UNIVERSITY DEPARTMENTS
REGULATIONS 2012
CURRICULA AND SYLLABIs FOR I TO VIII SEMESTERS

B.TECH. LEATHER TECHNOLOGY (FULL TIME)
ANNA UNIVERSITY:: CHENNAI 600 025

UNIVERSITY DEPARTMENT

R – 2012

B.TECH. LEATHER TECHNOLOGY

I – VIII SEMESTERS CURRICULA AND SYLLABI

SEMESTER I

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PRACTICAL

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*Minimum of two weeks industrial internship to be undertaken during the summer vacation after Semester VI

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<td>LT8018</td>
<td>Science and Technology of Leather Supplements and Synthetics</td>
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<td>LT8019</td>
<td>Technology of Animal and Tannery By products Utilization</td>
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<td>LT8020</td>
<td>Value Engineering in Leather Sector</td>
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<td>LT8021</td>
<td>Leather Bio Technology and its Application in Leather</td>
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<tr>
<td>LT8022</td>
<td>Computer Applications for Leather and Leather Products</td>
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<td>GE8072</td>
<td>Disaster Management</td>
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<td>GE8073</td>
<td>Human Rights</td>
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**TOTAL NO. OF CREDITS : 176**
OBJECTIVE
To impart basic communication skills and develop the habit of reading

OUTCOMES
• To enable all students of engineering and technology develop their basic communication skills in English.
• To give special emphasis to the development of speaking skills amongst the students of engineering and technology students.
• To ensure that students use the electronic media such as internet and supplement the learning materials used in the classroom.
• To inculcate the habit of reading for pleasure.

UNIT I
Listening - Introducing learners to GIE - Types of listening - Listening to audio (verbal & sounds); Speaking - Speaking about one’s place, important festivals etc. – Introducing oneself, one’s family / friend; Reading - Skimming a reading passage – Scanning for specific information - Note-making; Writing - Free writing on any given topic (My favourite place / Hobbies / School life, etc.) - Sentence completion - Autobiographical writing (writing about one’s leisure time activities, hometown, etc.); Grammar - Prepositions - Reference words - Wh-questions - Tenses (Simple); Vocabulary - Word formation - Word expansion (root words / etymology); E-materials - Interactive exercises for Grammar & Vocabulary - Reading comprehension exercises - Listening to audio files and answering questions.

UNIT II
Listening - Listening and responding to video lectures / talks; Speaking - Describing a simple process (filling a form, etc.) - Asking & answering questions - Telephone skills – Telephone etiquette; Reading – Critical reading - Finding key information in a given text - Sifting facts from opinions; Writing - Biographical writing (place, people) - Lab descriptions (general / specific description of laboratory experiments) - Definitions - Recommendations; Grammar - Use of imperatives - Subject-verb agreement; Vocabulary - Compound words - Word Association; E-materials - Interactive exercises for Grammar and Vocabulary - Listening exercises with sample telephone conversations / lectures – Picture-based activities.
UNIT III
Listening - Listening to specific task - focused audio tracks; Speaking - Role-play – Simulation
- Group interaction - Speaking in formal situations (teachers, officials, foreigners); Reading
- Reading and interpreting visual material; Writing - Jumbled sentences - Coherence and cohesion in writing - Channel conversion (flowchart into process) - Types of paragraph (cause & effect / compare & contrast / narrative / analytical) - Informal writing (letter/e-mail/blogs) - Paraphrasing; Grammar - Tenses (Past) - Use of sequence words - Adjectives; Vocabulary - Different forms and uses of words, Cause and effect words; E-materials - Interactive exercises for Grammar and Vocabulary - Excerpts from films related to the theme and follow up exercises - Pictures of flow charts and tables for interpretations.

UNIT IV
Listening - Watching videos / documentaries and responding to questions based on them; Speaking - Responding to questions - Different forms of interviews - Speaking at different types of interviews; Reading - Making inference from the reading passage - Predicting the content of a reading passage; Writing - Interpreting visual materials (line graphs, pie charts etc.) - Essay writing – Different types of essays; Grammar - Adverbs – Tenses – future time reference; Vocabulary - Single word substitutes - Use of abbreviations & acronyms; E-materials - Interactive exercises for Grammar and Vocabulary - Sample interviews - film scenes - dialogue writing.

UNIT V
Listening - Listening to different accents, Listening to Speeches/Presentations, Listening to broadcast & telecast from Radio & TV; Speaking - Giving impromptu talks, Making presentations on given topics; Reading - Email communication - Reading the attachment files having a poem/joke/proverb - Sending their responses through email Writing - Creative writing, Poster making; Grammar - Direct and indirect speech; Vocabulary - Lexical items (fixed / semi fixed expressions); E-materials - Interactive exercises for Grammar & Vocabulary - Sending emails with attachment – Audio / video excerpts of different accents, - Interpreting posters.

TOTAL : 60 PERIODS

TEXT BOOKS
REFERENCES

EXTENSIVE READERS

Website Resources
1. www.uefap.com
2. www.eslcafe.com
3. www.listen-to-english.com
4. www.owl.english.purdue.edu
5. www.chompchomp.com
OBJECTIVE
To impart the fundamental knowledge about matrices, infinite series, partial derivatives, improper and multiple integrals

OUTCOMES
1. To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
2. To make the student knowledgeable in the area of infinite series and their convergence so that he/she will be familiar with limitations of using infinite series approximations for solutions arising in mathematical modeling.
3. To familiarize the student with functions of several variables. This is needed in many branches of engineering.
4. To introduce the concepts of improper integrals, Gamma, Beta and Error functions which are needed in engineering applications.
5. To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT I MATRICES

UNIT II INFINITE SERIES

UNIT III FUNCTIONS OF SEVERAL VARIABLES

11
UNIT IV  IMPROPER INTEGRALS
Improper integrals of the first and second kind and their convergence – Evaluation of integrals involving a parameter by Leibnitz rule – Beta and Gamma functions – Properties – Evaluation of integrals using Beta and Gamma functions – Error functions

UNIT V  MULTIPLE INTEGRALS  9+3

TOTAL : 60 PERIODS

TEXT BOOKS

REFERENCES
OBJECTIVE
To introduce the basic physics concepts relevant to different branches of Engineering and Technology.

OUTCOME
On completion of the course the students are expected to have a thorough knowledge on the basic physics concepts relevant to different branches of Engineering and Technology.

UNIT I   PROPERTIES OF MATTER

UNIT II   ACOUSTICS AND ULTRASONICS

UNIT III   THERMAL PHYSICS
UNIT IV  APPLIED OPTICS

UNIT V  SOLID STATE PHYSICS
Nature of bonding - growth of single crystals (qualitative) - crystal systems - crystal planes and directions - expressions for interplanar distance - coordination number and packing factor for simple structures: SC, BCC, FCC and HCP - structure and significance of NaCl, ZnS, diamond and graphite - crystal imperfections: point defects, dislocations and stacking faults - unit cell, Bravais space lattices - miller indices.

TOTAL : 45 PERIODS

TEXT BOOKS

REFERENCE BOOKS

CY8151  ENGINEERING CHEMISTRY  L T P C
(Common to All Branches of Engineering and Technology)  3 0 0 3

OBJECTIVE
To introduce the basic chemistry concepts relevant to different branches of Engineering and Technology.
OUTCOME
On completion of the course the students are expected to have a thorough knowledge on thermodynamics, polymers, catalysis, spectroscopy and nanochemistry.

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

UNIT II POLYMER CHEMISTRY
Introduction: Classification of polymers – Natural and Synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerisation. Types and mechanism of polymerisation: Addition (Free Radical, cationic, anionic and living); condensation and copolymerisation. Properties of polymers: Tg, Tacticity, Molecular weight – weight average, number average and polydispersity index. Techniques of polymerisation: Bulk, emulsion, solution and suspension.

UNIT III KINETICS AND CATALYSIS
UNIT IV PHOTOCHEMISTRY AND SPECTROSCOPY


UNIT V NANOCHEMISTRY


TOTAL : 45 PERIODS

TEXT BOOKS

REFERENCES

GE8151 COMPUTING TECHNIQUES

OBJECTIVE
To introduce the basic knowledge about computers and fundamentals of C programming.

OUTCOME
On completion of the course the students are expected to have a
thorough knowledge on computers and C programming.

UNIT I     INTRODUCTION


UNIT II    C PROGRAMMING BASICS


UNIT III   ARRAYS AND STRINGS


UNIT IV    FUNCTIONS AND POINTERS


UNIT V     STRUCTURES AND UNIONS

Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure - Union - Programs using structures and Unions – Storage classes, Pre-processor directives.

TOTAL : 45 PERIODS

TEXTBOOKS

REFERENCES
GE 8152  ENGINEERING GRAPHICS  L T P C
2 0 3 4

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

OUTCOME
On completion of the course the students are expected to have a thorough knowledge on design of various engineering products and technical drawings.

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

UNIT I  PLANE CURVES AND FREE HAND SKETCHING 5+9

Visualization concepts and Free Hand sketching: Visualization principles – Representation of Three Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects

UNIT II  PROJECTION OF POINTS, LINES AND PLANE SURFACES 5+9
Orthographic projection- principles–Principal planes–First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and trapezoidal method and traces Projection of planes (polygonal and circular surfaces) inclined
to both the principal planes by rotating object method.

UNIT III  PROJECTION OF SOLIDS  \[5 + 9\]
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 and auxiliary plane method.

UNIT IV  PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES  \[5+9\]
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. Development of lateral surfaces of solids with cut-outs and holes.

UNIT V  SOMETRIC AND PERSPECTIVE PROJECTIONS  \[6 + 9\]
Principles of isometric projection – isometric scale – Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones - combination of two solid objects in simple vertical positions and miscellaneous problems. Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method and vanishing point method.

COMPUTER AIDED DRAFTING (Demonstration Only)  \[3\]
Introduction to drafting packages and demonstration of their use.

TOTAL : 75 PERIODS

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. Students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day

PH 8161

PHYSICS LABORATORY

(Common to All Branches of B.E. / B.Tech. Programmes)

L T P C 0 0 2 1

OBJECTIVE

To make the students understand and get hands-on in the basic concepts of practical Physics.

OUTCOME

Familiarizes the basic concept in experiments and provide strong platform to apply hands-on experience gained here for experimenting higher level concepts.

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of disc
2. Non–uniform bending - Determination of young’s modulus
3. Lee’s disc - Determination of thermal conductivity of a bad conductor
4. Potentiometer - Determination of thermo e.m.f. of thermocouple
5. Air wedge - Determination of thickness of a thin sheet of paper
6. i. Optical fibre - Determination of Numerical Aperture and acceptance angle
   ii. Compact disc - Determination of width of the groove using laser
7. Acoustic grating - Determination of velocity of ultrasonic waves in liquids
8. Post office box - Determination of Band gap of a semiconductor
9. Spectrometer - Determination of wavelength using grating
10. Viscosity of liquids - Determination of co-efficient of viscosity of a liquid by Poiseuille’s flow

TOTAL: 30 PERIODS

CY 8161 CHEMISTRY LABORATORY L T P C
(Common to All Branches of Engineering and Technology) 0 0 2 1

OBJECTIVE
To provide hands-on experience in using PH meter, potentiometry, titration methods and estimating the strength of given solutions.

OUTCOME
Ability to perform all kinds of titrations and estimate the unknown chemical samples.

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

TOTAL: 30 PERIODS

REFERENCES

GE8161 COMPUTER PRACTICES LABORATORY

OBJECTIVE
• To enable the student to learn and use the major components of a computer system
• To make the students write programs and solve problems
• To learn to use office automation tools

OUTCOME
At the end of the lab session student will be able to use MS office and generate data, solve simple problems with C-Programming Language.

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

TOTAL: 45 PERIODS
OBJECTIVE

To provide exposure to the students with hands-on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

OUTCOME:
- ability to fabricate carpentry components and pipe connections including plumbing works.
- ability to use welding equipments to join the structures.
- ability to fabricate electrical and electronics circuits

GROUP – A (CIVIL & ELECTRICAL)

1. CIVIL ENGINEERING PRACTICE

Plumbing
Basic pipe connections involving the fittings like valves, taps, coupling, unions, reducers, elbows and other components used in household fittings. Preparation of plumbing line sketches.
Laying pipe connection to the suction side of a pump – inlet.
Laying pipe connection to the delivery side of a pump – outlet.
Practice in mixed pipe connections: Metal, plastic and flexible pipes used in household appliances.

Wood Work
Sawing, planning and making common joints: T-Joint, Mortise and Tennon joint, Dovetail joint. Study
Study of joints in door panels, wooden furniture
Study of common industrial trusses using models.

2. ELECTRICAL ENGINEERING PRACTICE

Basic household wiring using switches, fuse, indicator – lamp etc.,
Preparation of wiring diagrams
Stair case light wiring
Tube – light wiring
Study of iron-box, fan with regulator, emergency lamp

GROUP – B (MECHANICAL AND ELECTRONICS) 15

3. MECHANICAL ENGINEERING PRACTICE

Welding
Arc welding of butt joints, lap joints, tee joints
Gas welding Practice.

Basic Machining
Simple turning, drilling and tapping
operations. Machine assembly Practice.

Study and assembling the following:
Centrifugal pump, mixies and air
conditioners. Demonstration on
(a) Smithy operations like the production of hexagonal bolt.
(b) Foundry operation like mould preparation for grooved pulley.

4. ELECTRONIC ENGINEERING PRACTICE 9

Soldering simple electronic circuits and checking continuity.
Assembling electronic components on a small PCB and testing.
Study of Telephone, FM radio, low-voltage power supplies.

TOTAL : 45 PERIODS

HS 8251 TECHNICAL ENGLISH - II L T P C
(For All Branches of B.E / B.Tech programmes) 3 1 0 4

OBJECTIVE

- To make the students acquire listening and speaking skills meant for both formal and informal contexts
- To help them develop their reading skills by exposing them to different types of reading strategies
• To equip them with writing skills needed for academic as well as workplace situations
• To make them acquire language skills at their own pace by using e-materials and language lab component

OUTCOME
On completion of the course the students are expected to acquire various linguistic skills required for academic and workplace situations.

UNIT I

9 + 3
Listening - Listening to informal conversations and participating; Speaking - Opening a conversation (greetings, comments on something, weather) - Turn taking - Closing a conversation (excuses, general wish, positive comment, thanks); Reading - Developing analytical skills, Deductive and inductive reasoning - Extensive reading; Writing - Effective use of SMS for sending short notes and messages - Using ‘emoticons’ as symbols in email messages; Grammar - Regular & irregular verbs - Active and passive voice; Vocabulary - Homonyms (e.g. ‘can’) - Homophones (e.g. ‘some’, ‘sum’); E-materials - Interactive exercise on Grammar and vocabulary – blogging; Language Lab - Listening to different types of conversation and answering questions.

UNIT II

9 + 3
Listening - Listening to situation based dialogues; Speaking - Conversation practice in real life situations, asking for directions (using polite expressions), giving directions (using imperative sentences), Purchasing goods from a shop, Discussing various aspects of a film (they have already seen) or a book (they have already read); Reading - Reading a short story or an article from newspaper, Critical reading, Comprehension skills; Writing - Writing a review / summary of a story / article, Personal letter (Inviting your friend to a function, congratulating someone for his success, thanking one’s friend / relatives); Grammar - modal verbs, Purpose expressions; Vocabulary - Phrasal verbs and their meanings, Using phrasal verbs in sentences; E-materials - Interactive exercise on Grammar and vocabulary, Extensive reading activity (reading stories / novels from links), Posting reviews in blogs - Language Lab - Dialogues (Fill up exercises), Recording students’ dialogues.

UNIT III

9 + 3
Listening - Listening to the conversation - Understanding the structure of conversations; Speaking - Conversation skills with a sense of stress, intonation, pronunciation and meaning - Seeking information – expressing feelings (affection, anger, regret etc.); Reading - Speed reading – reading passages with the time limit - Skimming; Writing - Minutes of meeting – format and practice in the preparation of minutes - Writing summary after reading the articles from the journals - Format for the journal articles – elements of technical articles (abstract, introduction,
methodology, results, discussion, conclusion, appendices, references) - Writing strategies; Grammar - Conditional clauses - Cause and effect expressions; Vocabulary - Words used as nouns and verbs without any change in the spelling (e.g. ‘rock’, ‘train’, ‘ring’); E-materials - Interactive exercise on Grammar & vocabulary - Speed Reading practice exercises; Language Lab - Intonation practice using EFLU materials – Attending a meeting and writing minutes.

UNIT IV
9 + 3
Listening - Listening to a telephone conversation, Viewing a model interview (face-to-face, telephonic and video conferencing) and observing the practices; Speaking - Role play practice in telephone skills - listening and responding, -asking questions, -note taking – passing on messages, Role play and mock interview for grasping the interview skills; Reading - Reading the job advertisements and the profile of the company concerned – scanning; Writing - Applying for a job – cover letter - résumé preparation – vision, mission and goals of the candidate; Grammar - Numerical expressions - Connectives (discourse markers); Vocabulary - Idioms and their meanings – using idioms in sentences; E-materials - Interactive exercises on Grammar & Vocabulary - Different forms of résumés- Filling up a résumé / cover letter; Language Lab - Telephonic interview – recording the responses - e-résumé writing.

UNIT V
9 + 3
Listening - Viewing a model group discussion and reviewing the performance of each participant - Identifying the characteristics of a good listener; Speaking - Group discussion skills – initiating the discussion – exchanging suggestions and proposals – expressing dissent/ agreement – assertiveness in expressing opinions – mind mapping technique; Reading - Note making skills – making notes from books, or any form of written materials - Intensive reading Writing - Types of reports – Feasibility / Project report – report format – recommendations / suggestions – interpretation of data (using charts for effective presentation); Grammar - Use of clauses; Vocabulary – Collocation; E-materials - Interactive grammar and vocabulary exercises - Sample GD - Pictures for discussion, Interactive grammar and vocabulary exercises - Pictures for discussion; Language Lab - Different models of group discussion.

TOTAL : 60 PERIODS

TEXT BOOKS
REFERENCES

EXTENSIVE READERS

WEB RESOURCES
1. www.esl-lab.com
2. www.englishgrammar.org
3. www.englishclub.com
4. www.mindtools.com
5. www.esl.about.com

MA8251 MATHEMATICS II L T P C
(Common to All Branches of B.E. / B.Tech. Programmes in II Semester ) 3 1 0 4

OBJECTIVE
To impart the fundamental knowledge about differential equations, vector calculus, analytic functions, complex integration and Laplace transforms.
OUTCOME

• To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
• To acquaint the student with the concepts of vector calculus, needed for problems in all engineering disciplines.
• To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow of electric current.
• To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

UNIT I DIFFERENTIAL EQUATIONS 9+3
Method of variation of parameters – Method of undetermined coefficients – Homogenous equation of Euler’s and Legendre’s type – System of simultaneous linear differential equations with constant coefficients.

UNIT II VECTOR CALCULUS 9+3
Gradient and directional derivative – Divergence and Curl – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral and volume integral – Green’s, Gauss divergence and Stoke’s theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT III ANALYTIC FUNCTION 9+3
Analytic functions – Necessary and sufficient conditions for analyticity – Properties – Harmonic conjugates – Construction of analytic function – Conformal mapping – Mapping by functions w= z+ c, az, 1/z, z². Bilinear transformation.
UNIT IV  COMPLEX INTEGRATION  9+3

UNIT V LAPLACE TRANSFORMS  9+3

TOTAL : 60 PERIODS

TEXT BOOKS

REFERENCES
OBJECTIVE
To introduce the physics of various materials relevant to different branches of technology.

OUTCOME
On completion of the course the students are expected to have a thorough knowledge on the various materials and their physical properties.

UNIT I  PREPARATION AND PROCESSING OF MATERIALS

UNIT II  PROPERTIES OF CONDUCTING AND SUPERCONDUCTING MATERIALS

UNIT III  ELECTRONIC MATERIALS

UNIT IV  INSULATING AND MAGNETIC MATERIALS
Dielectric, paraelectric and ferroelectric materials – Electronic, Ionic, Orientational and space charge polarization – Internal field and deduction of Clausius Mosotti equation – dielectric loss – different types of dielectric breakdown – classification of insulating materials and their

UNIT VCERAMIC AND NEW MATERIALS


TOTAL : 45 PERIODS

REFERENCES


CY8253 CHEMISTRY FOR TECHNOLOGISTS

OBJECTIVE
To introduce the chemistry involved in various technology.

OUTCOME
On completion of the course the students are expected to have a thorough knowledge on the chemistry of water, interfaces, oils, fats, chemicals and colorants.

UNIT I WATER

UNIT II  CHEMISTRY OF INTERFACES  9
Interface region-curved interfaces-thermodynamics of surfaces - Surface film on liquids-
Adsorption of gases on Solids-adsorption isotherms. Applications of adsorption studies-
detergency, wetting, foaming , defoaming, spreading, water repellency.

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
Surfactant Chemistry, bleaching powder, sodium hypochlorite, hydrogen peroxide, chlorine
dioxide, preparation, estimation of available chlorine in hypochlorite bleach liquor.
determination of strength of hydrogen peroxide.

UNIT V  COLORANTS  9
Theory of color and constitution: chromophore and auxochrome,classification of dyes based
on application. Chemistry and synthesis of , azo dye.

TOTAL : 45 PERIODS

REFERENCES
Shoban Lal Nagin Chand & Co., Jalandar, 2000
Pvt. Ltd., New Delhi, 1994
OBJECTIVE
• To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering

OUTCOME
On completion of the course the students are expected to study the effect of force and motion in various design functions of engineering.

UNIT I BASICS AND STATICS OF PARTICLES 

UNIT II EQUILIBRIUM OF RIGID BODIES

UNIT III PROPERTIES OF SURFACES AND SOLIDS
UNIT IV  DYNAMICS OF PARTICLES  9+3

UNIT V  FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS  9+3

TOTAL: 60 PERIODS (L:45 + T:15)

TEXT BOOKS

REFERENCES

LT8201  INTRODUCTION TO LEATHER MANUFACTURE  L T P C
3 0 0 3

AIM
This course aims at introducing the fundamentals of chemistry and technology of leather manufacture.

OBJECTIVES
This course objective is to introduce the fundamentals of chemistry and technology of leather manufacture.

**OUTCOMES**
Through this course the student gains an appreciation of the underpinning science and technology involved in manufacturing of leathers.

**UNIT I  HIDES/SKINS AND PRESERVATION  10**
Functions and properties of skins and hides; Histological characteristics of hides and skins - Cow, Ox, Buff, Cow Calf, buff calf, Goat and Sheep; Chemical constituents of hides and skins; Brief study of various fibrous and non-fibrous proteins; Standard flaying techniques; Hide/skin putrefaction and factors involved; Various preservation techniques and their principles; Defects in hides and skins; Raw material grading – Size, weight and surface defects as criteria.

**UNIT II  PRETANNING PROCESSES  12**
Principles and objectives of pretanning processes viz., soaking, liming, deliming, bating, pickling, depickling, degreasing and depickling.

**UNIT III  TANNING PROCESSES  10**
Various types of tanning materials; Organic and mineral tanning agents; Principles involved in vegetable and chrome tanning and their mechanism in brief; Combination tannages.

**UNIT IV  POST TANNING PROCESSES  7**
Principles and objectives of post tanning processes viz., rechroming, neutralisation, retanning, dyeing and fatliquoring; Various mechanical operations involved; Methods of drying.
UNIT V FINISHING TECHNIQUES

Principles and objectives of leather finishing; Classification of leather finishing; Types of auxiliaries and finishes used; General machinery employed in leather finishing

TOTAL : 45 PERIODS

TEXT BOOKS

PH8261 APPLIED PHYSICS LABORATORY  L T P C
(In common with Textile Technology)  0 0 2 1

OBJECTIVES:
• To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.

OUTCOMES
• The students will have the ability to test materials by using their knowledge of applied physics principles in optics and properties of matter.

LIST OF EXPERIMENTS
1. X-ray powder method
2. Study of crystal lattices
3. Torsion test
4. Density measurements of fibres
5. Electrical resistance measurement
6. Optical absorption –Spectrometer
7. FTIR study
8. pH measurement
9. Thermal conductivity
10. Di-electric constant
11. Viscosity of liquid
12. Strain gauge meter – Young’s modulus
13. Instrumentation amplifier
14. Electrical conductivity
15. Creep characterization
16. Melt flow index of polymers

TOTAL : 30 PERIODS

CY8261 APPLIED CHEMISTRY LABORATORY
(In common with Textile Technology)

0 0 2 1

OBJECTIVE
- To make the student acquire practical skills in the wet chemical and instrumental methods for quantitative estimation of hardness, alkalinity, metal ion content, corrosion in metals and cement analysis.

OUTCOMES
- The students will be conversant with hands-on knowledge in the quantitative chemical analysis of water quality related parameters, corrosion measurement and cement analysis.

LIST OF EXPERIMENTS
1. Preparation of solutions with various normality and molarity.
2. Determination of Redwood / Saybolt numbers, kinematic viscosity and viscosity index of lubricating oils
3. Determination of flash point, fire point, cloud and pour point of oils
4. Determination of acid value, saponification number and iodine value of oils
5. Determination of total, temporary, permanent, calcium and magnesium hardness of water samples
6. Determination of chloride, sulphate ,and COD of water samples
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
10. Synthesis of a dye, preparation of soap and a defoamer

TOTAL : 30 PERIODS
OBJECTIVES

• To provide the necessary basic concepts in probability and random processes and apply them in random signals, linear systems etc. in communications engineering.
• The students will have an exposure of various distributions.

UNIT I   RANDOM VARIABLES

Discrete and Continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma, Weibull and Normal distributions - Functions of a random variable.
UNIT II TWO-DIMENSIONAL RANDOM VARIABLES 9+3
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 RANDOM PROCESSES 9+3
Classification – Stationary process – Markov process - Poisson process – Random telegraph process.

UNIT IV CORRELATION AND SPECTRAL DENSITIES 9+3

UNIT V LINEAR SYSTEMS WITH RANDOM INPUTS 9+3
Linear time invariant system – System transfer function – Linear systems with random inputs – Auto-correlation and Cross-correlation functions of input and output - White noise.

TOTAL : 60 PERIODS

TEXT BOOKS

REFERENCES
AIM
To introduce various methods of chemical analysis through sophisticated instruments for accuracy

OBJECTIVES
To have thorough understanding on the theory of instrumentation and applications of analytical equipment used for testing of various products with special reference to leather technology. To know the importance of analytical instrumentation during the purification, compounding and formulating the finished product

OUTCOMES
Students can understand the principle and importance of various analytical instruments used for the characterization of various materials

UNIT I  INTRODUCTION TO SPECTROSCOPICAL METHODS OF ANALYSIS 3
Electromagnetic Radiation; Various ranges, Dual properties, Various energy levels, Interaction of photons with matter, absorbance, and transmittance and their relationship, Permitted energy levels for the electrons of an atom and simple molecules, classification of instrumental methods based on physical properties.

Quantitative Spectroscopy; Lambert’s Law, Limitations, Deviations (Real, Chemical, Instrumental) Nesslerimetry. Estimation of inorganic ions such as Fe, Ni and estimation of Nitrite using Beer-Lambert’s Law

UNIT II  MOLECULAR SPECTROSCOPY 13
Various transitions in organic and inorganic compounds effected by UV, visible and infra red radiations, various energy level diagrams of saturated, unsaturated and carbonyl compounds, excitation by UV and Visible radiations, Woodward-Fieser rules for the calculation of absorption maxima (dienes and carbonyl compounds) Effects of auxochromes and effects of conjugation on the absorption maxima, Instrumentation for UV, VISIBLE AND IR spectroscopies (source, Optical parts and Detectors), Multicomponent analysis, Photometric titration (Experimental set-up and various types of titrations); Applications of UV, VISIBLE AND IR spectrscopies.

UNIT III  ATOMIC SPECTROSCOPY 5
Atomic Absorption Spectrophotometry; Principle, Instrumentation and Application, Various interferences observed in AAS (Chemical, radiation and excitation); Flame photometry; Principle, Instrumentation and applications
POLARIMETRY AND REFRACTOMETRY

Polarimetry and refractometry Principle, instrumentation and Applications.
UNIT IV  THERMAL ANALYSIS

Thermogravimetry: Instrumentation, factors affecting the shapes of thermograms, applications, thermograms of some important compounds (CuSO$_4$. 5H$_2$O, CaC$_2$O$_4$.2H$_2$O etc; Differential thermal analysis: principle, Instrumentation and applications, differences between DSC and DTA, Applications of DSC (Inorganic and Polymer samples)

UNIT V CHROMATOGRAPHIC METHODS

Classification of chromatographic methods, column, Thin layer, paper, Gas, High performance liquid chromatographical methods (principles, mode of separation, instrumentation and technique)

TOTAL : 45 PERIODS

Text Book


REFERENCES


EE8252 PRINCIPLES OF 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
OUTCOMES:
- ability to identify the electrical components explain the characteristics of electrical machines.
- ability to identify electronics components and use of them to design circuits.

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

UNIT II  AC CIRCUITS
Introduction to AC circuits – waveforms and RMS value – power and power factor, single phase and three-phase balanced circuits, housing wiring, industrial wiring, materials of wiring

UNIT III  ELECTRICAL MACHINES

UNIT IV  ELECTRONIC DEVICES & CIRCUITS

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

TOTAL : 45 PERIODS

REFERENCES

LT8301 BASIC BIOCHEMISTRY AND MICROBIOLOGY

OBJECTIVE
To impart fundamental knowledge on biochemistry and microbiology that is essential for leather technologists

OUTCOMES
Students would gain knowledge on some of the basic aspects of biochemistry and microbiology

UNIT I
Introduction
Introduction to Biochemistry, water as a biological solvent, weak acid and bases, pH, buffers, Henderson-Hasselbalch equation, physiological buffers, fitness of the aqueous environment for living organisms.

UNIT II
Nucleic Acids
DNA - a genetic material, composition of DNA and RNA, generalized structure plan and nomenclature of nucleic acids, features of DNA double helix. Denaturation and annealing of DNA, structure and roles of different types of RNA.

Proteins
Amino acids: classification and structures of standard amino acids. Classification of proteins based on solubility, shape, composition and functions. Protein structure : levels of structure and protein architecture, primary structure of proteins, secondary structure of proteins- helix and pleated sheets, tertiary structure of proteins, forces stabilizing the tertiary structure and
quaternary structure of proteins, denaturation and renaturation of proteins, behavior of proteins in solutions, salting in and salting out of proteins. Structure and biological functions of fibrous proteins, (keratin, collagen and elastin), globular proteins (hemoglobin and myoglobin), lipoproteins, metalloproteins, glycoproteins and nucleoproteins; Enzymes and their industrial applications.

UNIT III
Carbohydrates

Structure, occurrence and biological importance of monosaccharides, disaccharides and polysaccharides

Lipids

Introduction, classification, nomenclature, structure and properties of lipids. Biological significance of fat.
UNIT IV  MICROBES- STRUCTURE AND MULTIPLICATION  
Basics of microbial existence; History of microbiology, classification and nomenclature of microorganisms, microscopic examination of microorganisms, light and electron microscopy; principles of different staining techniques like gram staining, acid fast, capsular staining, flagellar staining. Structural organization and multiplication of bacteria, viruses, algae and fungi, with special mention of life history of actinomycetes, yeast, mycoplasma and bacteriophages.

UNIT V  MICROBIAL NUTRITION AND GROWTH  
Nutritional requirements for microbial growth. Culture media - Chemical elements as nutrients. Carbon, Nitrogen Hydrogen, Oxygen, Sulfur, Phosphorus and other trace elements definitions of Chemo autotrophs, Chemoheterotrophs, Photo autotrophs, Photo heterotrophs. Media for cultivation of bacteria, fungi, protozoa and algae - Tissue culture media, brief account of animal cell culture, Plant cell culture, Chemically defined media, complex media, Selective media, Differential media, enrichment media and microbiological Assay media

TOTAL : 45 PERIODS

REFERENCE BOOKS
OBJECTIVE
To impart fundamental knowledge on inorganic and organic chemistry that is essential for leather technologists

OUTCOME
Students would gain knowledge on some of the basic aspects of inorganic and organic chemistry

UNIT I INTRODUCTION TO INORGANIC COMPOUNDS 10
A brief survey of the ‘s’ block - binary compounds, complexes, alkalides and electrides. Features of the ‘p’ block and its elements - expansion of the octet, Lewis structures; ‘d’ orbitals and transition metals; Coordination compounds –nomenclature, Theories - Coordination theory, Werner’s theory; Stereo chemistry

UNIT II MOLECULAR BONDING 10
Shapes of molecules - Valence Shell Electron Pair Repulsion method; Valence bond approach and atomic orbital hybridizations. LCAO-MO theory, pictorial derivation of bonding and antibonding molecular orbitals. MO energy level diagrams for homonuclear diatomics; Redox reactions.

UNIT III OILS, FATS AND WAXES 10
Types of oils-Development of Rancidity in an oil –Factors contributing to rancidity –Free acid value-Saponification value and iodine value of an oil- Methodology of determining these values-Problems on computing free acid, Saponification and iodine value-Types of Cholesterol- Risk factor in precipitating heart disease- Waxes-Classifications

UNIT IV HETEROCYCLIC AND ANTIMICROBIAL COMPOUNDS 6
Definition and reactions of Pyrrole, Furan, Thiophene, Pyridine - Reactions of furfural-Synthesis of Isoriazid; Antibacterial drugs-Synthesis of Sulphanilamide and sulphapyridine.

UNIT V DYES AND DYEING 9
Classification of dyes based on the mode of application of the dye to the fabric- Structural classification of dyes-Coupling reaction to produce azo dyes-Synthesis of the following azo dyes- Methyl orange, Methyl red and Congo red- Synthesis of Triphenyl methane dyes-Malachite green and para-rosaniline -Phthalein dye-Preparation of Eosin- Introduction to natural dyes and Reactive dyes
Text Books

REFERENCES

LT8303 THEORY OF SKIN PROTEINS AND PRE-TANNING PROCESSES L T P C 3 0 0 3

AIM
To understand the basic structure and function of skin and its components and to understand the various pretanning processes/operations

OBJECTIVES
- To impart knowledge on the structure and function of various constituents of skin
- To impart knowledge on principles and practice of preservation and various pretanning processes / operations.

OUTCOMES
At the end of this course students would have a good understanding on the skin, which is the substrate used for leather manufacture. Also the students will have fundamental understanding on preservation and various pretanning processes/operations.
UNIT I COMPONENTS, FUNCTIONS AND COMPOSITION OF SKIN
Organization of skin components in different animals; Structure and function of epidermis, dermis, cutaneous and subcutaneous tissues; hair; fat tissue; nerve; erectorpili muscle; sweat glands; Functions and properties of hides and skins; Chemical constituents of hides and skins; Fibrous and non-fibrous proteins in skin; Structure and properties of mono, di, oligo and polysaccharides; complex carbohydrates; Structure and properties of Fatty acids, Glycerolipids, phospholipids, sphingolipids, glycolipids, steroids; Structure, function and properties of amino acids.

UNIT II STRUCTURE, FUNCTION, THERMAL TRANSITION AND DEGRADATION OF COLLAGEN
Structure, function and chemical features of collagen; Types of collagen; Tropocollagen molecules; Sub-units of collagen; Kinetics of fibril formation; precipitated forms of collagen; Electron microscopy of the collagen fibre; Biosynthesis; Denaturation temperature; Mechanism of denaturation process; Thermal shrinkage; Factors influencing melting transition; Degradation of collagen – collagenase and its physico-chemical properties, and mechanism of action.

UNIT III PRETANNING PROCESSES
Chemistry and principles of different pretanning processes - Soaking, liming, deliming, bating, pickling, depickling and degreasing.

UNIT IV CLEANER PROCESSING IN BEAMHOUSE PRACTICES
Salt-free curing options, sulphide free unhairing systems, ammonia-free deliming, salt free pickling systems, solvent and eco friendly degreasing systems. Strategies to bring down BOD, COD and TDS standards of tannery effluents.

UNIT VPRACTICE AND QUALITY CONTROL
Different methods of pretanning processes as applied to light, heavy and industrial leathers. Process control in pretanning operations.

TOTAL: 45 PERIODS

Text Books

REFERENCES

EE8261 ELECTRICAL AND ELECTRONICS LAB

OBJECTIVE:
To impart hands on experience in verification of circuit laws and theorems, measurement of circuit parameters, study of circuit characteristics and simulation of time response. To expose the students to the basic operation of electrical machines and help them to develop experimental skills.

OUTCOME:
Ability to understand and analyze Instrumentation systems and their applications to various industries

LIST OF EXPERIMENTS
1. Study of DC & AC Starters
2. Wheatstone Bridge and Schering Bridge
3. Speed Control of DC Shunt Motor
4. Load Test on DC Shunt Motor
5. OCC & Load Characteristics of DC Shunt Generator
6. Load Test on Single-Phase Transformer
7. Load Test on Three-Phase Induction Motor
8. Load Test on Single-Phase Induction Motor
9. Study of Transducers
10. ADC and DAC Converters

TOTAL : 45 PERIODS

50
AIM
To provide an introduction to the production of chrome and vegetable tanned leathers from raw hides and skins.

OBJECTIVES
To provide practical knowledge on the production of chrome and vegetable tanned leathers from raw hides and skins.

OUTCOMES
Students will have practical skill to make chrome and vegetable tanned leathers from raw hides and skins

1. Assortment of hides and skins
2. Various methods of Curing
3. Manufacture of wet-blue from hides and skins
4. Manufacture of E.I and vegetable tanned leathers
5. Introduction to various post tanning and finishing processes for the manufacture of upper and garment leathers
6. Introduction to various mechanical operations/processing equipments/devices

TOTAL : 60 PERIODS
OBJECTIVES
To provide the mathematical foundations of numerical techniques for solving linear system, eigen value problems, interpolation, numerical differentiation and integration and the errors associated with them;

OUTCOMES
To demonstrate the utility of numerical techniques of ordinary and partial differential equations in solving engineering problems where analytical solutions are not readily available.

UNIT I SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS 9+3

UNIT II INTERPOLATION AND APPROXIMATION 9+3
Interpolation with unequal intervals - Lagrange interpolation – Newton’s divided difference interpolation – Cubic Splines - Interpolation with equal intervals - Newton’s forward and backward difference formulae – Least square method - Linear curve fitting.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 9+3

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 9+3
UNIT V  BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS  9+3

Finite difference methods for solving two-point linear boundary value problems. Finite difference techniques for the solution of two dimensional Laplace’s and Poisson’s equations on rectangular domain – One dimensional heat-flow equation by explicit and implicit (Crank-Nicholson) methods - One dimensional wave equation by explicit method.

TOTAL : 60 PERIODS

TEXT BOOKS

REFERENCES

PHYSICAL CHEMISTRY FOR LEATHER TECHNOLOGIST

CY8402

OBJECTIVE
To impart fundamental knowledge on physical chemistry for aspects related to leather technology

OUTCOMES
The students will an understanding on the physical chemistry and at a later stage when they pursue leather courses they will be able to relate the concepts of this course

UNIT I  PHASE RULE  9
Definition – Application of phase rule to water system – Thermal Analysis – Cooling curves – Two component system – Eutectic and compound formation-Liquid – liquid equilibria-
Distillation of binary liquid mixture- Azeotropic distillation-Fractional distillation-partially miscible liquid-CST-Immiscible liquid-Steam distillation

UNIT II  IONIC EQUILIBRIA
UNIT III  COLLOIDS

UNIT IV  SURFACTANTS
Chemical and Physico-chemical types, properties; Rheology : Viscosity. Non-Newtonian flow and Viscoelasticity, Birefringence: electrical and streaming; X-ray and Neutron scattering. Various Diffusional aspects and applications.

UNIT V  APPLICATION TO LEATHER TECHNOLOGY
Wetting, Cohesion & Adhesion, Contact Angle, Foams, detergency, Emulsions, stability, Surface properties and Membrane technology.

TOTAL : 45 PERIODS

TEXT BOOKS

LT8401  TECHNOLOGY OF HEAVY LEATHER MANUFACTURE  L T P C
3 0 0 3

AIM
This course aims at imparting knowledge in the technology of making different types of heavy leathers from hides.
OBJECTIVES
This course aims at imparting knowledge in the technology of making different types of heavy leathers from hides.

OUTCOMES
At the end of the course, the students will be in a position to understand the property requirements of different kinds of heavy leathers and process aspects for the same

UNIT I SOLE, HARNESS AND SADDLERY LEATHERS
Property requirement of sole leathers; Process design considerations; Choice of raw material; Manufacture of vegetable tanned sole leathers – Traditional and modern methods; Chrome tanned sole leathers; Water proofing of sole leathers; Manufacture of harness and saddlery leathers; International standards required for the above heavy leathers

UNIT II INDUSTRIAL LEATHERS
Different types of raw materials used, properties required: physical and chemical standards required and process details to achieve the specifications for the following industrial leathers: Belting leathers, honing/stropping leathers, picking band leathers, picker apron leathers. Hydraulic and pneumatic leathers.

UNIT III SPORTS GOODS LEATHERS
Different types of raw materials used, physical and chemical properties required and process details to achieve the specifications for the following sports goods leathers: Leathers for football, rugby ball, volley ball, hockey ball and cricket ball. Glove leathers for wicket keepers and boxing.

UNIT IV FINISHED LEATHERS FROM HIDES
Different types of raw materials used, physical and chemical properties required and process details to achieve the specifications for the following leathers: Full chrome, Semi chrome and Chrome retan - uppers, suedes, nubuck, lining, nappa, shrunken grain, upholstery. Dressing of E.I. kips into upper, lining and leathers for leathergoods, burnishable, printed leathers, Case hides.-Kattai and banwar from buff calf; Bag tanned leather and their use in traditional products

UNIT V UPGRADATION AND QUALITY CONTROL
Upgradation technologies; Rectification of defects in hides; Control of area, yield, color and finish of leathers; Quality control in heavy leather manufacture.

**TOTAL : 45 PERIODS**

**TEXT BOOKS**

AIM
To impart knowledge on the chemistry of various inorganic tanning materials and systems

OBJECTIVES
To impart knowledge on the chemistry and process of chrome and various inorganic tanning materials and systems

OUTCOMES
The students will gain a thorough understanding on the principles and practice of chrome tanning and a glimpse of other inorganic tannages

UNIT I INTRODUCTION TO COORDINATION CHEMISTRY; METAL IONS IN TANNING
Werner’s theory of coordination, origins of coordinative interactions, role of d and f orbitals, definition of ligands, nucleophilicity of ligands and electronegativity of donor atoms, chelation and masking, ligand field stabilisation energy and introduction of factors controlling molecular stability of transition metal complexes. Historical overview of mineral tanning.

UNIT II AQUEOUS CHEMISTRY OF CHROMIUM
Electronic configuration and its implications, common oxidation states of chromium, redox stabilities of chromium (VI) and chromium (III) salts, redox potentials and their interconversion, protolysis, kinetic inertness of chromium (III), basicity, olation, oxolation and polymerisation, Stiasny’s series, McClandish precipitation point.

UNIT III FACTORS CONTROLLING CHROME TANNING
Single and double bath chrome tannages and their relative merits and demerits, preparation of basic chromium sulphate (BCS) salt, reaction parameters influencing composition of BCS, kinetics of chrome tanning, diffusion and complexation, effects of float volume, pH, basicity, masking, temperature, drum speed, ageing chrome tanned substrates.
UNIT IV MECHANISM OF CHROME TANNAGE

Theories of chrome tanning; absorption, coating, electrostatic and hydrogen bond interactions and coordinative forces involved in chrome tanning, indirect evidence for chrome binding sites in protein, hydrothermal stability of chrome-collagen compound.

UNIT V OTHER INORGANIC TANNAGES

Aqueous chemistry of aluminium (III), zirconium (IV), titanium (IV) and iron(III) and its relevance to mineral tanning, chemistry of silicates and phosphates and their tanning mechanisms, mechanism of inorganic tannages and their relevance to combination tanning.

Total : 45 Periods

REFERENCES


LT8403 THE THEORY AND PRACTICE OF VEGETABLE AND ORGANIC TANNAGES

AIM

To make the students understand the chemistry of different vegetable and organic tanning agents and respective technology systems.

OBJECTIVES

• At the end of this course, the students will have knowledge on the chemistry of various vegetable and organic tanning agents and the mechanism of their interaction with the skin protein - Collagen.
OUTCOMES
The students will gain a thorough understanding on vegetable tannins and their application in vegetable tanning process. This subject also provide a glimpse of other organic tannages

UNIT I VEGETABLE TANNINS
Vegetable tannins - definition and classification, Occurrence, Biosynthesis; Chemistry of hydrolysable tannins - gallotannins, ellagi tannins - their structural aspects including tannin dimers, trimers, etc., Chemistry of condensed (flavanoid) tannins proanthocyanidins, dimers, trimers and other oligomers - Isolation and characterization of vegetable tannins.

UNIT II CONSTITUENTS OF VEGETABLE TANNING MATERIALS
Tannins as well as non-tannins, polyphenolic constituents present in popular tanning materials like avaram, konnam, wattle, cutch, babul, myrobalan, etc., and their physico-chemical properties and their effect on the physical properties of leathers.
UNIT III  MECHANISM AND PRACTICE OF VEGETABLE TANNING


UNIT IV  OTHER ORGANIC TANNAGES

Mechanism of tanning with Aldehyde, Dialdehydes, oil, Sulphonyl chloride, Quinone, oxazolidine, phosphonium and other organic tanning agents; wet white leathers; Synthetic tannins - Classification - properties, uses in leather industry - Mechanism of reaction with collagen.

UNIT V  PREPARATION OF VEGETABLE TANNIN EXTRACTS AND SYNTHETIC TANNING AGENTS

Methods of preparation of vegetable tannin extracts, spray dried vegetable tannins, synthetic and other organic tannages.

TOTAL : 45 PERIODS

TEXT BOOKS

2. Rodd, “Chemistry of carbon compounds”, Vol. III-D, Chapter on “Hydrolysable tannins”.
AIM
To impart knowledge on analytical methods for the analysis of leather, leather chemicals and process liquors generated during processing of leathers

OBJECTIVES
At the end of the course, the student would understand

- The analytical chemistry behind testing of leather chemicals and leathers
- The principle used in instrumental techniques
- Various methods of analyses of leather chemicals, spent process liquors and pelts/leathers
- Quality Standards of various leather chemicals and leather end products

OUTCOMES
This subject provides the students an understanding on the theoretical background on the chemical testing of leather, process liquor and chemicals used for leather manufacture

UNIT I ANALYSIS OF PRETANNING & TANNING AGENTS/CHEMICALS 15
Principles of analytical methods employed in analysis of pretanning chemicals – Water, Common salt, lime, unhairing, deliming and bating agents; Vegetable tanning materials and extracts; Aldehydes; Chrome extracts and liquors; Zirconium, Titanium, Aluminium, Iron and THPS tanning agents; Specifications recommended by standards organizations.

UNIT II ANALYSIS OF POST TANNING AND FINISHING CHEMICALS 8
Principles of analytical and instrumental methods employed in analysis of neutralising agents, syntans, dyes, oils and fats, fatliquors, post tanning auxiliaries, pigments, resin binders, wax emulsions, fillers, lacquers and lacquer emulsions and finishing auxiliaries; Specifications recommended by standards organizations.

UNIT III ANALYSIS OF PROCESS LIQUORS AND EMISSIONS 8
Principles of analytical and instrumental methods employed in analysis of exhaustion liquors
of pretanning, tanning and post tanning processes. Analysis of emissions - air pollutants from leather processing; Specifications recommended by standards organizations.

UNIT IV  ANALYSIS OF TANNED LEATHERS    8
Principles of analytical and instrumental methods employed in analysis of various chrome leathers, vegetable tanned leathers; Specifications recommended by standards organizations.

UNIT V  ANALYSIS OF ECO-SENSITIVE SUBSTANCES IN LEATHER    6
Principles of analytical and instrumental methods employed in analysis of eco-sensitive substances - Penta chlorophenol (PCP), Formaldehyde, Hexavalent chromium [Cr(VI)], azodyes etc., present in leather chemicals and finished leathers; Application of instrumental techniques such as UV-Vis spectrophotometer, GC, HPLC to analyse these eco-sensitive substances; Specifications recommended by standards organizations.

TOTAL : 45 PERIODS

REFERENCES

AIM
To provide practical knowledge and the skill on chemical analyses of various leather chemicals, process liquors, effluent and pelts/leathers at various stages of processing and eco-sensitive chemicals present in leather.
OBJECTIVES
To impart practical knowledge on chemical analysis of various leather chemicals, process liquors, effluent and pelts/leathers at various stages of processing and eco-sensitive chemicals present in leather

OUTCOMES
Students will have practical experience on the analysis of various leather chemicals, pelts/leathers and eco-sensitive substances by means of qualitative and quantitative methods of analyses

Analysis of Lime
a. Purity of lime
b. Total bases

Analysis of Sodium Sulphide
Analysis of Deliming Agents
a. Analysis of ammonium salts
b. Analysis of boric acid

Analysis of Bate

Analysis of Vegetable Tanning Materials
a. Qualitative analysis
b. Quantitative analysis
c. Acids and Salts in Vegetable Tannin Extracts by Different Methods

Analysis of Chrome tanning agents
a. Moisture
b. \( \text{Cr}_2\text{O}_3 \) content
c. Acid combined with chromium
d. Basicity: Proctor and Lehigh basicities
e. Degree of olation

Analysis of Syntans
Quantification of phenolic content & free formaldehyde

Analysis of Oils and fatliquors
a. Moisture
b. Acid value
c. Saponification value
d. Iodine value
e. Free fatty acids
f. Unsaponifiables
g. Total alkalinity

Analysis of pretanned pelts and tanned leathers

Analysis of process liquors
Soak, Lime, Pickle Liquor, Chrome and Vegetable tan liquors; BOD, COD, TOC, TDS, TS in composite liquors/waste waters.

TOTAL: 60 PERIODS
AIM
To carry out the practical leather processing of heavy and finished leathers from raw hides.

OBJECTIVES
At the end of the course students will gain confidence in manufacturing
• Heavy leathers like sole, saddle, belting etc., from hides
• Finished leathers from different bovine hides and calf skins

OUTCOMES
Students will gain the skill set to make heavy and finished leathers from raw hides and calf skin

Manufacture of vegetable tanned and chrome sole leathers;
Waterproofing of sole leathers;
Processing of Industrial leathers like belting, hydraulic and pneumatic leathers;
Processing of harness and saddle leathers;
Manufacture of sports goods leathers – football leathers, cricket and hockey ball leathers, sports glove from hides

Manufacture of following leathers (minimum three) from different raw materials and tannages:
• Picking band leathers and stropping leathers
• Upholstery leathers
• Upper leathers
• Zug grain upper leathers
• Nappa leathers
• Patent leathers
• Shrunken grain leathers
• Suede upper leathers
• Burnishable upper leathers
• Oil-pull up leather
• Inorganic and organic tannages other than chromium and vegetable respectively.
• Eco friendly options for different unit operations.
• Water and energy saving during leather processing.

TOTAL : 90 PERIODS
OBJECTIVE
To impart knowledge on the synthesis and characterization of polymers

OUTCOMES
This subject will provide the students a basic understanding on polymers which will be useful for them to connect their role in leather and synthetics manufacture

UNIT I
Introduction to natural and synthetic polymers; Terms and fundamental concepts; Step-growth polymerization, Carother’s equation, Functionality, Crosslinking; PET manufacturing; Chain growth polymerization, Free radical polymerization, Kinetics of free-radical initiation, termination, chain transfer, Mayo’s equation, cage effect, autoacceleration, inhibition and retardation;

UNIT II
Polypropylene manufacturing; Acrylic manufacturing; Atom transfer radical polymerization, ionic polymerization, ring opening polymerization; Nylon-6 manufacturing; Co-polymerization and its importance. Copolymer equation, reactivity ratio, tailor making of copolymer properties; Techniques of chain polymerization; Bulk, solution, emulsion, microemulsion and suspension polymerization; chemical modification of fibres; Polymer solution, Flory’s theory; Interaction parameter.

UNIT III
Molecular weight and its distribution by: End group analysis, osmometry, light scattering, ultra centrifugation, gel permeation chromatography, intrinsic viscosity; Spectroscopic methods of polymer characterization such as, FTIR, UV, NMR and others.

UNIT IV
Compounding of polymers - fillers, plasticizers, antioxidants, UV stabilizers, colouring agents and flame retardants. Polymer processing - compression, moulding, injection, extrusion, calendering and film casting; Preparation and properties of polyesters, polyamides, epoxy and silicone polymers; Conductive polymers, super absorbent polymers.
UNIT V
Recycling, remoulding, depolymerisation, incineration, biodegradable polymers.

TOTAL : 45 PERIODS

REFERENCES

LT8502 TECHNOLOGY OF LIGHT LEATHER MANUFACTURE

AIM
This course aims at imparting knowledge in the technology of making different types of light leathers from skins.

OBJECTIVES
This course aims at imparting knowledge in the technology of making different types of light leathers from skins.
OUTCOMES
At the end of the course, the students will be in a position to understand the property variations of different leathers and suitable processing variations that are required in the manufacture of the same.

UNIT I PROPERTIES OF LEATHER 9
Definition and understanding of various physical, chemical and organo-leptic properties of leather.

UNIT II PROPERTY – PROCESS RELATIONSHIP 8
Understanding of the relationship between each leather property and the process parameter of each unit operation/process.
UNIT III  PRODUCT BRIEF OF LIGHT LEATHERS  8
Product brief i.e, property requirements w.r.t. product manufacture and use of different light leathers

UNIT IV  PROCESS DESIGN  8
Concept of designing the process of manufacture of light leathers of different product briefs.

UNIT V LIGHT LEATHER MANUFACTURE  12
Process of manufacture of leathers such as glazed kid, nappa garment, fine glove, suede garment and lining; Quality control aspects with special reference to light leather manufacture

TOTAL : 45 PERIODS

TEXT BOOKS
3. CLRI Process Bulletins.

LT8503 THEORY AND PRACTICE OF POST TANNING PROCESSES  L T P C  3 0 0 3

AIM
To impart knowledge on chemicals and processes involved in post tanning operations of leather manufacture.

OBJECTIVES
To impart knowledge on
- Chemistry of post tanning auxiliaries.
- Mechanism of dyeing, fatliquoring and retanning
- Practice of Post tanning processes

OUTCOMES
The students will be able to understand the theory and practice of post tanning processes involved in the making of different leathers

UNIT I  DYES AND DYEING OF LEATHER  10
Theory of colours, chromophoric groups and their optical absorption, structural features of dyes, factors affecting hue and colour, intensity; Classification of dyes based on their chemical
nature, application and colour index, properties; blending of dyes, theory and practice of colour matching, theory and mechanism of dyeing, chemistry and application of dyeing auxiliaries such as leveling agents, dispersing agents and dye fixatives.

UNIT II  
FATLIQUORS AND FATLIQUORING OF LEATHER  

UNIT III  
SYNTANS AND RETANNING OF LEATHER  
Classification of syntans, auxiliary, intermediate, replacement syntans and resin tanning agents Sulphonation of naphthalene, naphthols, phenol-formaldehyde condensation reactions, characterisation and photo oxidation mechanisms of phenolic syntans. Bleaching agents and mordants. Light fast, amino resin, formaldehyde-free, acrylic and PU syntans. Chemistry and mechanism of retanning.

UNIT IV  
PRACTICE OF POST TANNING PROCESSES AND OPERATIONS  
Practice of post tanning processes viz., neutralization, retanning, dyeing, fatliquoring and Post tanning process technologies for products from different types of leathers.

UNIT V  
POST TANNING MECHANICAL OPERATIONS  
Sammying, splitting and shaving, drying, staking, toggling, buffing etc operations – understanding and judicious application of these operations to meet the end product parameters.

TOTAL : 45 PERIODS

TEXT BOOKS
AIM
To impart knowledge on analytical methods for physical testing of leathers and related microscopical and bacteriological tests of leather and leather chemicals

OBJECTIVES
To impart knowledge on

- Principle in microscopical and bacteriological testing related to leather processes
- Mould and pest growth and control in leather
- The analytical methods/principles and instrumental techniques used in physical testing leathers
- Standard and quality control measures of physical testing of leathers

OUTCOMES
This subject provides the students an understanding on the theoretical background on the microbial and physical testing of leathers

UNIT I  MICROSCOPY
Mechanical and optical parts of compound microscope, images formed, defects in eye pieces -and their rectification etc. Preparation of microscopical slides, fixing, embedding, sectioning, staining and mounting etc. Fibre structure and assessment - Orientation of fibre structure in curing, soaking, liming, pickling, tanning, post tanning and finishing. Optimal condition of fibre structures in various types of leathers. Assessment of finished leather, heavy leathers and light leathers.

UNIT II  BACTERIOLOGY

UNIT III  MOULD & PEST CONTROL
Structure of moulds associated during different stages of leather manufacture. Effect of environmental factors on mould growth. Effect of mould growth during processing of skins/hides, finished leathers, leather goods and during transportation. Testing and prevention of mould growth during processing, storage of finished goods and transportation. Parasitic
diseases of livestock that affect the leather quality - Demodectic - Sarcoptic and Psoroptic manage mites, warble files, ticks and lice.

UNIT IV    PHYSICAL TESTING OF LEATHERS
Sampling position for physical testing of leathers. Different physical testing methods - principles involved. Static and Dynamic methods, Non-destructive testing of leathers.

UNIT V    STANDARDS AND QUALITY CONTROL
Physical characteristics and specifications of various types of leathers

TOTAL : 45 PERIODS

TEXT BOOKS

LT8505     PRINCIPLES OF UNIT OPERATIONS AND UNIT PROCESSES
IN LEATHER AND LEATHER CHEMICALS MANUFACTURE

AIM
To impart knowledge on basic concepts of chemical engineering unit operations and processes and application in leather and leather chemicals manufacture

OBJECTIVES
To impart knowledge on basic concepts of chemical engineering unit operations and processes connected to leather chemicals manufacture
OUTCOMES
At the end of the course, the student would understand the basic concepts of unit operations, material and energy balances, fluid dynamics mass and heat transfer in various unit operations such as distillation, extraction, drying and humidification size reduction and separation and mixing techniques technology of organic and inorganic chemicals involved in the processing of leather chemicals.
UNIT I  CONCEPTS & METERING OF FLUIDS


UNIT II  HEAT TRANSFER AND MASS TRANSFER

Diffusion: Binary diffusion, concept of mass transfer coefficients and interface mass transfer and stagewise contact.
Distillation: Principle of distillation, Application of distillation in leather chemicals and auxiliaries processing.
Extraction: Extraction principles, Leaching and Extraction equipment and their application in manufacture of leather chemicals
Drying: Drying characteristics, Theory and mechanism of drying, estimation of drying rate, design and performance of industrial dryers for leather.
Humidification: Humidity charts, methods of humidification and dehumidification; Equipments and their design aspects; Humidity control in leather processing.

UNIT III  MECHANICAL SEPARATIONS

Size reduction: Theory and equipment; application in leather chemical processing
Clarification: Principles of clarification, Liquid-Liquid, Liquid-solid and Liquid-gas separations, Application in leather processing and effluent treatment
Mixing: Basic theory and application in leather and leather chemical processing.

UNIT IV  PRINCIPLES OF UNIT PROCESSES

General principles of unit operations and unit processes in leather & leather chemicals processing: General concepts of unit operations and unit processes in leather & leather chemicals processing. Development of process flow sheets with reference to leather and leather chemical industries design, control safety pollution abatement. Principles of halogenation, esterification, hydrolysis, oxidation, hydrogenation. Polymerization, sulphation and sulphonation, diazotization and coupling.
Tanning agents: Vegetable tannins and Vegetable tannin extracts, Basic Chromium Sulphate, Aluminium, and Zirconium, salts for leather processing.

Oils, fats and detergents: Oils and fats; their nature and products derived from oils and fats, Fatty Acids and Alcohols, waxes and fatliquors.

Synthetic binders: Binders on acrylcs, polyamides, polyesters, polyurethanes, polypropylene

Dyes and intermediates & surface coating agents: Raw materials; important unit processes; Types of dye intermediates and dyes; pigments, lacquers

Recent developments in chemicals for leather manufacture: Recent developments like REACH and its implications on leather chemicals; Alternate eco-benign leather chemicals and auxiliaries for leather manufacture.

UNIT V WATER AND INORGANIC CHEMICALS

Treatment of water for domestic and industrial purposes, manufacture of sodium chloride, sodium sulphide, sodium sulphite and bisulphite, soda ash, caustic soda, lime, sulphuric and hydrochloric acids.

Total: 45 Periods

REFERENCES

8. Dutta, S.S., An introduction to the principles of leather manufacture, ILTA.
OBJECTIVES

- To enhance the employability skills of students with a special focus on Presentation skills, Group discussion skills and Interview skills
- To help them improve their soft skills, including report writing, necessary for the workplace situations
  2. Creating effective PPTs – presenting the visuals effectively
  3. Using body language with awareness – gestures, facial expressions, etc.
  4. Preparing job applications – writing covering letter and résumé
  5. Applying for jobs online – email etiquette
  6. Participating in group discussions – understanding group dynamics – brainstorming the topic
  7. Training in soft skills – persuasive skills – sociability skills – questioning and clarifying skills – mock GD
  8. Writing reports – collecting, analyzing and interpreting data – drafting the report
  9. Attending job interviews – answering questions confidently
  10. Interview etiquette – dress code – body language – mock interview

TOTAL 30: PERIODS

Requirements for a class of 30 students

1. A PC or a lap top with one or two speakers
2. A Collar mike and a speaker
3. An LCD projector and a screen
4. CD’s and DVD’s on relevant topics
5. Individual chairs for conducting group discussions

REFERENCE BOOKS


EXTENSIVE READERS

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

LT8511 MATERIAL TESTING LABORATORY - II

AIM
To provide practical knowledge on microscopical and microbiological testing of leathers physical testing of leathers.

OBJECTIVES
To provide practical knowledge microbiological testing and physical testing of leathers

OUTCOMES
At the end of the course, the students would have practical experience and understanding in

- Microscopical analysis/identification of leathers
- Microbiological testing of raw skins/hides, pelts and leathers and various process liquors
- Physical testing of leathers

**MICROSCOPY LAB**

a. Setting up of a compound microscope  
b. Preparation of microscopical slides by paraffin embedding method and by freezing method  
c. Identification of hides and skins from their histological structures and from their grain pattern-Buffalo, Cow, Sheep and Goat  
d. Microscopical assessment of fibre structure during the process - Soaking, liming, pickling and tanning and different finished leathers.

**MICROBIOLOGY LAB**

a. Preparation of various culture media  
b. Staining of bacteria  
c. Enumeration of bacteria in hides and skins and in tan liquors  
d. Isolation and identification of fungi/mold/yeast in raw hides/skins, leathers and tan liquors  
e. Mildew resistance test for leathers  
f. Identification of insect and parasitic damages in skins/hides/leathers (Entomology demo only)

**PHYSICAL TESTING LAB**

**Strength Properties**

a. Tensile Strength and Elongation at break  
b. Tongue tear strength  
c. Stitch tear and slit tear strengths  
d. Grain crack and bursting strengths

**Wear and Comfort Properties**

a. Static/dynamic water absorption  
b. Water vapour permeability  
c. Abrasion resistance

80
d. Perspiration resistance

**Fastness Properties**

a. Rub fastness
b. Water fastness
c. Heat fastness
d. Light fastness
e. Gloss

TOTAL : 90 PERIODS
AIM
To carry out the practicals for manufacture of light leathers from raw goat, sheep and calf skins.

OBJECTIVES
To provide practical knowledge on light leathers from raw and intermediate processed materials from goat, sheep and calf skins.

OUTCOMES
At the end of the course students will gain confidence in processing
- Upper, Lining, Nappa, Suede, Nubuck, Glove leathers from different skins
- Specialty leathers from different skins

Practical training (minimum 6 leathers) on the manufacture of
White Leather from wet white tanning (compulsory)
Resin and protein upper leathers
Nappa leathers
Glazed kid leathers
Nubuck leathers
Dress glove
Utility glove leathers
Crushed kid leathers
Suede upper leathers
Suede garment leathers
Mesh leathers
Hair-on/Fur-on leathers
Chamois leathers

TOTAL : 60 PERIODS
OBJECTIVE
To educate students about the importance of studying environmental science and engineering in course curriculum and to create awareness in protection of environment.

OUTCOMES
The students will be able to understand

- Biodiversity and the importance of maintaining the environment
- How industrial activities affect the environment and methods available to protect them
- Policies to protect the environment
UNIT I  ENVIRONMENT, ECOSYSTEMS, BIODIVERSITY AND SUSTAINABLE DEVELOPMENT  
Definition of environment and components in the environment- definition of an ecosystem, concept and functions of different ecosystems like (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)- biodiversity, threats to biodiversity and conservation of biodiversity- sustainable development and significance of sustainable development in environmental related issues.

UNIT II  ENVIRONMENTAL POLLUTION AND CHEMISTRY  
Definition of pollution- different types of environmental pollution- classification of pollutants in water and wastewater – characterization of pollutants in water and wastewater - environmental significance - types of sampling, significance of sampling, precautions to be taken while sampling and preservation of samples. Atmospheric structure and composition - definition of air pollution – sources and classification of air pollutants and their effect on human health, vegetation, animals, property, aesthetic value and visibility- ambient air quality and emission standards –photochemical smog, ozone layer depletion, greenhouse gases, global warming, acid rain and their effect on environment. Definition, types and sources of solid and hazardous wastes - need for solid and hazardous waste management – elements of integrated waste management and role of stakeholders – definition, types and sources of nuclear and radioactive wastes – waste management and disposal.

UNIT III  WASTEWATER TREATMENT AND DISPOSAL  
Unit operations and processes- principles of physical treatment: screening, mixing, equalization, sedimentation, filtration - principles of chemical treatment: coagulation, flocculation, precipitation, flotation - objectives of biological wastewater treatment and various process- need for tertiary treatment.

UNIT IV  ENVIRONMENTAL IMPACT & RISK ASSESSMENT  

UNIT V  ENVIRONMENTAL POLICIES AND LEGISLATION  
Environmental legislations in India- environment protection act – air (prevention and control of pollution) act – water (prevention and control of pollution) act – wildlife protection act – forest
conservation act – solid and hazardous waste management rules – biomedical waste rules – responsibilities of generators- role and responsibility of pollution control boards.

REFERENCES


LT8602 LEATHER GOODS AND GARMENTS TECHNOLOGY LT P C

3 0 0 3

AIM

To impart knowledge on making leather goods and garments

OBJECTIVES

To impart knowledge on making leather goods and garments

OUTCOMES

Through this course students will be able know

- various components used for the manufacture of leather good and garments
- processing steps involved in the making of leather goods and garments
- different machineries involved in the products manufacture
- techniques to design and develop leather goods and garments
- organisation and management of a leather goods and garments manufacturing unit

UNIT I OVERVIEW

Classification of Leather Goods and Garments; Selection of Materials, grading and assorting of leathers for leather goods & garments ; Property requirements for leather and other materials; Accessories for Leather goods & garments - Various types of fasteners, fittings and other

**UNIT II**

i) Production planning - Nomenclature used for component identification in various leather garments skirts, jackets, trousers etc and various leather goods – Wallet, hand bags, Executive bags etc. Process scheduling and line balancing.


iii) Assembling - Pre assembly and assembly operations – skiving, splitting, folding, sewing etc. Various types of assembly techniques for leather goods and garments.

iv) Quality - Quality control measures in leather products manufacture.

**UNIT III  MACHINERY**

Machinery needs for leather goods and garments manufacture. Various types of sewing machines – flat bed, cylinder bed, post bed and other special sewing machines – different feed mechanisms.

Clicking, splitting, skiving, folding, embossing, creasing machines – their working principles operation and maintenance.

**UNIT IV  DESIGN & DEVELOPMENT**

Pattern design and development – measurement/ sizing for various types of leather goods & garments, pattern grading for leather garments. CAD applications for leather goods and garments. Fashion and material trends.

**UNIT V  ORGANISATION & MANAGEMENT**

Project Feasibility reports, plant lay out, costing and pricing for leather goods and garments. Analysis of International market trends for goods and garments – EU, USA & other markets.

Social auditing of leather goods & garment units - occupational Health & Safety, ISO 9000 & 14000.

**REFERENCES**

6. A course manual on leather garment pattern designing.
8. Leather and sports goods – Pattern and Template marker, NIMI Publications, 2011

LT8603 LEATHER MACHINERIES

AIM
To impart theory and practical knowledge on the working principles, use and maintenance of machineries used in leather manufacture.

OBJECTIVES
To impart theory knowledge on the working principles, use and maintenance of machineries used in leather manufacture.

OUTCOMES
At the end of the course, the students would understand the
• General principles involved in various machineries used in leather manufacture.
• Salient features and purpose of the various machinery used
• Preventive maintenance and safety in the use of leather machinery
• Adjustment of machinery parts for proper functioning of different machines used in leather processing
• Design of optimal machinery layout of tannery

UNIT I GENERAL PRINCIPLES AND MECHANISM OF LEATHER MACHINERY 12
involved in various tannery machines. Mechanism of cutting and shearing action of helical blade systems. Bush, ball, roller and ring oil bearing, cam springs and their application and function in tannery machinery.

UNIT II DESIGN, MATERIAL SELECTION AND CONSTRUCTION OF EQUIPMENT 12
Basic design, material selection and construction of pits, drums and paddles. Pneumatic
steering mechanism and control as applied to dust control equipment, air compressor, auto spray, etc. Hydraulic steering mechanism in case of shaving, staking, embossing machines, etc.
UNIT III  MECHANICAL FEATURES OF LEATHER MACHINERY

Salient features and purpose of the various machinery used in beam house, tanning and finishing yards, unhairing, fleshing, scudding, sammying, setting, shaving, staking, buffing, dedusting, glazing, machines, finiflex, hydraulic press, curtain coating, roller coating, transfer coating, autospry, driers and measuring machine etc.

UNIT IV  TANNERY LAYOUT

Drawing a neat lay out for a small/medium tannery showing the wet yard and finishing yard by arranging the machines as per the sequence of operation for standard leather processing.

UNIT V  PREVENTIVE MAINTENANCE AND SAFETY

Preventive maintenance and safety in the use of leather machinery

REFERENCES


OBJECTIVES

To impart knowledge on materials and processes/operations involved in leather finishing.

OUTCOMES

At the end of this course, the students would be in a position to

- Appreciate the role of various finishing agents and auxiliaries used in leather finishing
- Formulate strategies for finishing different types of leathers
- Study various upgradation techniques
- Methods of drying – Toggle drying, paste drying, vacuum drying etc. and preparing the crust
UNIT I COATING SCIENCE
Theory of surface coating; Characteristics of various components of coating system; Parameters of the process of coating and its influence on coating characteristics; Testing of coatings.

UNIT II PIGMENTS
Classification of pigments; Inorganic, organic, nacreous (pearlescent) and interference pigments - their representation code in the colour index. Different forms of pigments - powders and pastes. Evaluation and control of their brilliance, opacity, particle size, resistance to solvent, heat and light and colour matching.

UNIT III POLYMERIC MATERIALS AND THEIR DISPERSION FORMS
General introduction to addition and condensation polymerization; various methods of polymerisations, resins binders - acrylics, vinyls and urethanes, protein binders, cellulose nitrate, cellulose acetate butyrate, - protein binders - lacquers - emulsion and emulsifiers - evaluation and control - solvents and thinners.

UNIT IV PRINCIPLES OF FINISHING, FINISH FORMULATIONS AND THEIR APPLICATION
Resistance to heat, light and solvent. Pigment volume concentration, plasticizer, wetting agents, role in dispersion and stability - requirements in multiple coat technique – such as clearing coat, sealer coat, base coat, top and feel coat. Single coat composition methods like spraying, curtain coating, roller coating etc. Cationic finishes and their relative merits. Foam finish; Eco- friendly finishing - Volatile Organic Compounds (VOC) reductions. Finish formulation for various types of leathers.

UNIT V COATING METHODS AND NOVEL FINISHING SYSTEMS
Role of equipments like HVLP spray Roller coats, Continuous embossing machines, Dorn Busch, Finiflex, etc. Methods such as oil pull-up, waxy, burnishable, antique, grain suede, screen printing, roller printing, tie and dye finishing. Pearl finishing, easy-care and patent finishing, cationic finishing, foam finishing, transfer foil, lamination, etc.,

TOTAL : 45 PERIODS
REFERENCES

LT8611 LEATHER GOODS AND GARMENTS – DESIGN AND FABRICATION LABORATORY

OBJECTIVE
To impart practical knowledge on making leather goods and garments.

OUTCOMES
At the end of this course students will be able understand the practical intricacies involved in design and fabrication of leather goods and garments

Leather Assortment
Pattern preparation/nesting
Cutting of leather and other materials
Table work / pre assembly operations
Assembling and stitching operation
Pattern design for leather goods and garments.
Pattern grading and practice in CAD/CAM.
Practice in leather goods and garments making

TOTAL : 60 PERIODS

LT8612 LEATHER MACHINERY LABORATORY

OBJECTIVES
To impart practical knowledge on the working principles and maintenance of machineries used in leather manufacture.
OUTCOMES
This course will provide practical exposure on the functioning and maintenance of different machine used in leather manufacture
• Adjusting the position of different rollers in a splitting machine to get the required thickness while splitting.
• Adjusting the grinding stones to achieve the required level profile in a splitting band knife.
• Adjusting the position of rollers in a shaving machine to achieve proper thickness.
• Replacing the worn-out helical blades in a shaving machine.
• Procedure to be followed in removing the worn-out knife.
• Replacing the rubber beading in a drum door.
• Changing the main ball bearing in a drum.
• Tightening the V-belts in a drum.
• Adjusting the worn-out staking blades in a slocomb staking machine for proper staking.
• Increasing the staking pressure.
• Selection and fixing of the emery paper in a buffing machine.
• Adjusting the lateral oscillation of a buffing cylinder.
• Adjusting the feed roll position for proper buffing.
• Fixing the felt in a buffing machine.
• Fixing the glass roll in a glazing machine.
• Fixing the leather strap to the cast iron bed of a glazing machine.
• Increasing the glazing bed.
• Adjusting the various knobs in a spray gun to achieve proper spraying over leather.
• Adjusting the air compressor pressure for proper spraying.

TOTAL : 60 PERIODS
LT8613 TANNERY PRACTICE - IV

OBJECTIVES
To provide practical training in various methods of finishing of leathers.

OUTCOMES
At the end of this course the students will have skill set to handle process/operations in finishing various leathers

- Modern methods of finishing
- Use of cross linkers, Feel modifiers
- Water repellent finish formulations.
- Finishing using Roller coaters, Transfer coating m/c
- Cationic and foam finishing technologies.
- Patent finishing using Roller Coaters
- Trouble shooting in finishing.
- Finishing of various types of leathers – chrome-free, exotic, upholstery and water-repellant leathers

TOTAL : 60 PERIODS

LT8701 LEATHER FOOTWEAR TECHNOLOGY

OBJECTIVE
To impart knowledge of various materials and components used in footwear manufacture.

OUTCOMES
At the end of this course students will be able know about
- various components used for the manufacture of footwear
- processing steps involved in the making of leather footwear
- different machineries involved in the footwear manufacture
- techniques to design and develop leather footwear
UNIT I  FOOTWEAR MATERIALS AND COMPONENTS  9
Different types of upper and lining leathers; Different types of soling materials; Different types of adhesives used in footwear industry; Kinds of insole boards, Grinderies; Fasteners; Shoe dressing materials etc.

UNIT II  DESIGN AND PATTERN DEVELOPMENT  9
History of shoe; Purposes and styles; Fashion & designs; Preparation of standards and section for men, ladies & children; Classic and other types of shoes and boots.

UNIT III  CUTTING, PRE-CLOSING AND CLOSING  13
Principles of cutting – Hand, machine; Clicking room design and management. Checking incoming work, stitchmaking, skiving, punching and gimping, heat embossing, flow moulding, toe puff attachment, attaching linings and scrims, trimming linings, finishing off closed seams.
Top line and other edge treatments, local reinforcements, attaching fastners and trims.

UNIT IV  PRELASTING AND LASTING  10
Principles and methods of pre-lasting and lasting for different types of construction; Sole attaching; Lasted margin; Upper preparation; Sole preparation; Sole cementing; Upper
cementing; Bottom fillers and shanks; Adhesive drying, Heat activation, Spotting, Pressing, Last slipping, Health and safety, Quality control and fault finding problems- solving.

UNIT VMETHODS OF SHOE CONSTRUCTION

Various methods of shoe construction; shoe room techniques.

TOTAL : 45 PERIODS

REFERENCES

3. “Shoes and Leather News”, Published by bureau of foreign and domestic commerce, Dept of commerce, US, 1940.

LT8702 PROCESS ECONOMICS AND INDUSTRIAL MANAGEMENT FOR LEATHER SECTOR

OBJECTIVES

The objective of this course is to teach principles of cost estimation, feasibility analysis, management, organization and quality control that will enable the students to perform as efficient managers.

OUTCOMES

Process economics and industrial management principles introduced to the students will facilitate them in better management of the leather industry.

UNIT I PRINCIPLES OF PRODUCTION MANAGEMENT AND ORGANISATION

Planning, organization, staffing, coordination, directing, controlling, communicating, organization as a process and a structure; types of organizations

Method study; work measurement techniques; basic procedure; motion study; motion economy; principles of time study; elements of production control; forecasting; planning; routing; scheduling; dispatching; costs and costs control, inventory and inventory control.
UNIT II  ENGINEERING ECONOMICS FOR TECHNOLOGISTS-INTEREST, INVESTMENT COSTS AND COST ESTIMATION  10
Time Value of money; capital costs and depreciation, estimation of capital cost, manufacturing costs and working capital, invested capital and profitability.

UNIT III  PROFITABILITY, INVESTMENT ALTERNATIVE AND REPLACEMENT  8
Estimation of project profitability, sensitivity analysis; investment alternatives; replacement policy; forecasting sales; inflation and its impact.

UNIT IV  ANNUAL REPORTS AND ANALYSIS OF PERFORMANCE  4
Principles of accounting; balance sheet; income statement; financial ratios; analysis of performance and growth.

UNIT V   ECONOMIC BALANCE AND QUALITY CONTROL  8

TOTAL : 45 PERIODS

TEXT BOOKS

REFERENCE
OBJECTIVE
The goal of this course is to help students to identify innovative projects that promotes creativity.

OUTCOMES
At the end of the project period, students should be familiar with current thinking in their field, and able to apply the concepts to relevant research problems or practical applications.

The aim of the this course is to develop students to take intellectual risks, to think creatively, and to create new knowledge through structured, systematic initiatives that encourage the development of creative and innovative skills. The course will help students to identify innovative projects that promote and inculcate creativity by applying concepts relevant to research applications and practical applications related to leather science and technology. Several novel learning concepts, models, frameworks and tools that are applicable to learning and applying leather science and technology will be carried out. Each student will be allowed to choose projects that are creative and innovative in nature, which lead to budding these skills to meet the challenges of the leather sector world-wide.

TOTAL: 30 PERIODS

OBJECTIVE
To impart practical exposure on the industrial practices of leather or leather chemicals manufacture

OUTCOMES
The industrial internship is expected to provide practical exposure on industrial practices and instill confidence to students

Each student is required to undergo a practical training in leather processing unit/leather chemical manufacturing unit and submit an industrial training report on practical internship
undertaken by/assigned to him by the Department. The report should be based on the practical experience gained at the industry duly certified by the issuing authority at the training centre of leather industry. The objective of the training is to make use of the practical knowledge gained on site by the student at various stages of the leather and leather chemical processing. This helps to judge the level of proficiency, originality and capacity for application of the practical knowledge attained by the student during the training period.

Student should undertake this industrial internship/training for a minimum of two weeks during the summer vacation after sixth semester. However evaluation for this course will be done in seventh semester.

TOTAL DURATION: Min 2 WEEKS

LT8713 LEATHER FOOTWEAR – DESIGN AND FABRICATION L T P C
LABORATORY 0 0 4 2

OBJECTIVE
To impart practical knowledge on making leather footwear.

OUTCOMES
At the end of this course students will be able understand the practical intricacies involved in design and fabrication of leather footwear.

Leather Assortment
Layout preparation
Preparation and cutting
Upper preparation
Pre Assemble operation
Closing Operation
Bottom Stock Preparation
Lasting and Finishing
Practice in CAD/CAM and pattern grading using machine.
Practice in classic shoe making; moccasin construction; practice in shoe finishing

TOTAL : 60 PERIODS

MG8654 TOTAL QUALITY MANAGEMENT

AIM
To provide comprehensive knowledge about the principles, practices, tools and techniques of Total quality management.

OBJECTIVES
The objective of this course is to introduce the students about various concepts involved in Total Quality Management system

OUTCOMES
At the end of this course the students will be to
• understand the TQM concept and principles and the various tools available to achieve total quality management.
• understand the statistical approach for quality control
• have awareness about the ISO and QS certification process and its need for the industries.

UNIT I INTRODUCTION

UNIT II TQM PRINCIPLES
Quality statements - Customer focus –Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Continuous process improvement – PDCA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS & TECHNIQUES I
UNIT IV  TQM TOOLS & TECHNIQUES II
UNIT V  QUALITY SYSTEMS FOR LEATHER AND LEATHER PRODUCTS


TOTAL : 45 PERIODS

TEXT BOOK

REFERENCE BOOKS

LT8811  PROJECT WORK  L T P C
0 0 24 12

OBJECTIVE
The objective of the project is to make use of the knowledge gained by the student at various stages of the degree programme. This helps to judge the level of proficiency, originality and capacity for application of the knowledge attained by the student at the end of the programme.

OUTCOMES
The project work is expected to shape the student to think originally, plan/execute work properly, analytical abilities and reporting/communication skills

Each student is required to submit a report on the project undertaken by and assigned to him by the Department. The report should be based on the information available in the
literature or data determined in the laboratory/industry. The objective of the project is to make use of the knowledge gained by the student at various stages of the degree programme. This helps to judge the level of proficiency, originality and capacity for application of the knowledge attained by the student at the end of the programme.

**VIVA VOCE**

The object of the viva-voce examination is to determine whether the objectives of the Project work have been met by the student as well as to assess the originality and initiative of the student as demonstrated in the Project Work.

**Total : 240 PERIODS**

**LT8001 ADVANCED PHYSICS AND CHEMISTRY OF LEATHER – I (APCL – I) 3003**

**AIM**

To impart knowledge on the advanced physical and chemical concepts of native collagen and collagen processed into leather.

**OBJECTIVES**

This subject is to impart advanced physical and chemical concepts associated with the structure of collagen and their dimensional changes associated during the leather manufacture.

**OUTCOMES**

At the end of the course the students would have gained comprehensive knowledge on the chemistry and physics of molecular architecture, hydration, swelling, phase transitions, dimensional stability, relaxation, shrinkage and cross-linking phenomena of collagen/processed collagen/leather.

**UNIT I**

Histology and fibre packing in Skins. Techniques for study of macro-ultra and microstructural details of skins. Primary, secondary, tertiary and quarternary structure of collagen.

**UNIT II**

Molecular architecture of collagen. Inter and intra-change forces in the stabilisation and
aggregation of collagen molecules. Three dimensional network of collagen fibres in skins and leather matrix.

**UNIT III**
Hydration, fibre swelling and phase transitions in collagen fibres and their role in dimensional stability of skin and leather matrix.

**UNIT IV**
Molecular mechanisms in relaxation and folding with special reference to native collagen and tanned collagen. Helix to coil transition and effects of thermo-mechanical stress on connective tissue fibres.

**UNIT V**
Shrinkage and cross linking phenomena in native, chrome tanned and vegetable tanned collagen. Influence of electromagnetic and high energy radiation on native collagen.

**TOTAL : 45 PERIODS**

**TEXT BOOKS AND REFERENCES**

AIM
To attempt micro-level understanding of leather making

OBJECTIVES
This subject is to impart advanced physical and chemical concepts associated with the hydration of skin, diffusion and transport of chemicals and surface treatment associated with leather manufacture.

OUTCOMES
• To understand hydration of skin protein and its functional sites
• To understand diffusion and transport phenomena in collageneous matrices
• To understand molecular level changes and dimensional changes during various unit processes in leather making
• To relate surface science to leather making.

UNIT I
Macro and microporosity of skin and influence of hydration and water structure on the pore size pattern in skin. Functional sites in protein for interactions with vegetable and pretanning materials, Electrophilic and nucleophilic reactions at protein sites.

UNIT II

UNIT III
Molecular level processes and changes in soaking, liming/dehairing, deliming/bating, pickling, tanning, dyeing and Fatliquoring.
UNIT IV
Dimensional changes and Ultra and micro structural variations of skins during soaking, liming, deliming/bating, pickling, tanning, retanning, Fatliquoring and drying as well as finishing with resin and casein finishes.

UNIT V
Surface science application to leather. Surface charge and energy of full chrome and chrome retanned leather. Emulsions in leather processing and the surface charge and potential of leather finish films, adhesion, mechanisms, influence of opacity, refractive index and scattering coefficient of pigments and pigment formulations and factors controlling the stability of leather finish films.

TOTAL : 45 PERIODS

TEXT BOOKS AND REFERENCES

LT8003 CAD/CAM FOR LEATHER PRODUCTS DESIGN AND MANUFACTURE 3 0 0 3

AIM
To impart knowledge on CAD/CAM for leather products design and manufacture.

OBJECTIVES
• To focus on the computer applications in leather products sector, hardware in cad, pattern engineering, last and sole modelling for footwear and advanced computational techniques in cad, rapid prototyping.

OUTCOMES
The students would have exposure on the use of computer based application in designing leather products
UNIT I  COMPUTER APPLICATIONS IN LEATHER AND PRODUCT SECTOR

Definition, historical development, scope of applications and advantage. CNC devices for computer aided cutting including laser and water jet, computer aided manufacturing.
UNIT II  HARDWARE IN CAD
Introduction, Principles, Capabilities and operation of graphical workstations, central processing units, graphic terminals, input/output devices, interface and storage devices, networking concepts of LAN and WAN.

Digitization: 2D & 3D Coordinate extracting, principles of digital and analog conversion, digital input/output processing systems.

Output devices: Prints, plotter and cutter. Various types, their working principles and applications.

UNIT III  PATTERN ENGINEERING
Computerized techniques for pattern generation, grading and assessment of leather products patterns, consumption calculations, pattern nesting and costing, stitching etc. through computerized techniques.

UNIT IV  LAST AND SOLE MODELLING FOR FOOTWEAR
Digitization with Microscribe; manipulation and optimization of digitized last; use of macros; last comparison; grading wizard; flattening; 3D visualization of last and styles; concept of e-last; introduction to sole and sole mould design.

UNIT V   ADVANCED COMPUTATIONAL TECHNIQUES IN CAD, RAPID PROTOTYPING
Principles and practice; simulation – concepts and applications.

TOTAL : 45 PERIODS

REFERENCES
6. Desai and Abel, “Introduction to FEM”. “Step by Step guide to CAD for footwear”: CAD Centre, SDDC, CLRI.

LT8004 CONSUMER BEHAVIOUR AND BUSINESS ORIENTATION

AIM
To impart consumer behaviour and business orientation skills to students.

OBJECTIVE
• The purpose of this course is to provide an overview of consumer decision making, marketing implications, consumer behaviour, business orientation and issues in business marketing catering to leather sector.

OUTCOMES
At the end of this course students are expected to understand the issues related to the consumer behavior and business orientation related to leather sector

UNIT I CONSUMER DECISION-MAKING AND MARKETING IMPLICATIONS

UNIT II CONSUMER DECISION-MAKING AND BEYOND

UNIT III DETERMINANTS OF CONSUMER BEHAVIOUR
a) Motivation-Abraham Maslow’s need Herz-berg’s two factor theory, Sigmund freud’s Psycho- analytical model of Motivation.
b) Perception - Selective attention, Exposure and Subliminal Perception Process- Factors for perceptual distortion.

d) Beliefs and Attitudes- Cognitive , Affective and Action oriented Attitude.

UNIT IV     BUSINESS ORIENTATION   8

UNIT V     ISSUES IN BUSINESS MARKETING    14
The concept and application of product life cycle [plc], advertising and publicity, sales and distribution management. The idea of consortium marketing, competitive bidding/ tender marketing, negotiating with principal customers. The contemporary perspectives on Infrastructure Development, Product and Procurement Reservation, Marketing Assistance, Subsidies and other Fiscal and Monetary Incentives. National state level and grass-root level financial and non-financial institutions in support of small business development. Credit risk management, contract management, interest risk management, forest risk management, leadership strategic planning.

TOTAL : 45 PERIODS

REFERENCES
3. Research for Marketing decisions- Paul, Donald, Herald- Prentice Hall (India) Zikmund: Exploring Marketing Research, 8e, Thomson 2006
4. Naresh K.Malhotra, Marketing Research, An applied Orientation, Pearson Education


AIM
To impart knowledge on eco friendly options for leather processing.

OBJECTIVE
The objective of this course is to provide theoretical orientation on the cleaner options in beamhouse, tanning, post tanning and finishing process in leather manufacture.

OUTCOMES
• At the end of the course the students would have gained knowledge on the cleaner process technology in the leather processing during tanning, post tanning and finishing systems. The emphasis on the course content will be on the fundamentals of bio beam house processing.

UNIT I CLEANER PROCESSING - BEAMHOUSE
Eco-friendly process technologies: Salt free curing options, sulphide free unhairing systems, ammonia - free deliming, salt free pickling systems, solvent free degreasing systems. Paradigm shift from chemical processing of hides and skins to bio beam house processing.

UNIT II CLEANER PROCESSING: TANNING
Less chorme and chrome-free tanning systems. Latest concepts and trends in leather processing. Eco-labelling. Integrated strategies to achieve permissible BOD, COD and TDS standards of tannery effluents.

UNIT III CLEANER PROCESSING: POST TANNING
Formaldehyde, Phenol, AOX free post tanning systems; Latest concepts and trends in leather processing. Eco-labelling. Integrated strategies to achieve permissible BOD, COD and TDS standards of tannery effluents.

UNIT IV CLEANER PROCESSING: FINISHING
Cleaner processing and solvent free finishing systems; Eco-labelling. integrated strategies to achieve permissible BOD, COD and TDS standards of tannery effluents.
Role of following finishing equipment like autospray, roller coats, embossing machines, finiflex, auto togglers, stacking machines etc. Techniques such as oil pull-up, waxy, burnishable, crazy horse, antique finish, screen printing, roller printing, tie and dye finishing, metallic effects, patent finishing, cationic finishing, other novel finishing techniques like electrostatic finishing.
Shoe suede, garment suede, grain finished effect and specialty finishes at split leather - processing technologies and finishing techniques specially suited for the purpose. Upgradation of lower ends for better utilisation. Transfer foil, lamination techniques, etc in split finishing. Latest trends.

TOTAL : 45 PERIODS

REFERENCES

LT8006 ENGINEERING ECONOMICS AND FINANCE MANAGEMENT

AIM
To impart knowdege on financial management concepts and principles of engineering economics

OBJECTIVE
Knowledge on the economic aspect of leather industry and financial management of tanneries will be gained.

OUTCOMES
Students would understand and would have learnt the engineering economics and how to manage finance in leather industry.

UNIT I FINANCIAL ACCOUNTING

UNIT II PROFIT VALUE ANALYSIS
UNIT III  WORKING CAPITAL MANAGEMENT


UNIT IV  CAPITAL BUDGETING

Significance of capital budgeting – payback period – present value method – Accounting rate of return method.
UNIT V  ENGINEERING ECONOMICS

TEXT BOOKS

REFERENCES
2. Charles T.Homgren, Cost Accounting, PHI 1985

LT8007 ENTERPRISE RESOURCE PLANNING FOR LEATHER SECTOR  L T P C
3 0 0 3

AIM
To introduce enterprise resource planning principles to leather technologists.

OBJECTIVE
• The objective of this course is to teach the principles of ERP technologists involved in enterprise resource and various caes studies in the pre and post implementation of ERP,s that will enable the students to perform as an efficient entrepreuner.

OUTCOMES
This course is expected to augment the entrepreneurship skills of the students.

UNIT I INTRODUCTION
1. What is ERP?
2. Need of ERP
3. Advantages of ERP
4. Growth of ERP
UNIT II 
ERP AND RELATED TECHNOLOGIES 13

1. Business process Reengineering (BPR)
2. Management Information System (MIS)
3. Decision Support Systems (DSS)
4. Executive Support Systems (ESS)
5. Data Warehousing, Data Mining
6. Online Analytical Processing (OLTP)
7. Supply Chain Management (SCM)
8. Customer Relationship Management (CRM)

UNIT III ERP MODULES & VENDORS
1. Finance
2. Production planning, control & maintenance
3. Sales & Distribution
4. Human Resource Management (HRM)
5. Inventory Control System
6. Quality Management
7. ERP Market

UNIT IV ERP IMPLEMENTATION LIFE CYCLES
1. Evaluation and selection of ERP package
2. Project planning
3. Implementation team training & testing
4. End user training & Going Live
5. Post Evaluation & Maintenance

UNIT V ERP CASE STUDIES
Post implementation review of ERP Packages in Manufacturing, Services, and other Organizations

REFERENCES

TOTAL : 45 PERIODS
AIM
This course aims at providing necessary skills for the students in becoming a technocrat.

OBJECTIVE
- To understand the entrepreneurship in leather sector related to industrial enterprise, venture planning and development, techno economic feasible reports, resource management and production. To gain knowledge on market management.

OUTCOMES
This course would enable the students to explore their feasibilities of turning into efficient entrepreneurs.

UNIT I GLOBAL LEATHER AND ALLIED INDUSTRIES

UNIT II VENTURE PLANNING AND DEVELOPMENT AS APPLIED TO LEATHER AND ALLIED SECTOR

UNIT III TECHNO-ECONOMIC FEASIBILITY REPORTS (TEFR) FOR LEATHER AND ALLIED SECTOR
Components of TEFR - size of projects, Project costing - Selection and means of finance - cash-flow projections - Costing and pricing - Implementation schedules - PERT and related project scheduling charts - TEFR for tannery, shoe plants, leather chemical, leather garments and leather goods units.
UNIT IV RESOURCE MANAGEMENT AND PRODUCTION PLANNING FOR LEATHER AND ALLIED SECTOR

Material and money flow - Labour management - Principles of production management - TQM concepts - ISO and related certification methods - Purchase management in leather sector - Credit financing and labour issues in leather sector - Productivity bottlenecks in tanneries and shoe plants and debottlenecking strategies - Inventory control measures for leather sector.

Operations research - time-motion studies - Principles of time management - Management information system - Intranet and Internet communication and its relevance in managing enterprises - Factors concerning system productivity in leather sector.

UNIT V MANAGING GLOBAL LEATHER MARKETS


TOTAL: 45 PERIODS

REFERENCES

8. SIDBI Report on Small Scale Industries Sector (Latest Editions)
LT8009        FASHION FORCASTING FOR LEATHER AND LEATHER PRODUCTS

AIM
To impart knowledge on fashion forecasting for leather and leather products.

OBJECTIVES
- To give focus on the historical evaluation & international trends, fashion considerations, product development, presentation techniques and fashion forecasting of leather and leather products.

OUTCOMES
At the end of the course, students will have knowledge in various fashion trends in leather and leather products sector.

UNIT I   HISTORICAL EVALUATION & INTERNATIONAL TRENDS   10
Historical evaluation of leather and leather products styling. Seasonal influences on fashion, cultural and geographical instances on leather and products fashion. Market research and track record.

UNIT II   FASHION CONSIDERATIONS   9
Design Criteria through effect of shape, colour, pattern, texture and decorative materials. Life cycle of fashion

UNIT III   PRODUCT DEVELOPMENT   9

UNIT IV   PRESENTATION TECHNIQUES   9
Organisation of shows and preparation of art portfolios; advertising; effect of foreign languages in the presentation and promotional activities.

UNIT V   FASHION FORECAST   8
Direction of fashion trends in leather and leather products production and marketing.

TOTAL : 45 PERIODS

REFERENCES
AIM
To impart human resource management skills to the students.

OBJECTIVES
The purpose of this course is to provide an overview of human resource management, with particular emphasis in human resource planning and strategy, personnel selection, equal employment opportunity, training, performance appraisal, compensation, and contemporary issues.

OUTCOMES
This course will aid the students in appreciating the role, relevance and importance of human resource in any organization.

UNIT I MANAGEMENT AND GENERAL EMPLOYMENT PRACTICES 15
Human resource planning, Organizational design, HR budgeting, Motivation, Leadership, Employee involvement, Ethics, International issues ,Job design: Job analysis-Job description, Performance management: Performance appraisals, Workplace behaviour problems

UNIT II STAFFING 6
Equal employment opportunity, recruitment, selection, career planning, organizational exit

UNIT II HUMAN RESOURCE DEVELOPMENT 7
HRD role clusters: Analysis/Assessment roles- Evaluator,Needs analyst, Researcher Development roles - Evaluator, HRD materials developer, Program designer Strategic roles – HRD manager,Marketer, Organization – Change agent, Individual – Career development advisor, Instructor/Facilitator, Administrator
Competency development: Technical competence, Managerial competence, Process competence, Helping Competence and Coping Competencies; Training and Development; Organizational Development, Career Development; Contemporary issues: Knowledge management and learning organizations, BPR, TQM and Intellectual capital management.
UNIT IV  COMPENSATION AND BENEFITS
Job evaluation, Pay structures, Benefit programs, Pay delivery administration.

UNIT V  HEALTH, SAFETY, SECURITY AND LABOUR RELATIONS
Employee assistance programs, safety programs, theft, fraud, investigations, corrections; Labour laws, unfair labour practices, collective bargaining

TOTAL : 45 PERIODS

TEXT BOOKS AND REFERENCES

LT8011  INTERNATIONAL MARKETING AND FOREIGN TRADE

AIM
To impart knowledge on international marketing and foreign trade aspects of leather industry

OBJECTIVE
The knowledge on marketing leather and leather products in international market and foreign trade policies will be gained.

OUTCOMES
• At the end of the course the students would understand the basics of international trade, government policies in export aspects of world trade related to leather sector, custom tariff and international marketing.

UNIT I
Basics of International trade - India’s trade policy, International trade and Monetary Systems-Marketing Services in International trade Pricing and trade cycles-Precautionary measures to prevent fraud in International trade - International trade Multimodal Transport Operations-Consumer Behavior and Role of international Marketing- Indian market Analysis.
UNIT II

India’s new foreign trade Policy -Legal frame work of foreign trade Policy-Special focus - General provision on Import and Export-Promotional Measures- Duty exemption/ Duty remission scheme EPCG Scheme -EOU/ EHTP/ STP/ BTP- SEZs.

UNIT III
Marketing concepts and Import- Forms of organization in Import and domestic Trade - Products, Sales forecasting and sales Management-pricing, Promotion, Branding and Advertising.
Retail Management - Introduction to Logistics - Parameters of Supply Chain Management - Management of logistics and Supply Chain - Consumer Supply Chain Relationship.

UNIT IV
The Customs Tariff Act-Exemptions in Import-by UN and its agencies and their officials- Import by UN or international organizations for execution of projects in India-Imports by Government Diplomats, Trade representatives etc.-Customs Tariff

UNIT V

TOTAL : 45 PERIODS

TEXT BOOKS
1. Wagdre, H. International Marketing Management, Adhyayan Publisher, 2007
OBJECTIVES
The sorting, assessment and valuation of various leather and leather products will be learnt.

OUTCOMES
At the end of the course the students would have gained expertise in assigning valuation to various leather and leather products.

UNIT I
Cost accounting, elements of cost, classification of cost elements – examples from textile industry, methods of costing
UNIT II
Cost profit volume analysis, breakeven analysis; standard costing, analysis of variance

UNIT III
Costing of leather and leather products – material, labour, power and overhead expenses

UNIT IV
Foreign exchange mechanisms, exchange rates; foreign exchange exposure management – risks, strategies to reduce risk

UNIT V
Budget, types of budgets, budgeting and control in tanneries and leather products industry

TOTAL : 45 PERIODS

REFERENCES

LT8013 LEATHER AND PRODUCT MERCHANDISING L T P C 3 0 0 3

AIM
To impart knowledge on leather products merchandising that relates to the domestic and global leather and leather product merchandising.
OBJECTIVES
The objective of the course is to provide

- Fundamentals of purchasing
- Retail sector
  Global Market

OUTCOMES
At the end of this course students will be in a position to understand the nuances of merchandising associated in leather and leather products manufacture

UNIT I PRINCIPLES OF MARKETING MANAGEMENT 9

Marketing Environment, Factors Affecting Marketing Environment, Marketing Information System and Marketing Research, Strategic Marketing Planning.

UNIT II PURCHASING PRINCIPLES AND MANAGEMENT 9
Purchasing scope and development - Strategic aspects of purchasing - Key purchasing variables consideration - Purchasing negotiations & competitive – Bidding - Outsourcing - purchasing operation - Buying capital goods & services - Purchasing for resale - Purchasing systems and technology - Evaluation of purchasing performance - Purchasing ethics and legal issues

UNIT III PRINCIPLES AND PRACTICE OF MERCHANDISING 9
Merchandising concepts, technology, systems, planning - Merchandise pricing and budgeting, sample handling - Managing merchandise assortments - Developing and - presenting product lines - Introduction to shipping operation

UNIT IV RETAIL SECTOR OF LEATHER 9
Overview of retailing; Changing retail environment - Typology of retail buying -
Understanding the consumer - Competitive strategies in the retail industry - Retail location strategy; Store layout & Design - Product planning and selection; Inventory management - Retail pricing; Retail communication - Customer Service

UNIT V  GLOBAL SOURCING OF LEATHER
Globalization and its influences - The role and importance of global sourcing - Global sourcing process and strategy - Investigation and tendering - Supplier selection and development - Operationalization of global sourcing strategy - Performance Measurement - The benefits and challenges of global sourcing - Coping with custom clearance uncertainties - Sourcing on the Internet - Supplier relationship development - Merchandising language for sourcing

REFERENCES
1. Apparel Product Design and Merchandising Strategies by Cynthia L. Regan. Publisher: Prentice Hall

TOTAL : 45 PERIODS
AIM
To impart knowledge on leather products machinery used in leather sector.

OBJECTIVES
This course covers the hand tools and machines, machines for shoe and footwear construction, system, automation in leather product machines and modular manufacturing and layout.

OUTCOMES
At the end of the course working knowledge and principles behind all the machineries used during leather making will be gained.

UNIT I HAND TOOLS AND MACHINES
Hand tools and machinery used in leather and leather products making and other auxiliaries operations – General constructions - Principles involved in their working - Power transmissions systems. The machinery: Pattern grading, clicking Press, splitting, skiving, edge-folding, stamp Marking, sewing, punching, crimping, eyeleting, Seam-rubbing and taping, thermo-cementing, Pre-forming, etc.
UNIT II  MACHINES FOR SHOE AND FOOTWEAR CONSTRUCTION  8
Machines used in cemented, stitch down, welted, string lasted, DVP & DIP and other types of construction. Principles involved in their working - trouble shooting and & preventive maintenance. Spare parts planning and inventing control.

UNIT III  TRANSPORT SYSTEM  5
Different types of material handling system in leather products industry. Manual, semi-automatic and automatic conveyors.

UNIT IV  AUTOMATION IN LEATHER PRODUCT MACHINES  11
Application of computer/microprocessor base leather products making machines, principle and operation technique, safety measurements computerized controls, micro-processor links, and used of Robotics Die Less Cutting Systems. CAM for automatic stitching and other advance footwear machinery.

UNIT V  MODULAR MANUFACTURING AND LAYOUT  13
Productivity improvements: scheduling, Simulation, Toyota and rink system and Lean manufacturing system.
Factors affecting plant location and construction of factory building for balancing the production line in footwear Industry. Application of Neural-network software in layout preparation.

REFERENCES
OBJECTIVE
This course covers the trends in livestock & marketing of skins etc.

OUTCOMES
At the end of the course working knowledge and principles all the organization and Management.

UNIT I  TRENDS IN LIVESTOCK POPULATION  5
Categories of livestock, global distribution, India’s share, distribution livestock in India, growth rates, trends and relative importance, projections.

UNIT II  AVAILABILITY AND MARKETING OF HIDES AND SKINS  10
Concepts, global availability, India’s share in the world, trends in meat production and consumption practices, fallen animal recovery systems, off-take rates (slaughter and mortality rates), availability of hides and skins, projections.
Collection and mobilization of hides and skins, Origin and characteristics, Transportation, Grading systems, Pricing, major markets and sourcing of hides and skins, Broad features of marketing.

UNIT III  STRUCTURE OF TANNING INDUSTRY AND LEATHER PRODUCT INDUSTRIES IN INDIA  10
Distribution of tanneries in India, scale of operation, type of ownership, line of specialization, capacity and production, employment pattern, industrial policy, environmental issues, leather complexes.
Categories of products, distribution of footwear, leather garments, leather goods industries, scale of operation, ownership pattern, capacity and production, industrial policy, employment, exports and domestic market.
UNIT IV  INDIA’S FOREIGN TRADE AND POLICY
Economic and social importance of leather sector, trade terms, trends in the exports, major importing countries, imports of India, review of trade policy and impact.

UNIT V  GLOBAL MARKET FOR LEATHER AND LEATHER PRODUCTS
Shifts in production bases, structure of global market, trends in the global trade, major markets, competitors for India, dynamics of global leather trade.

EMERGING DIMENSIONS IN THE GLOBAL TRADE: Non-price Competition, Trade related Environmental and Social issues, Eco-labels and Social certification, E-Commerce, impact of World Trade Organisation.

STRATEGIES FOR EXPORT PROMOTION: Identification of critical factors, Role of various organizations, Planning and sustainable development, Trade policy, Developing market network and market intelligence, Resource and product related strategies.

TOTAL: 45 PERIODS

TEXT BOOKS AND REFERENCES
1. Report of All India Survey on Raw Hides and Skins, CLRI, 1987 and 2004
2. Report on Capacity Utilisation and Scope for modernization of Indian tanning industry, CLRI, 1990
3. Report of the Committee on The Development of Leather and Leather Manufactures for Exports (Seetharamaiah Committee Report), Govt of India, 1972
6. Bulletins of India’s Foreign Trade in Leather and Leather Products, CLRI
AIM
To impart knowledge on Occupational Safety and Hazard aspects in leather manufacture

OBJECTIVES
This course covers on the following aspects

1. legal framework of safety & health in India and international conventions
2. hazard identification and assessment
3. productive machine safety in the leather industry
4. work ecology and ergonomics
5. emergency prevention and preparedness safety & health management

OUTCOMES
The importance of safety in tanneries will be known and implementation of safety procedures will be gained at the end of the course.

UNIT I SAFETY PHILOSOPHY, HAZARD IDENTIFICATION AND ASSESSMENT 10
Legal framework of safety & health in India International conventions and trends Responsibilities and enforcement mechanism. Need for safety & health (cost/benefit rational; safety, environment and productivity triangle); Role of industrial hygiene, Hazard classification (hazard categories and groups), Hazard identification and assessment (tools and methods).

UNIT II SAFETY IN USE OF HAZARDOUS SUBSTANCES AT WORK 8
Chemical and biological hazards in the work place in the leather industry; Health effects of chemical and biological exposure Hazard information systems on hazardous substances (material safety data sheets, labelling) Workplace exposure monitoring and evaluation Hazard prevention and control measures (storage, handling and disposal) in the leather industry.
UNIT III PRODUCTIVE MACHINE SAFETY IN THE LEATHER INDUSTRY, WORK ECOLOGY AND ERGONOMICS

Safety hazards of machinery, machine tools and electrical installations; Hazard prevention and safeguarding of machinery (guards, machine controls, ergonomics); Role of preventive maintenance; Safe workstation design and layout, Manual handling of material; Lighting (standards, use of natural and artificial illumination); Climate control (standards, temperature/humidity, improving general ventilation); Noise management (standards, prevention and protection); Safety of factory premises and installations (railings, flooring, safe structures); Welfare measures; Personal protection and hygiene (selection, use, maintenance);

UNIT IV EMERGENCY PREVENTION AND PREPAREDNESS

Planning for emergencies; Control of fire and explosion; Dealing with medical emergencies

UNIT V SAFETY & HEALTH MANAGEMENT AND PROMOTION

Promoting safety & health practices at the workplace (training, safety and warning signs); Role and responsibilities of managers, supervisors and workers.

TOTAL : 45 PERIODS

REFERENCES

AIM
This course aims to impart knowledge on the chemistry and properties of various auxiliaries used in leather processing.

OBJECTIVE
The course provides overview on different auxiliaries viz., fatliquors, syntans, dyes and finishing chemicals used in leather manufacture.

OUTCOMES
At the end of the course students would know the chemistry of different types of leather auxiliaries and their effect on the end properties of leathers.

UNIT I
Definition and function of leather auxiliaries, role of wetting agents, syntans, fatliquors, dyes, pigments, binder, top coats, feel modifiers and matting agents in leather processing. Surface tension and principles of wetting, importance of HLB, Chemical classification of wetting agents.

UNIT II
Chemical classification of syntans, sulphonation of naphthalene, phenols, Napthols, Phenol formaldehyde condensation reactions, chemistry of light fast syntans, chemistry of amino resins and PU, Unit operations in syntan manufacture.

UNIT III
Composition of fatliquors; Functionalisation of oils for surface active function, chemical classification natural and synthetic oils, sulphation, sulphonation, sulphitation reactions of oils, role of double bonds and iodine value in functionalisation of oils, sulphochlorination, sulphaomidation, transesterification, phosphorylation reactions for fatliquor preparation. Stability of emulsions, grain and particle sizes of emulsions, factors controlling grain sizes of emulsions. Fatliquor manufacturing technology.

Theory of colors, chromphoric groups, structural features of dyes; acid, basic and reactive dye classification. Chemistry and technology of dye manufacture.

UNIT IV
Definition of pigments, groups of polymer bases for colour. Classification, formulations of pigments, particle size, refractive index, density, opacity criteria for the choice of pigment bases, Different techniques in particle size reduction and importance of particle size on functional properties of pigment formulation.

Functional definition of binders, chemical classification of binders, acrylic, protein, polyurethane, introduction to manufacturing of binder formulations.

UNIT V
Different types of top coat formulations, choice of polymers for surface protection, role of plasticizers, internal and external plasticizers.

Principles of feel modification of polymer surfaces, types of feel modifiers and matting agents.

TOTAL : 45 PERIODS

TEXT BOOKS AND REFERENCES

AIM
To impart knowledge on the use of leather supplements used as substitutes for leather in the manufacture of leather products
OBJECTIVE
The emphasis on the course content will be on the fundamentals of polymerization of various polymers used. Analytical skills on testing of polymers will be emphasized that will enable them to understand various polymer properties and manufacturing methods.

OUTCOMES
At the end of the course the students would have gained knowledge on the chemistry of most common polymeric materials used in leather industry as supplements.

UNIT I
Technology of the most common polymeric materials used in leather industry as supplements. Polymer and Rubber industries in India.

UNIT II
Manufacture of industrially important polymers for plastics, fibres and elastomer - Polyethylene, polyproplylene, polyvinyl chloride, polyvinyl alcohol, polyacrylonitrile, polystyrene, polyurethane, fluoro-carbon polymers, epoxy resins, polyamides, polyesters, alkyd resins, silicone polymers, cellulosics.

UNIT III
Fabrication of polymeric materials, compounding and mixing, casting, extrusion, fibre spinning, molding, coating, foam fabrication.

UNIT IV
Testing of polymers. Mechanical and Thermal testing.

UNIT V
Manufacture of rubber and elastomers. Natural rubber, processing, vulcanizing synthetic elastomers, butadiene copolymer, neutral rubber, polyisoprene polybutadiene. Polymer and rubber industries in India.

TOTAL : 45 PERIODS

REFERENCES

LT8019  TECHNOLOGY OF ANIMAL AND TANNERY BYPRODUCTS UTILISATION  LTPC  3003

AIM
To impart knowledge on the preparation and use of tannery by-products that emerge during the preservation and manufacture of leather and leather products.

OBJECTIVE
- To address value engineering through the objectives, different stages, procedures and implementation of reengineering.

To make students apply the learned concepts in a case study/project.

UNIT I  INTRODUCTION.
Types of animal byproducts - from abattoirs, meat processing plants, poultry, fishing and other sources including fallen animals. Present methods of collection, processing and utilisation in developing countries vis-a-vis developed countries: conservation techniques and concept of two tier technology. Protein meals from animals by-products including fallen animals and their significance in livestock feeds.
UNIT II  DIFFERENT METHODS OF RENDERING  9
Bone products and their utilisation. Keratinous proteins - various sources keratinous based products and their uses.

UNIT III  ANIMAL BLOOD, ITS PRODUCTS AND THEIR UTILISATION  9

UNIT IV  COLLECTION AND CONSERVATION OF ORGANS AND GLANDS FROM SLAUGHTERED ANIMALS : POSSIBLE SCOPE OF THEIR UTILISATION  9
Anaerobic digestion, its significance for the preparation of animal feed, fuel gas, fertilizer, etc. Quality control including microbiological aspects of products processed from animal by-products.

UNIT V  PRESENT INDUSTRIAL STATUS OF VARIOUS BY-PRODUCTS IN THE COUNTRY  9
Process studies on Glue making from tannery wastes - Bone glue and deproteinisation of bone - Horn and hoof meal - Protein meals by different methods

TOTAL : 45 PERIODS

REFERENCES
AIM
To impart knowledge of value engineering and reengineering and relating them to leather industry.

OBJECTIVE
• To address value engineering through the objectives, different stages, procedures and implementation of reengineering.
• To make students apply the learned concepts in a case study/project.

UNIT I FUNDAMENTALS OF VALUE ENGINEERING AS APPLIED TO LEATHER MANUFACTURE 8
Value- Types –How to add value-Job plan – techniques employed- Who will do value engineering- Organizing the value engineering study-Benefitsin leather and allied industries

UNIT II STEP BY STEP APPLICATION OF JOB PLAN IN LEATHER RELATED INDUSTRIES 10

UNIT III WORK SHEETS AND GUIDE LINES FOR LEATHER AND ALLIED INDUSTRIES 9

UNIT IV REENGINEERING PRINCIPLES IN LEATHER PROCESSING AND IN LEATHER PRODUCT SECTOR 10
UNIT V IMPLEMENTATION OF REENGINEERING IN LEATHER SECTOR


TOTAL : 45 PERIODS

TEXT BOOKS
2. Del L. Younker, “Value Engineering” Marcel Dekker, Inc. 2003

REFERENCE

LT8021 LEATHER BIOTECHNOLOGY AND ITS APPLICATION IN LEATHER L T P C
3 0 0 3

UNIT I PROTEINS AND NUCLEIC ACID & ENZYMEOLOGY

UNIT II GENETIC ENGINEERING (RECOMBINANT DNA TECHNOLOGY
Principles and methods: Essentials of biotechnology - products of biotechnology, Restriction enzymes, vectors, DNA cloning strategies.

UNIT III BIOTECHNOLOGY FOR HIDES/SKINS IMPROVEMENT
Applications in Animal nutrition and animal production: embryo transfer, gene transfer, transgenic animals. Cleaner Leather Processing : Use of enzyme options in beam house operations - Soaking, unhairing, bating, degreasing, offal treatment: Types of enzymes - proteases, lipases - properties, assay systems and production. Types of fermentation,
Preparation of media, preparation of inoculum, separation and purification of products.

UNIT IV WASTE MANAGEMENT FOR LEATHER 8
General features of the organic and inorganic pollutants of tannery. Stabilisation and disposal of organic and chemical wastes and their biological treatment. Possible energy generation from wastes.

UNIT V UTILISATION OF COLLAGENOUS TISSUES FOR BIOMEDICAL AND OTHER APPLICATIONS 4
Collagen and its application in food, cosmetic and medical fields.

TOTAL : 45 PERIODS

REFERENCES

LT8022 COMPUTER APPLICATIONS FOR LEATHER AND LEATHER PRODUCTS 3 0 0 3

AIM
To make students capable of using Computer and related technologies for an effective management of leather and leather products industry
OBJECTIVES
To expose the students to Systems analysis concepts, application aspects of DBMS, Data communication principles, Web Designing, ERP, MIS, E-Commerce and CAD applications in leather/leather products manufacture

UNIT I SYSTEMS ANALYSIS & DESIGN AND IT INFRASTRUCTURE 8
Definition of a System; System development life cycle - System study; System analysis; System Design (Input, output, files, procedure); Implementation and maintenance; Need for the IT Infrastructure; Form factor; Data Center & Disaster Recovery; Security & Threads.

UNIT II DATABASE MANAGEMENT SYSTEM 7
Different types of Database Management Systems and SQL; DDL, DML - Retrieving, Manipulating, Updating tables; Concepts on Leather Industry specific database – with respect to Leather Processing and Product Industry;

UNIT III DATA COMMUNICATIONS 7
Concept of Data Communication, Modes of Transmission -Digital Vs Analog, SerialVs Parallel, Synchronous Vs Asynchronous; Types of Communication - Simplex, Half Duplex, Full Duplex; Communication channels - Twisted pair cables, Coaxial cables, Optical Fiber, Radio Waves, Satellites; Communication Protocols - FTP, HTTP, TCP/IP, WAP; Data Communication Devices; Network topologies; Network Types (LAN, WAN and MAN), Data Communication Terminologies in Internet – WWW-Website-Webpage-HTML-URL.

UNIT IV CONCEPTS FOR WEB BASED APPLICATIONS 12
Tools for Web Designing, Management Information System, ERP System for Leather Processing – Material Management and Inventory Control, Production Planning.

UNIT V 11
E-COMMERCE
E-Commerce-Definition; Traditional Commerce V/s E-Commerce; Benefits of e-commerce; Various e-commerce models-B2B, B2C;

CAD SYSTEMS
CAD Systems for Leather & Leather Products- Pattern grading & cutting for footwear,
leather goods and garments; Design and development of Leather products; Computerised color matching systems – its principle and application.

TOTAL: 45 PERIODS

TEXT BOOK

REFERENCES
4. Kendall & Kendall, Systems Analysis and Design (Printice Hall India)
6. Understanding SQL (BPB Publications)
7. Hands-on HTML (BPB Publications)
10. Reference Manuals for CAD systems for Footwear and Garments.
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 Processes and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

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

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

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.

TEXTBOOKS:

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

GE8073 HUMAN RIGHTS

OBJECTIVES:
- 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: