

ANNA UNIVERSITY : : CHENNAI : 600 025

UNIVERSITY DEPARTMENTS

R – 2013

B. TECH. (PART TIME) LEATHER TECHNOLOGY

I – VII SEMESTERS CURRICULA AND SYLLABI

SEMESTER I

| CODE NO. | COURSE TITLE | L | T | P | C |
|--------------|-----------------------|-----------|----------|----------|-----------|
| PTMA8151 | Applied Mathematics | 3 | 0 | 0 | 3 |
| PTPH8151 | Engineering Physics | 3 | 0 | 0 | 3 |
| PTCY8152 | Engineering Chemistry | 3 | 0 | 0 | 3 |
| PTGE8151 | Computing Techniques | 3 | 0 | 0 | 3 |
| PTGE8152 | Engineering Graphics | 3 | 0 | 0 | 3 |
| TOTAL | | 15 | 0 | 0 | 15 |

SEMESTER II

| CODE | COURSE TITLE | L | T | P | C |
|---------------|--|-----------|----------|----------|-----------|
| THEORY | | | | | |
| PTEE8253 | Principles of Electrical and Electronics Engineering | 3 | 0 | 0 | 3 |
| PTLT8201 | Basic Biochemistry and Microbiology | 3 | 0 | 0 | 3 |
| PTLT8202 | Inorganic and Organic Chemistry | 3 | 0 | 0 | 3 |
| PTLT8203 | Instrumental Methods of Analysis for Leather Technologists | 3 | 0 | 0 | 3 |
| PTLT8204 | Theory of Skin Proteins and Pre Tanning Processes | 3 | 0 | 0 | 3 |
| TOTAL | | 15 | 0 | 0 | 15 |

SEMESTER III

| CODE | COURSE TITLE | L | T | P | C |
|---------------|---|-----------|----------|----------|-----------|
| THEORY | | | | | |
| PTCY8302 | Physical Chemistry for Leather Technology | 3 | 0 | 0 | 3 |
| PTLT8301 | Technology of Heavy Leather Manufacture | 3 | 0 | 0 | 3 |
| PTLT8302 | Theory and Practice of Chrome and Inorganic Tannages | 3 | 0 | 0 | 3 |
| PTLT8303 | Theory and Practice of Vegetable and Organic Tannages | 3 | 0 | 0 | 3 |
| PTLT8304 | Theory of Material Testing of Leathers – I | 3 | 0 | 0 | 3 |
| TOTAL | | 15 | 0 | 0 | 15 |

SEMESTER IV

| CODE | COURSE TITLE | L | T | P | C |
|---------------|---|-----------|----------|----------|-----------|
| THEORY | | | | | |
| PTLT8401 | Principles of Unit Operations and Unit Processes in Leather and Leather Chemicals Manufacture | 3 | 0 | 0 | 3 |
| PTLT8402 | Technology of Light Leather Manufacture | 3 | 0 | 0 | 3 |
| PTLT8403 | Theory and Practice of Post Tanning Processes | 3 | 0 | 0 | 3 |
| PTLT8404 | Theory of Material Testing of Leathers – II | 3 | 0 | 0 | 3 |
| | Elective I | 3 | 0 | 0 | 3 |
| TOTAL | | 15 | 0 | 0 | 15 |

SEMESTER V

| CODE | COURSE TITLE | L | T | P | C |
|---------------|--|-----------|----------|----------|-----------|
| THEORY | | | | | |
| PTLT8501 | Environmental Science and Engineering for Leather Sector | 3 | 0 | 0 | 3 |
| PTLT8502 | Leather Goods and Garments Technology | 3 | 0 | 0 | 3 |
| PTLT8503 | Leather Machineries | 3 | 0 | 0 | 3 |
| PTLT8504 | Theory and Practice of Leather Finishing | 3 | 0 | 0 | 3 |
| | Elective II | 3 | 0 | 0 | 3 |
| TOTAL | | 15 | 0 | 0 | 15 |

SEMESTER VI

| CODE | COURSE TITLE | L | T | P | C |
|---------------|--|-----------|----------|----------|-----------|
| THEORY | | | | | |
| PTLT8601 | Leather Footwear Technology | 3 | 0 | 0 | 3 |
| PTLT8602 | Process Economics and Industrial Management for Leather Sector | 3 | 0 | 0 | 3 |
| | Elective III | 3 | 0 | 0 | 3 |
| | Elective IV | 3 | 0 | 0 | 3 |
| | Elective V | 3 | 0 | 0 | 3 |
| TOTAL | | 15 | 0 | 0 | 15 |

SEMESTER VII

| CODE | COURSE TITLE | L | T | P | C |
|------------------|-------------------------------------|----------|----------|-----------|-----------|
| THEORY | | | | | |
| PTLT8701 | Entrepreneurship for Leather Sector | 3 | 0 | 0 | 3 |
| PTMG8651 | Total Quality Management | 3 | 0 | 0 | 3 |
| PRACTICAL | | | | | |
| PTLT8712 | Creative and Innovative Project | 0 | 0 | 3 | 2 |
| PTLT8713 | Project Work | 0 | 0 | 9 | 6 |
| TOTAL | | 6 | 0 | 12 | 14 |

TOTAL NO. OF CREDITS : 104

LIST OF ELECTIVES FOR LEATHER TECHNOLOGY

| COURSE CODE | COURSE TITLE | L | T | P | C |
|-------------|--|---|---|---|---|
| PTLT8001 | Advanced Physics and Chemistry of Leather – I (APCL I) | 3 | 0 | 0 | 3 |
| PTLT8002 | Advanced Physics and Chemistry of Leather II (APCL II) | 3 | 0 | 0 | 3 |
| PTLT8003 | CAD/CAM for Leather Products Design and Manufacture | 3 | 0 | 0 | 3 |
| PTLT8004 | Computer Applications for Leather and Leather Products | 3 | 0 | 0 | 3 |
| PTLT8005 | Consumer Behavior and Business Orientation | 3 | 0 | 0 | 3 |
| PTLT8006 | Eco Benign Options for Leather Processing | 3 | 0 | 0 | 3 |
| PTLT8007 | Engineering Economics and Finance Management | 3 | 0 | 0 | 3 |
| PTLT8008 | Enterprise Resource Planning for Leather Sector | 3 | 0 | 0 | 3 |
| PTLT8009 | Fashion Forecasting for Leather and Leather Products | 3 | 0 | 0 | 3 |
| PTLT8010 | Human Resources Development | 3 | 0 | 0 | 3 |
| PTLT8011 | International Marketing and Foreign Trade | 3 | 0 | 0 | 3 |
| PTLT8012 | Leather and Leather Products Costing | 3 | 0 | 0 | 3 |
| PTLT8013 | Leather and Product Merchandising | 3 | 0 | 0 | 3 |
| PTLT8014 | Leather Bio Technology and its Application in Leather | 3 | 0 | 0 | 3 |
| PTLT8015 | Leather Products Machinery | 3 | 0 | 0 | 3 |
| PTLT8016 | Organisation and Management of Leather Manufacture | 3 | 0 | 0 | 3 |
| PTLT8017 | Safety in Leather Industries | 3 | 0 | 0 | 3 |
| PTLT8018 | Science and Technology of Leather Auxiliaries | 3 | 0 | 0 | 3 |
| PTLT8019 | Science and Technology of Leather Supplements and Synthetics | 3 | 0 | 0 | 3 |
| PTLT8020 | Technology of Animal and Tannery By products Utilization | 3 | 0 | 0 | 3 |
| PTLT8021 | Value Engineering in Leather Sector | 3 | 0 | 0 | 3 |
| PTGE8071 | Disaster Management | 3 | 0 | 0 | 3 |
| PTGE8072 | Human Rights | 3 | 0 | 0 | 3 |

OBJECTIVES

- To facilitate the understanding of the principles and to cultivate the art of formulating physical problems in the language of mathematics.

UNIT I MATRICES 9

Characteristic equation – Eigenvalues and Eigenvectors of a real matrix – Properties of eigenvalues and eigenvectors – Cayley-Hamilton Theorem – Diagonalization of matrices - Reduction of a quadratic form to canonical form by orthogonal transformation.

UNIT II FUNCTIONS OF SEVERAL VARIABLES 9

Partial derivatives – Homogeneous functions and Euler's theorem – Total derivative – Differentiation of implicit functions – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables - Maxima and minima of functions of two variables.

UNIT III ANALYTIC FUNCTION 9

Analytic functions – Necessary and sufficient conditions for analyticity – Properties – Harmonic conjugates – Construction of analytic function – Conformal Mapping – Mapping by functions $w = a + z$, az , $1/z$, - Bilinear transformation.

UNIT IV COMPLEX INTEGRATION 9

Line Integral – Cauchy's theorem and integral formula – Taylor's and Laurent's Series – Singularities – Residues – Residue theorem – Application of Residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour with no pole on real axis.

UNIT V LAPLACE TRANSFORMS 9

Existence conditions – Transforms of elementary functions – Basic properties – Transforms of derivatives and integrals – Inverse transforms – Convolution theorem – Transform of periodic functions – Application to solution of linear ordinary differential equations with constant coefficients.

TOTAL : 45 PERIODS**OUTCOMES**

- To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- 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 the 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

TEXT BOOKS

- Grewal B.S., Higher Engineering Mathematics, Khanna Publishers, Forty Second Edition, Delhi, 2012.
- Ramana, B.V. Higher Engineering Mathematics" Tata McGraw Hill Publishing Company, 2008.

OUTCOME

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

TEXT BOOKS

1. Gaur R.K., and Gupta, S.L., Engineering Physics, Dhanpat Raj Publications, 2003.
2. Palanisamy, P.K., Engineering Physics, Scitech Publications (P) Ltd, 2006.
3. Arumugam, M., Engineering Physics, Anuradha Publications, 2000.

REFERENCES

1. Sankar, B.N., Pillai.S.O., Engineering Physics, New Age International (P) Ltd., 2007.
2. Rajendran.V Engineering Physics, Tata McGraw-Hill, 2009.

PTCY8152

ENGINEERING CHEMISTRY

L T P C
3 0 0 3

OBJECTIVES

- To understand about the chemical thermodynamics.
- To impart knowledge in the basics of polymer chemistry.
- To develop sound knowledge on kinetics and catalysis.
- To impart basic knowledge on photochemistry and spectroscopy.

UNIT I CHEMICAL THERMODYNAMICS 9

Second law: Entropy - entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions; Clausius inequality. Free energy and work function: Criteria of spontaneity; Helmholtz and Gibbs free energy functions; 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 9

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: T_g, Tacticity, Molecular weight – weight average, number average and polydispersity index. Techniques of polymerisation: Bulk, emulsion, solution and suspension.

UNIT III KINETICS AND CATALYSIS 9

Introduction-reaction velocity, factors affecting reaction velocity, rate constant, order of reaction, molecularity, pseudo molecular reactions, zero, first, second, and third order reactions, reactions of fractional orders, determination of order of reactions. Catalysis: Auto catalysis - Enzyme Catalysis: Michaelis-Menton equation; factors affecting enzyme catalysis. Heterogeneous Catalysis: Types of adsorption isotherms: Langmuir-Hinselwood and Rideal-Eley Mechanism.

UNIT IV PHOTOCHEMISTRY AND SPECTROSCOPY 9

Photochemistry: Laws of photochemistry - Grotthuss-Draper law, Stark-Einstein law and Lambert-Beer Law. Photoprocesses - Internal Conversion, Inter-system crossing, Fluorescence, Phosphorescence, Chemiluminescence and Photo-sensitisation. Spectroscopy: Electromagnetic spectrum - Absorption of radiation – Electronic, Vibrational and rotational transitions. Width and intensities of spectral lines. Spectrophotometric estimation of iron. UV-visible and IR spectroscopy – principles, instrumentation (Block diagram) and applications.

UNIT V NANO CHEMISTRY**9**

Basics - distinction between molecules, nanoparticles and bulk materials; size-dependent properties. Nanoparticles: Nanocluster, nanorod, nanotube and nanowire. Synthesis: Precipitation, thermolysis, hydrothermal, solvothermal, electrodeposition, chemical vapour deposition, laser ablation; Properties and Applications. Risk discussion and Future perspectives.

TOTAL : 45 PERIODS**OUTCOMES:**

On completion of the course the students are expected to have a thorough knowledge on thermodynamics, polymers, catalysis, spectroscopy and nanochemistry.

TEXT BOOKS

1. P. Kannan and A. Ravikrishnan, "Engineering Chemistry", Sri Krishna Hitech Publishing Company Pvt. Ltd. Chennai, 2009.
2. S. Vairam, P. Kalyani and Suba Ramesh, "Engineering Chemistry", Wiley India, 2011.

REFERENCES

1. P.W. Atkins and de Paula Julio, "Physical Chemistry", Oxford University Press, 8th Ed., (Indian Student Edition) (2009).
2. K. K. Rohatgi-Mukherjee, "Fundamental of Photochemistry" New Age International (P) Ltd., New Delhi, 1986.
3. G.A. Ozin and A.C. Arsenault, "Nanochemistry: A Chemical Approach to Nanomaterials", RSC Publishing, 2005.
4. V.R.Gowariker, N.V.Viswanathan and JayadevSreedhar, "Polymer Science", New Age International P (Ltd.), Chennai, 2006.

PTGE8151**COMPUTING TECHNIQUES****L T P C
3 0 0 3****OBJECTIVE**

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

UNIT I INTRODUCTION**8**

Generation and Classification of Computers- Basic Organization of a Computer –Number System – Binary – Decimal – Conversion – Problems. Need for logical analysis and thinking – Algorithm – Pseudo code – Flow Chart.

UNIT II C PROGRAMMING BASICS**10**

Problem formulation – Problem Solving - Introduction to 'C' programming –fundamentals – structure of a 'C' program – compilation and linking processes – Constants, Variables – Data Types – Expressions using operators in 'C' – Managing Input and Output operations – Decision Making and Branching – Looping statements – solving simple scientific and statistical problems.

UNIT III ARRAYS AND STRINGS**9**

Arrays – Initialization – Declaration – One dimensional and Two dimensional arrays. String-String operations – String Arrays. Simple programs- sorting- searching – matrix operations.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES 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 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 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 ISOMETRIC AND PERSPECTIVE PROJECTIONS 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)

Introduction to drafting packages and demonstration of their use.

TOTAL : 45 PERIODS

OUTCOME:

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

TEXT BOOK:

1. N.D.Bhatt and V.M.Panchal, "Engineering Drawing", Charotar Publishing House, 50th Edition, 2010

REFERENCES:

1. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore, 2007.
2. Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
3. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson, 2nd Edition, 2009.
4. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.
5. Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.
6. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.

Publication of Bureau of Indian Standards:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only.
4. The students will be permitted to use appropriate scale to fit solution within A3 size.
5. The examination will be conducted in appropriate sessions on the same day.

**PTEE8253 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

UNIT I ELECTRICAL CIRCUITS 9

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 9

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

UNIT III ELECTRICAL MACHINES 9

Principles of operation and characteristics of DC machines. Transformers (single and three-phase) – synchronous machines – three-phase and single-phase induction motors – (op. Principles).

UNIT IV ELECTRONIC DEVICES & CIRCUITS 9

Types of Materials –Silicon & Germanium- N type and P type materials – PN Junction – Forward and Reverse Bias –Semiconductor Diodes –Rectification – Bipolar Junction Transistor – Characteristics – transistor as an Amplifier –Introduction to operational Amplifier –Inverting Amplifier –Non Inverting Amplifier –DAC – ADC .

UNIT V MEASUREMENTS & INSTRUMENTATION 9

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

TOTAL : 45 PERIODS

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.

REFERENCES

1. Del Toro, "Electrical Engineering Fundamentals", Pearson Education, New Delhi, 2007
2. John Bird, "Electrical Circuit Theory and Technology", Elsevier, First Indian Edition, 2006
3. Allan S Moris, "Measurement and Instrumentation Principles", Elsevier, First Indian Edition, 2006
4. Rajendra Prasad, "Fundamentals of Electrical Engineering", Prentice Hall of India, 2006
5. Thereja .B.L., "Fundamentals of Electrical Engineering and Electronics", S. Chand & Co. Ltd., 2008
6. Sanjeev Sharma, "Basics of Electrical Engineering", S.K International Publishers, New Delhi, 2007
7. V.K Mehta and Rohit Mehta, "Principle of Electrical Engineering", S. Chand & Company, 2008

PTLT8201

BASIC BIOCHEMISTRY AND MICROBIOLOGY

L T P C

3 0 0 3

OBJECTIVE

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

UNIT I

5

INTRODUCTION

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

UNIT II

12

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

12

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**10****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**8****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**OUTCOMES**

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

REFERENCE BOOKS

1. Lehninger's Principle of Biochemistry: (3rd ed. 2002), Nelson, L. D. and M. M Cox, Macmillan, Worth Publication Inc.
2. Biochemistry: (4th ed. 1992) Stryer, L., W.H. Freeman & Co. NY
3. Biochemistry with Clinical Correlation: (5th ed., 2002) Thomas M. Devlin, Wiley- Liss Publication.
4. Biochemistry: (2nd ed.1995) Voet&Voet, John Wiley and Sons.
5. Biochemistry: (3rd ed. Vol.1, 2, 3, 1993) JeoffreryZubay, Wm C. Brown Publ
6. Principle of Microbiology: (2nd ed.1997) R.M. Atlas, Wm.C Brown., IOWA.
7. Microbial Physiology: (3rded.) Albert G. Moat and John W. Foster A. Johnwiley& Sons. Inc. Publication.
8. Microbiology: (5th ed. 2003) Pelczar& Chan, Tata McGraw Hill Publishing Co. Ltd.
9. General Microbiology: (2nd ed. vol-1, 2, 1989) Power &Daginawala, Himalaya Publishing House.
10. Biochemistry of Bacterial Growth: (4th ed.) Joet Mandelstam, Kenneth McQuillen, IanDawed. Blackwell Scientific Publication.

PTLT8202**INORGANIC & ORGANIC CHEMISTRY****L T P C
3 0 0 3****OBJECTIVE**

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

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

TOTAL : 45 PERIODS**OUTCOME**

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

TEXT BOOKS

1. J W Huheey, E A Keiter and R L Keiter, 'Inorganic Chemistry' 4th edn, Harper Collins,
2. M J Winter, 'Chemical Bonding' Oxford Primer Series, Oxford University Press, 1994
3. N C Norman, 'Periodicity and the p-block Elements' Oxford Primer Series, Oxford University Press, 1994
4. R.T. Morrison and R.N.Boyd "Organic Chemistry" VI Edition Prentice Hall Inc (1996) USA
5. K.S.Tiwari, N.K.Vishnoi and S.N.Malhotra "A text book of Organic Chemistry" Second Edition, Vikas Publishing House Pvt. Ltd. (1998) New Delhi.

REFERENCES

1. Chemistry in Engineering and Technology, Vol.2, TMH Publishing Co Ltd., New Delhi, 1994
2. I L Finar "Organic Chemistry" ELBS (1994).

AIM

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

OBJECTIVES

- To enable students gain fundamental knowledge on various physico-chemical analytical methods
- To make students understand the underpinning science behind various instrumental techniques

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 3

Polarimetry and refractometry Principle, instrumentation and Applications

UNIT IV THERMAL ANALYSIS 5

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

UNIT V CHROMATOGRAPHIC METHODS 6

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

TOTAL : 45 PERIODS

OUTCOMES:

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

TEXT BOOK

1. Willard, H.H., Merritt.L.L., Dean J.A., and Settle, F.A., Instrumental methods of analysis, Sixth edition, CBS publishers, 1986.

REFERENCES

1. Parikh V .M. Absorption spectroscopy of organic molecules Addison –Wesley Publishing company, 1994.
2. Skoog D.A. and West D.MM., Fundamentals of Analytical Chemistry, Saunders –college Publishing, 1982.
3. Banwell, G.C., Fundamentals of molecular spectroscopy TMH, 1992.

**PTLT8204 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.

UNIT I COMPONENTS , FUNCTIONS AND COMPOSITION OF SKIN 9

Organization of skin components in different animals; Structure and function of epidermis, dermis, cutaneous and subcutaneous tissues; hair; fat tissue; nerve; erectorpilli 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 12

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 10

Chemistry and principles of different pretanning processes - Soaking, liming, delimiting, bating, pickling, depickling and degreasing.

UNIT IV CLEANER PROCESSING IN BEAMHOUSE PRACTICES 7
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 V PRACTICE AND QUALITY CONTROL 7
Different methods of pretanning processes as applied to light, heavy and industrial leathers. Process control in pretanning operations.

TOTAL : 45 PERIODS

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.

TEXT BOOKS

1. Lehninger A.L., Nelson D.L., Cox M.M., "Principles of Biochemistry", CBS Publications, 1993.
2. Gustavson, K.H., 'The Chemistry & Reactivity of Collagen', Academic Press, New York.
3. Flaherty, O., William Roddy, T. Robert, M. Lollar, 'The Chemistry and Technology of Leather', Vol.1 Preparation for Tannage, E Robert Krieger Publishing Company, New York, 1978.
4. Bienkiewicz, "Physical Chemistry of Leather Manufacture", Krieger, Florida, 1982.

REFERENCES

1. Voet D., Voet G., "Biochemistry", Second Edition, John Wiley and Sons, 1994.
2. Stryer L., "Biochemistry", Fourth Edition, 1994.
3. Darnell J., Lodish H., Baltimore D., "Molecular Cell Biology", Freeman W.H., 1990.

**PTCY8302 PHYSICAL CHEMISTRY FOR LEATHER TECHNOLOGY LT P C
3 0 0 3**

OBJECTIVE:

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

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 9
Acids and bases- Arrhenius concept-Lewis concept- Dissociation of weak acid, weak base-ionic product of water-Buffer solutions –calculation of pH-Henderson's equation-Hydrolysis of salts-Degree of hydrolysis-Determination –acid-base indicators-their applications-solubility product principle-Ionic equilibria involving complex ions.

UNIT III COLLOIDS 9
Introduction to colloids – properties of colloids – coagulation of solutions –Origin of charge on colloidal particles –Determination of size of colloidal particles- Donnan Membrane equilibrium – Emulsions – Gels – Applications of colloids

UNIT IV SURFACTANTS 9
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 9
Wetting, Cohesion & Adhesion, Contact Angle, Foams, detergency, Emulsions, stability, Surface properties and Membrane technology.

TOTAL : 45 PERIODS

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

TEXT BOOKS

1. Puri B.H. Sharma L.R and M.S.Prathama, Principles of Physical Chemistry, S. Chand and Company, Delhi (2001).
2. Gordon M. Barrow, Physical Chemistry, Sixth edition, Tata McGraw Hill (1998).
3. Bienkiewicz, "Physical chemistry of leather making", Krieger Publishing Co., Florida, 1983.
4. Introduction to Colloid and Surface Chemistry, Duncan J. Shaw, Butternorth, Hewemann, (1992).

PTLT8301 TECHNOLOGY OF HEAVY LEATHER MANUFACTURE L T P C
3 0 0 3

OBJECTIVES:

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

UNIT I SOLE, HARNESS AND SADDLERY LEATHERS 9
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 9
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 9
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 9

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 9

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

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

TEXT BOOKS

1. Choichi Ogiwara, 'A practical guide to heavy leather processing', Fuel and Leather Research Centre, Karachi, 1980.
2. Tuck, D.H. 'The manufacture of upper leathers', Tropical Products Institute, London, 1981.
3. Jyotirmay Dey, 'Practical aspects of the manufacture of upper leather, Indian Leather Technologists Association, Calcutta, 1989.

PTLT8302 THEORY AND PRACTICE OF CHROME AND INORGANIC TANNAGES L T P C 3 0 0 3

AIM

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

OBJECTIVES

Chemistry of inorganic tanning materials giving more thrust to chrome tanning material and system and a glimpse of other inorganic tanning systems based on Al, Zr, Ti, Fe, Si and P.

UNIT I INTRODUCTION TO COORDINATION CHEMISTRY; METAL IONS IN TANNING 10

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 8

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 8

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 9

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 10

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

OUTCOMES

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

REFERENCES

1. Fred O Flaherty, Roddy, T.W. and Lollar, R.M. 'The Chemistry and Technology of Leather', Vol.III, Type of tannages, Rober E.Krieger Publishing Co.,New York, 1977.
2. Gustavson, K.H. 'Chemistry of Tanning Processes' Academic Press, New York, 1956.
3. Bienkiewicz 'Physical Chemistry of Leather Manufacture' Krieger, Florida 1982.
4. Covington A D, 'Tanning Chemistry' RSC Publishing, Cambridge, UK, 2009.

**PTLT8303 THEORY AND PRACTICE OF VEGETABLE AND ORGANIC TANNAGES L T P C
3 0 0 3**

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.

UNIT I VEGETABLE TANNINS 14

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 7

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 10

Mechanism of reaction of vegetable tannins with collagen. Electrolytic equilibria, diffusion equilibria, fixation and absorption equilibria. General practices in vegetable tanning. Pit tanning and drum tanning. Manufacture of E.I. leathers - Modern practices in E.I. tanning.

UNIT IV OTHER ORGANIC TANNAGES 8

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 6

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

TOTAL : 45 PERIODS

OUTCOMES

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

TEXT BOOKS

1. Howes, F.N. "Vegetable tanning materials", Butterworth. London, 1953.
2. Rodd, "Chemistry of carbon compounds", Vol. III-D, Chapter on "Hydrolysable tannins".
3. Haslam , E. "The biochemistry of Plants", Vol.7. Academic Press, 1981, Chapter 18, "Vegetable tannins". "A survey of modern vegetable tannages". Tanning extracts Producers Federation, Switzerland, 1975.
4. Humphreyes, G.H.W. and Jones, C.R. "The manufacture of sole and other heavy leathers". Pergamon Press, 1966. Chapter 5, "Vegetable tannin materials and syntans".
5. O'Flaherty and Roddy,T.W. , Lollar, R.M. "The Chemistry and Technology of Leather", Vol. II. Krieger Publishing Corpn., New York, 1977.
6. Gustavson, K.H. "Chemistry of Tanning Processes" Academic Press, New York, 1950.
7. Vegetable and Synthetic Tanning agents, Sundara Rao, V.S., et al – The Leather Industry, (ed. Bu Sadulla, S) Kothari Desk book series, H.C. Kothari Group (Publications Division), Madras, p.71, 1995.

**PTLT8304 THEORY OF MATERIAL TESTING OF LEATHERS – I L T P C
3 0 0 3**

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

- 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

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

REFERENCES

1. Sarkar, P.K., 'Analytical Chemistry of Leather Manufacture', Indian Leather Technologists Association, Calcutta, 1982.
2. 'Official methods of Analysis', Society of Leather Technologists and Chemists, U.K., 1981.
3. 'Methods of chemical testing of leathers', IS: 582 – 1970 (Reaffirmed 2003) Bureau of Indian Standards, New Delhi.
4. Fred O Flaherty, Roddy, T.W. and Lollar, R.M. 'The Chemistry and Technology of Leather', Vol.IV, Evaluation of leather, Rober E. Krieger Publishing Co., New York, 1977.

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

UNIT I CONCEPTS & METERING OF FLUIDS 4

Concepts of Unit operations and Processes, Fundamentals: Unit and Dimensions, Material and Energy Balances. Fluid statics and dynamics, Compressible and incompressible fluids, Newtonian and Non-Newtonian fluids, Measurement of pressure drop and fluid velocity. Pumps, Compressor, Blowers.

UNIT II HEAT TRANSFER AND MASS TRANSFER 16

Fundamentals of Heat Transfer, Heat transfer equipment, Heat exchangers, Evaporators and Condensers and Simple Design Calculations.

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 3

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 17

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 acrylics, 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

5

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

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.

REFERENCES

1. McCabe .W.L and Smith, J.C., Unit Operations in Chemical Engineering, McGraw Hill, Fourth Ed., 1993.
2. Treybal, R.E., Mass Transfer Operations, McGraw Hill Book Company, Third Ed. 1981.
3. Coulson, J.M., and Richardson, J.F., Chemical Engineering, Vol.I and II Third Ed. Pergamon press, 1978.
4. Welty, J.R., Wilson, R.E., and Wicks, C.E. Fundamentals of momentum, Heat and Mass Transfer, Third Ed., John Wiley, 1984.
5. Perry, J.H., Chemical Engineers Handbook, McGraw Hill, New York, Sixth Ed., 1984.
6. Shreve, R.N., Austin, G.T., Shreve's Chemical Process Industries, McGraw-Hill Book company, 1984.
7. Groggins, P.H., Unit Processes in Organic synthesis, McGraw-Hill Book company, 5th Edition, 2004.
8. Dutta, S.S., An introduction to the principles of leather manufacture, ILTA.
9. Thorstensen, T.C., Practical Leather Technology, Krieger Publications, 1993

PTLT8402

TECHNOLOGY OF LIGHT 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 light leathers from skins.

OBJECTIVES

- 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

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.

TEXT BOOKS

1. Briggs, P.S. 'Gloving, clothing and special leathers', Tropical Products Institute, London, 1981.
2. Kartheiz, Fuchs, H.P. 'The Chemistry and technology of Novelty Leathers' FAO, United Nations, Rome.
3. CLRI Process Bulletins.

| | | |
|-----------------|--|----------------|
| PTLT8403 | 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

- Post tanning processes like neutralization and its importance to the manufacture of various types of leathers.
- Chemistry of post tanning auxiliaries.
- Mechanism of dyeing, fatliquoring and retanning

| | | |
|---|-----------------------------------|-----------|
| 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. | | |

OBJECTIVES:

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

UNIT I ENVIRONMENT, ECOSYSTEMS, BIODIVERSITY AND SUSTAINABLE DEVELOPMENT 8

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 14

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 10

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 9

Definition and over view of Environmental Impact Assessment (EIA), key issues in EIA, legal and regulatory aspects in India – types and limitations of EIA –public participation in EIA- EIA process: screening, scope, setting, analysis – risk analysis - sources of environmental risks – risk management - risk communication and risk perception- emergency preparedness.

UNIT V ENVIRONMENTAL POLICIES AND LEGISLATION 4

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.

TOTAL : 45 PERIODS

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

REFERENCES

1. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education (2004).
2. Sawyer,C.N., MacCarty, P.L. and Parkin, G.F., Chemistry for Environmental Engineering and Science, Tata McGraw – Hill, Fifth edition, New Delhi 2003.
3. Metcalf and Eddy, Wastewater Engineering, Treatment and Reuse, Tata McGraw Hill, New Delhi, 2003.
4. Peavy HS, Rowe DR, Tchobanoglous G (1985) Environmental Engineering. (Eds: McGraw-Hill International Editions), Civil Engineering Series, 577.
5. Petts, J., Handbook of Environmental Impact Assessment, Vol., I and II, Blackwell Science, London, 1999.

PTLT8502

LEATHER GOODS AND GARMENTS TECHNOLOGY

L T P C
3 0 0 3

OBJECTIVES

To impart knowledge on making leather goods and garments

UNIT I OVERVIEW

8

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 accessories. Alternative materials and their adaptability for goods and garments. Operational sequences in leather goods and garments production.

UNIT II

12

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.

ii) Cutting and clicking - Hand & machine cutting, Knives & tools – Preparation and handling. Pattern interlocking/nesting for material optimization. Factors influencing cutting value.

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

9

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 9
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 7
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.

TOTAL : 45 PERIODS

OUTCOMES:

Through this course students will be able know

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

REFERENCES

1. Pattern Making Manual - Womens Garments, ESMOD, Paris, 1991.
2. Fashion Drawing Method, ESMOD, Paris, 1992.
3. Metric Pattern cutting for Menswear, Winifred Aldrich, BSP Professional Books, London, 1990.
4. Grading Manual, ESMOD, Paris, 1994.
5. Skiving Manual, First Edition, 1994 CLRI, Madras.
6. A course manual on leather garment pattern designing.
7. Leather garments making, NIMI publication, 2012.
8. Leather and sports goods – Pattern and Template marker, NIMI Publications, 2011

PTLT8503

LEATHER MACHINERIES

L T P C
3 0 0 3

OBJECTIVES:

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

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 | 12 |
| 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 | 5 |
| 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 | 4 |
| Preventive maintenance and safety in the use of leather machinery | | |

TOTAL : 45 PERIODS

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

REFERENCES:

1. Walter Landmann, The Machines in the Tannery – A Review of Leather Producing Machinery and Equipment in current use, World Trades Publishing, UK, 2003
2. Thomas C.Thorstensen, Practical Leather Technology- Robert E.krieger Publishing Company, Huntington, New york, 1976.

| | | |
|-----------------|---|----------------|
| PTLT8504 | THEORY AND PRACTICE OF LEATHER FINISHING | L T P C |
| | | 3 0 0 3 |

OBJECTIVES

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

| | | |
|--|------------------------|----------|
| UNIT I | COATING SCIENCE | 9 |
| 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 | 9 |
| 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 9

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 9

Impregnation: Terminology, types of impregnating binders, characteristics, selection of systems for corrected and full grain impregnation, formulations, application methods and precautions

Finishing: Definition, aims, film formation mechanisms, properties of films such as glass transition temperature/ minimum film forming temperature, transparency, gloss and 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 9

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

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

REFERENCES

1. Pattern. T.E., Pigment Hand Book, vol.3 ed. W.J., New York, 1973.
2. Patterson, P., Pigments - An Introduction to Theory of Physical Chemistry, Elsevier Publishing Co. Ltd., Amsterdam, 1967.
3. Treatise on coating, Misers and Long Ed., Marcel Dekker, New York (5 Vol.)
4. Sharpouse, J.H., "Leather Technicians Handbook", Leather Producers Association, Northampton NN3 1JD, Reprinted 1995.

OBJECTIVES

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

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, Grinders; 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; Cutting 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 fasteners 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 V METHODS OF SHOE CONSTRUCTION 4

Various methods of shoe construction; shoe room techniques.

TOTAL : 45 PERIODS

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

REFERENCES

1. Cott, N.F., "American Shoe Making", Shoe Trades Publishing Co., Cambridge.1993.
2. "Apparel International" Published by P.F collier and sons, U.K, 1961.
3. "Shoes and Leather News",Published by bureau of foreign and domestic commerce, Dept of commerce, US, 1940.

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.

UNIT I PRINCIPLES OF PRODUCTION MANAGEMENT AND ORGANISATION 15

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

Essentials of economic balance – Economic balance approach, economic balance for leather and product industries. Elements of quality control, role of control charts in production and quality control.

TOTAL : 45 PERIODS**OUTCOMES**

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

TEXT BOOKS

- Peters, M. S. and Timmerhaus, C. D., “ Plant Design and Economics for Chemical Engineers ”, 5th Edn., McGraw Hill, 2002.
- Holand, F.A., Watson, F.A. and Wilkinson, J.K., “ Introduction to process Economics “, 2nd Edn., John Wiley, 1983.
- Narang, G.B.S. and Kumar, V., “ Production and Costing ”, Khanna Publishers, New Delhi, 1988.

REFERENCE

- Allen, L.A., “ Management and Organization”, McGraw Hill.

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.

UNIT I GLOBAL LEATHER AND ALLIED INDUSTRIES 6

Concepts and Fundamental Principles in global leather - Factors influencing business environment, Opportunity assessment, Business forecasting and prospective in leather sector - Leather as an economic and export opportunity sector - Influence of national and international environment on the sustainability of the leather sector.

UNIT II VENTURE PLANNING AND DEVELOPMENT AS APPLIED TO LEATHER AND ALLIED SECTOR 12

Resource planning, Product and process selection criteria - Market segmentation and selection - Investment strategies, Business financing systems, Financial analysis for investment decision - Policy issues and legal clearances - Venture planning in tanneries, shoe units, chemical units and leather garments and goods units - Return on investments in leather sector - Financial sensitivity analysis for investments in the leather sector as applied in industrial leather sector.

UNIT III TECHNO - ECONOMIC FEASIBILITY REPORTS (TEFR) FOR LEATHER AND ALLIED SECTOR 5

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 10

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 12

Market demand assessment techniques - Taxation and internal revenue issues - Market forecasting tools and techniques - Brand building - Export - import guidelines and trade issues - Market sensitivity analysis - Global trade in leather - inter-country comparison of strengths and weaknesses at market place - WTO and related issues influencing leather - Eco-criteria and its influence in leather market - Forecasting domestic market for leather products and market driven planning of an enterprise in leather sector.

TOTAL : 45 PERIODS

OUTCOMES

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

REFERENCES

1. Brandt, Steven C., The 10 Commandments for Building a Growth Company, Third Edition, Macmillan Business Books, Delhi, 1977
2. Bhide, Amar V., The Origin and Evolution of New Businesses, Oxford University Press, New York, 2000.
3. Desai, Vasant, Small Scale Enterprises Vols. 1-12, Mumbai, Himalaya Publishing House. (Latest edition).
4. Dollinger, Mare J., Entrepreneurship: Strategies and Resources, Illinois, Irwin, 1955.
5. Holt, David H., Entrepreneurship: New Venture Creation, Prentice-Hall of India, New Delhi, latest Edition.
6. Panda, Shiba Charan, Entrepreneurship Development, New Delhi, Anmol Publications. (Latest Editions)
7. Patel, V. G., The Seven Business Crises and How to Beat Them, Tata-McGraw, New Delhi, 1995.
8. SIDBI Report on Small Scale Industries Sector (Latest Editions)
9. Taneja, Satish and Gupta, S.L. Entrepreneurship Development-New Venture Creating, Galgotia Publishing House, New Delhi, Latest Edition
10. Verma, J.C., and Gурpal Singh, Small Business and Industry-A Handbook for Entrepreneurs, New Delhi, Sage, 2002
11. Vesper, KarlSH, New Venture Strategies, (Revised Edition), New Jersey, Prentice- Hall, 1990.

PTMG8651

TOTAL QUALITY MANAGEMENT

LT PC

(Common to EEE, Mechanical, Automobile, Printing, Industrial, Manufacturing, CSE, ECE, IT, Leather, Production)

3 0 0 3

AIM

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

OBJECTIVES:

- To understand the various principles, practices of TQM to achieve quality.
- To learn the various statistical approaches for Quality control.
- To understand the TQM tools for continuous process improvement.
- To learn the importance of ISO and Quality systems

UNIT I

INTRODUCTION

9

Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of product and service quality - Basic concepts of TQM – TQM Framework - Contributions of Quality Gurus – Barriers to TQM – Cost of Quality.

UNIT II

TQM PRINCIPLES

9

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 9

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

UNIT IV TQM TOOLS & TECHNIQUES II 9

Quality circles – Quality Function Deployment (QFD) – Taguchi quality loss function – TPM – Concepts, improvement needs – Performance measures - BPR.

UNIT V QUALITY SYSTEMS 9

Need for ISO 9000- ISO 9000-2000 Quality System – Elements, Documentation, Quality auditing- QS 9000 – ISO 14000 – Concepts, Requirements and Benefits –Quality Council – Leadership, Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward.

TOTAL : 45 PERIODS

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.

TEXT BOOK

1. Dale H.Besterfield, et al., “Total Quality Management”, Pearson Education Asia, Third Edition, Indian Reprint , 2006.

REFERENCE BOOKS

1. James R. Evans and William M. Lindsay, “The Management and Control of Quality”, (6th Edition), South-Western (Thomson Learning), 2005.
2. Oakland, J.S. “TQM – Text with Cases”, Butterworth – Heinemann Ltd., Oxford, Third Edition , 2003.
3. Suganthi,L and Anand Samuel, “Total Quality Management”, Prentice Hall (India) Pvt. Ltd., 2006 .
4. Janakiraman,B and Gopal, R.K, “Total Quality Management – Text and Cases”,Prentice Hall (India) Pvt. Ltd., 2006.

PTLT8713

PROJECT WORK

**L T P C
0 0 9 6**

OBJECTIVE:

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

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

PTLT8001

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

**L T P C
3 0 0 3**

AIM

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

OBJECTIVES

- 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

10

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

UNIT II

10

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

UNIT III

7

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

UNIT IV

9

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**9**

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**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.

TEXT BOOKS AND REFERENCES

1. Flaherty, O. Roddy, T.W., Lollar, R.M., 'The Chemistry & Technology of Leather', Vol.1, E. Robert Krieger Publishing Co., New York 1978.
2. Gustavson, K.H., 'The Chemistry & Reactivity of Collagen', Academic Press, New York.
3. Ramachandran, G.N., 'Treatise on the Biology of Collagen', Academic Press, New York.
4. Krishnan, V, Ed. 'Trends in Collagen', Proceedings of the Indian Academy of Sciences (Chemical Sciences), Vol. 111, No. 1, Indian Academy of Sciences, Bangalore, 1999.

PTLT8002**ADVANCED PHYSICS AND CHEMISTRY OF LEATHER II**
(Prerequisite: Elective APCL-I)**L T P C**
3 0 0 3**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

UNIT I**6**

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**9**

Types of transport of fluids into solid matrices. Diffusion and transport phenomena in collageneous matrices. Kinetics and diffusion of tannery materials, dyes; forced diffusion into collageneous matrices.

UNIT III**15**

Molecular level processes and changes in soaking, liming/dehairing, deliming/bating, pickling, tanning, dyeing and Fatliquoring.

UNIT IV**6**

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 III | PATTERN ENGINEERING | 8 |
| 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 | 7 |
| 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 | 6 |
| Principles and practice; simulation – concepts and applications. | | |

TOTAL : 45 PERIODS

OUTCOMES

The students would have exposure on the use of computer based application in designing leather products

REFERENCES

1. MP Groover and EW Zinimers, "CAD/CAM, Computer Aided Design and Manufacturing", Prentice Hall of India, 1984.
2. Newman & S P Sul., "Introduction to Computer Graphics", Published by Morgan Kaufmann, 1995
3. S.Harrington, "Computer Graphics : A programming approach", Edition 2, Published by Elsevier, 1997.
4. Zandi, "Computer Aided Design and drafting", Published by Delmer, 1985.
5. William Pratt., "Digital Image Processing", 1978.
6. Desai and Abel, "Introduction to FEM". "Step by Step guide to CAD for footwear": CAD Centre, SDDC, CLRI.
7. Rapid prototyping ; AU – FRG publications, 1984.
8. Jorg Buchner Simulation : "QUEST" manual : EDS Technologies, Published by Springer, 2003.

| | | |
|-----------------|---|----------------|
| PTLT8004 | COMPUTER APPLICATIONS FOR LEATHER AND LEATHER PRODUCTS | L T P C |
| | | 3 0 0 3 |

OBJECTIVES

To make students capable of using Computer and related technologies for an effective management of leather and leather products industry

| | | |
|---------------|--|----------|
| 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, Serial Vs 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

OUTCOMES

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

TEXT BOOK

1. Alex Leon & Mathews Leon, "Fundamentals of Information Technology", Leon Techworld, 1999.

REFERENCES

1. Dorian Cougias, E. L. Heiberger, Karsten Koop, The Backup Book: Disaster Recovery from Desktop to Data Center.
2. Tannenbaum, "Operating Systems", PHI, 4th Edition, 2000
3. Date C. J., "An Introduction to Database Systems", 7th Ed., Narosa Publishing, 2004
4. Kendall & Kendall, Systems Analysis and Design (Prentice Hall India)
5. Achyut S. Gobbole, Data Communication and Networks (Tata McGraw Hill Publishing Company)
6. Understanding SQL (BPB Publications)
7. Hands-on HTML(BPB Publications)
8. Ann Navarro, Effective Web Designing (BPB Publications)
9. E-commerce Developer's Guide to Building Community & using Promotional Tools (BPB Publications)
10. Reference Manuals for CAD systems for Footwear and Garments.

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.

UNIT I CONSUMER DECISION-MAKING AND MARKETING IMPLICATIONS 6

Introduction to the study of consumer behaviour- Stages in Consumer Decision Making-Types of Consumer decision-making -Consumers shopping styles and Trends-Information search and consumers decision-making-Information search and marketing strategies- Dimensions of information search - Impulse Buying of Consumer- an emerging trend.

UNIT II CONSUMER DECISION-MAKING AND BEYOND 7

Models of consumers- Four views of consumer decision-making - Economic, Passive, Cognitive, Emotional-A simple view of consumer decision-making Howard sheth Model- Engel, Kollat and B1ackWell Model- Case studies with reference to India.

UNIT III DETERMINANTS OF CONSUMER BEHAVIOUR 10

- 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.
- c) Learning -Pavlovian & Skinner's approaches in Stimulus Response Theories- Leon festinger's Cognitive Dissonance Theory.
- d) Beliefs and Attitudes- Cognitive , Affective and Action oriented Attitude.

UNIT IV BUSINESS ORIENTATION 8

Management roles and functions in a business. Designing and re-designing business process, location, layout, operations planning and control. Basic awareness on the issues impinging on quality, productivity and environment. Principles of double-entry book-keeping: journal entries, cash-book, pass book,and Bank Reconciliation Statement, ledger accounts, trail balance and preparation of final accounts: Trading and Profit and Loss Account; Balance-sheet. Briefintroduction to Single-Entry system of record keeping. Sources of risk/venture capital, fixed capital, working capital and a basic awareness of financial services such as leasing and factoring. Managing business growth. The pros and cons of alternative growth options, internal expansion, acquisitions and mergers, integration and diversification.Crisis in business growth.

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 rist management, forest risk management, leadership strategic planning.

TOTAL : 45 PERIODS

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

REFERENCES

1. Consumer Behavior 9th Edition Leon and Schiffman and Leslie Lazar Knuk, Pearson Education Blackwell: Consumer Behaviour, 10e, Thomson 2007
2. Consumer Behaviour- Suja Nair - Himalaya Publishers. Assael: Consumer Behaviour, 6e Thomson 2006
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 Asia. Panda, Shiba Charan, Entrepreneurship Development, New Delhi, Anmol Publications.
5. Patel, V.G., The Seven Business Crises and How to Beat Them, Tata-Mcgraw,New Delhi, 1995.
6. Verma, J.C., and Gurpal Singh, Small Business and Industry-A Handbook for Entrepreneurs, Sage, New Delhi, 2002

PTLT8006

ECO-BENIGN OPTIONS FOR LEATHER PROCESSING

L T P C

3 0 0 3

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.

UNIT I CLEANER PROCESSING - BEAMHOUSE 9

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 9

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 9

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 9

Cleaner processing and solvent free finishing systems; Eco-labelling. integrated strategies to achieve permissible BOD, COD and TDS standards of tannery effluents.

UNIT V ENGINEERING ECONOMICS**7**

Economics – Engineering economics – Demand analysis Laws of demand – Production and cost – Pricing methods

TOTAL : 45 PERIODS**OUTCOMES**

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

TEXT BOOK

1. R. Kesavan, C.Elanchezhian and T.Sundar Selwyn – Engineering Economics and Financial Accounting, Laxmi Publications 2005

REFERENCES

1. C.James, Vanhorn, Fundamentals of Financial management PHI 1996
2. Charles T.Homgren, Cost Accounting, PHI 1985
3. S.N.Maheswaran, Management Accounting and Financial Control, Sultan Chand, 1992.

PTLT8008 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 case studies in the pre and post implementation of ERP,s that will enable the students to perform as an efficient entrepreneur.

UNIT I INTRODUCTION**6**

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**10**

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 | 10 |
| 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 | 6 |
| Post implementation review of ERP Packages in Manufacturing, Services, and other Organizations | | |

TOTAL : 45 PERIODS

OUTCOMES

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

REFERENCES

1. Leon, A. Enterprise Resource Planning, Tata Mcgraw-hill, 1999.
2. Garg, V.K. and Venkitakrishnan, N.K. ERP Ware: ERP Implementation Framework, Prentice Hall, 1999
3. Garg, V.K. and Venkitakrishnan, N.K. Enterprise Resource Planning Concepts and Practice, PHI Learning Pvt. Ltd., 2004

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| PTLT8009 | FASHION FORCASTING FOR LEATHER AND LEATHER PRODUCTS | L T P C |
| | | 3 0 0 3 |

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.

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|---|---|-----------|
| 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. | | |

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

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| UNIT III | PRODUCT DEVELOPMENT | 9 |
| Market Strategy - Prototype Development - Field test and evaluation - Standard preparation - Second prototype - Final run. Costing | | |

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|---|--------------------------------|----------|
| 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**OUTCOMES:**

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

REFERENCES

1. Cott, N.F., "American Shoe Making", Shoe Trades Publishing Co., Cambridge.1993.
2. "Apparel International" Published by P.F collier and sons, U.K, 1961.
3. "Shoes and Leather News", Published by bureau of foreign and domestic commerce, Dept of commerce, US, 1940.

PTLT8010**HUMAN RESOURCE DEVELOPMENT****L T P C
3 0 0 3****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 concepts and relate them to contemporary issues.

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 III 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 Competeance and Coping Competencies; Training and Development; Organizational Development,Career Development;

Comtemporany issues: Knowledge management and learning organizations, BPR, TQM and Intellectual capital management.

UNIT IV COMPENSATION AND BENEFITS**5**

Job evaluation, Pay structures, Benefit programs, Pay delivery administration.

UNIT V HEALTH, SAFETY, SECURITY AND LABOUR RELATIONS 12
Employee assistance programs, safety programs, theft, fraud, investigations, corrections;
Labour laws, unfair labour practices, collective bargaining

TOTAL : 45 PERIODS

OUTCOMES

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

TEXT BOOKS AND REFERENCES

1. Mathis, R. L. & Jackson, J. H. (2003). Human Resource Management, (10th ed.), Mason, Ohio: Thomson-Southwestern.
2. Rao, T.V., (1996) "Human Resources Development: Experiences. Interventions. Strategies", Sage Publications, New Delhi.

PTLT8011 INTERNATIONAL MARKETING AND FOREIGN TRADE L T P C
3 0 0 3

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.

UNIT I 9
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 11
Introduction-Import to India-An over view, Import and the Customs in India-Importation of Goods, Customs Duty and Exemptions-Valuation of Goods under Customs, Clearance of Imported Goods and Goods in Transit-Warehousing of Goods, Import into India.
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 11
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 5
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 **9**
 Marketing Management in the Indian context Introduction-concept-process functions-Role of Marketing in modern Organization- Marketing environment-Socio economic forces- Marketing Planning-Understanding BuyerandOrganizational behavior- -Product Management -ricing decisions-Promotion Decisions.

TOTAL : 45 PERIODS

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.

TEXT BOOKS

1. Wagdre, H. International Marketing Management, Adhyayan Publisher, 2007
2. Datey, V. S. Foreign Trade Policy, Taxmann Publishers, 2008.
3. Bhat, M. K. international marketing management with special reference to India, king publishers, 2001

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|-----------------|---|----------------|
| PTLT8012 | LEATHER AND LEATHER PRODUCTS COSTING | L T P C |
| | | 3 0 0 3 |

OBJECTIVES

The sorting, assessment and valuation of various leather and leather products will be learnt.

UNIT I **9**
 Cost accounting, elements of cost, classification of cost elements – examples from textile industry, methods of costing

UNIT II **5**
 Cost profit volume analysis, breakeven analysis; standard costing, analysis of variance

UNIT III **17**
 Costing of leather and leather products – material, labour, power and overhead expenses

UNIT IV **9**
 Foreign exchange mechanisms, exchange rates; foreign exchange exposure management – risks, strategies to reduce risk

UNIT V **5**
 Budget, types of budgets, budgeting and control in tanneries and leather products industry

TOTAL : 45 PERIODS

OUTCOMES

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

REFERENCES

1. "Cost accounting for textile mills", ATIRA, Ahmadabad, 1974
2. Kantwala, D.N., "Costing and Cost Control – A Marginal Approach for Textile Industry", Texcons, Bombay, 1974
3. James C., Van Home., "Financial Management and Policy", Prentice Hall of India Pvt. Ltd, New Delhi, 1980
4. Bhave P.V. and Srinivasan V., "Costing Accounting to Textile Mills", ATIRA, Ahmadabad, 1976
5. Thukaram Rao M.E., "Cost and Management Accounting" New Age International, Bangalore, 2004
6. Thukaram Rao M.E., "Cost Accounting and Financial Management" New Age International, Bangalore, 2004.

PTLT8013

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

To understand

- Fundamentals of purchasing
- Retail sector
- Global Market

UNIT I PRINCIPLES OF MARKETING MANAGEMENT 9

Introduction, Definition, Importance and Scope of Marketing, Philosophies of Marketing Management, Elements of Marketing - Needs, Wants, Demands, Customer, Consumer, Markets and Marketers; Marketing Vs Selling, Consumer Markets and Industrial Markets. Concept of Marketing Management, Marketing – Mix, Functions of Marketing Management, Marketing Organisations, Qualities of Marketing Manager. 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 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

OUTCOMES

At the end of the course the students would have gained knowledge on various enzyme-based leather processing operations.

REFERENCES

1. Rohm, H.J. and Reed, G. "A Comprehensive treatise on Biotechnology", Verlag Chemie, Weinheim, 1983.
2. Pelczar, J., Reid, R.D. and Chan, F.C.S., "Microbiology", Tata McGraw Hill, 1977.
3. Old, R.W., and Primrose, S.B., "Principles of Genemanipulation" 3/e Cambridge, 1985.
4. Stryer, L. "Biochemistry" 3/e W.H. Freeman and Co. 1989.
5. Lehninger, A.L., Nelson, D.L., Gx M.M "Principles of Biochemistry", CBS Publications, 1993
6. Puvanakrishnan, R and Dhar, S.C. "Enzyme Technology in Beamhouse practices" CLRI Publication.
7. Wrinter, N.A., "Biological treatment of waste water", 1982.
7. Schroeder, E.D., "Waste and Waste water treatment", McGraw - Hill Inc. 1983

PTLT8015

LEATHER PRODUCTS MACHINERY

**L T P C
3 0 0 3**

AIM

To impart knowledge on leather products machinery used in leather sector.

OBJECTIVES

- To focus on the hand tools and machines, machines for shoe and footwear construction, system, automation in leather product machines and modular manufacturing and layout.

UNIT I HAND TOOLS AND MACHINES 8

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.

AIM

To impart knowledge on Occupational Safety and Hazard aspects in leather manufacture

OBJECTIVES

To understand

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

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 17

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 7

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

UNIT V SAFETY & HEALTH MANAGEMENT AND PROMOTION 3

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

TOTAL : 45 PERIODS

OUTCOMES:

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

REFERENCES

1. Jeannie Mager Stellmann, Encyclopaedia of Occupational Safety & Health, 4th edition, International Labour Office, Geneva 1999.
2. J. Buljan, A Sahasranaman, J Hannak, Occupational Safety and Health Aspects of Leather Manufacture, 1st edition, United Nations Industrial Development Organization, Chennai, 1998.
3. CLRI, Safety Manual on Leather Processing, 1st edition, Central Leather Research Institute, Chennai, 1999.

PTLT8018

SCIENCE AND TECHNOLOGY OF LEATHER AUXILIARIES

L T P C
3 0 0 3

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.

UNIT I

9

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

9

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

UNIT III

13

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, sulphoamidation, 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

9

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 **5**
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

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

TEXT BOOKS AND REFERENCES

1. Fred O Flaherty, Roddy, T.W. and Lollar, R.M. 'The Chemistry and Technology of Leather', Vol.II, Type of tannages, Rober E. Krieger Publishing Co., New York, 1977.
2. Gustavson, K.H. 'Chemistry of Tanning Processes' Academic Press, New York, 1956.
3. Venkataraman , K. 'Chemistry of Synthetic Dyes', Academic Press, New York and Lond, 1971.
4. Myers, R.R., and Lond, J.S. 'Treatise on Coatings', Marcel Dekker, New York, 1975.

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| PTLT8019 | SCIENCE AND TECHNOLOGY OF LEATHER SUPPLEMENTS AND SYNTHETICS | L T P C 3 0 0 3 |
|-----------------|---|----------------------------------|

AIM

To impart knowledge on the use of leather supplements used as substitutes for leather in the manufacture of leather products

OBJECTIVE

- 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. 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.

UNIT I **6**
Technology of the most common polymeric materials used in leather industry as supplements. Polymer and Rubber industries in India.

UNIT II **15**
Manufacture of industrially important polymers for plastics, fibres and lastomer - Polyethylene, polypylene, polyvinyl chloride, polyvinyl alcohol, polyacrylonitrile, polystyrene, polyurethane, fluoro-carbon polymers, epoxy resins, polyamides, polyesters, alkyd resins, silicone polymers, cellulotics.

UNIT III **6**
Fabrication of polymeric materials, compounding and mixing, casting, extrusion, fibre spinning, molding, coating, foam fabrication.

UNIT IV **8**
Testing of polymers. Mechanical and Thermal testing.

UNIT V**10**

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

TOTAL : 45 PERIODS**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.

REFERENCES

1. Williams, D.J., 'Polymer Science & Engineering', Prentice Hall, New York, 1971.
2. Austin, G.T., Shreer's 'Chemical Process Industries', 5th ed., McGraw Hill International Book Co., Singapore, 1984.
3. Elrich. F.R., 'Science & Technology of Rubber', Academic Press, New York, 1978.
4. Lubin, 'Handbook of composites', Van Nostrand Reinhold Co., New York.

PTLT8020**TECHNOLOGY OF ANIMAL AND TANNERY BY PRODUCTS UTILISATION****L T P C
3 0 0 3****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.

OBJECTIVES:

The objective of the course is to impart knowledge on the various by products emanating from slaughter houses and tanneries, their composition and various utilization methods available till date

UNIT I INTRODUCTION.**9**

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**

Alimentary tract and its processing into various products. Present status of the industry in the country. Pet foods methods of preparation in brief.

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 IV REENGINEERING PRINCIPLES IN LEATHER PROCESSING AND IN LEATHER PRODUCT SECTOR 10

The 6 R's of organizational transformation and reengineering – process reengineering – preparing the workforce – Methodology – PMI leadership expectation – Production and service improvement model – Process improvement in leather and allied industries.

UNIT V IMPLEMENTATION OF REENGINEERING IN LEATHER SECTOR 8

Process analysis techniques – Work flow analysis – Value analysis approach – Nominal group technique – Fish bone diagram – Pareto analysis – team building – Force fields analysis – Implementation in leather and allied industries.

TOTAL : 45 PERIODS

OUTCOMES

Case studies based knowledge on value engineering will be obtained at the end of the course.

TEXT BOOKS

1. S.S.Iyer, "Value Engineering", New Age Information, 1996.
2. Del L. Younker, "Value Engineering" Marcel Dekker, Inc. 2003
3. M.S.Jayaraman and Ganesh Natarajan, "Business Process Reengineering", Tata McGraw Hill, 1994.

REFERENCE

1. Dr.Johnson, A.Edosomwan, "Organizational Transformation and Process reengineering", British Library Cataloguing in publication data, 1996.

PTGE8071

DISASTER MANAGEMENT

**L T P C
3 0 0 3**

OBJECTIVES:

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

UNIT I INTRODUCTION TO DISASTERS 9

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) 9

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

UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 9

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 9

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 9

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:

1. Singhal J.P. "Disaster Management", Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423
2. Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., 2012. **ISBN-10:** 1259007367, **ISBN-13:** 978-1259007361]
3. Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011
4. Kapur Anu Vulnerable India: A Geographical Study of Disasters, IAS and Sage Publishers, New Delhi, 2010.

REFERENCES

1. Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005
2. Government of India, National Disaster Management Policy,2009.

OBJECTIVES :

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

UNIT I**9**

Human Rights – Meaning, origin and Development. Notion and classification of Rights – Natural, Moral and Legal Rights. Civil and Political Rights, Economic, Social and Cultural Rights; collective / Solidarity Rights.

UNIT II**9**

Evolution of the concept of Human Rights Magna carta – Geneva convention of 1864. Universal Declaration of Human Rights, 1948. Theories of Human Rights.

UNIT III**9**

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

UNIT IV**9**

Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V**9**

Human Rights of Disadvantaged People – Women, Children, Displaced persons and Disabled persons, including Aged and HIV Infected People. Implementation of Human Rights – National and State Human Rights Commission – Judiciary – Role of NGO's, Media, Educational Institutions, Social Movements.

TOTAL : 45 PERIODS**OUTCOME :**

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

REFERENCES:

1. Kapoor S.K., "Human Rights under International law and Indian Laws", Central Law Agency, Allahabad, 2014.
2. Chandra U., "Human Rights", Allahabad Law Agency, Allahabad, 2014.
3. Upendra Baxi, The Future of Human Rights, Oxford University Press, New Delhi.