of supply chain networks and functions.

TEXT BOOK:
1. Sunil Chopra, Peter Meindl and Kalra, “Supply Chain Management, Strategy, Planning,
REFERENCES: