CURRICULUM

FOR

DIPLOMA OF ASSOCIATE ENGINEER

IN

LEATHER TECHNOLOGY

(3- Year Course)

Revised-July, 2016

Scheme of Studies
D.A.E. LEATHER Technology

Code		Subjects	Total Hrs.	T	P	C
Gen	111	Islamiat and Pak Studies	32	1	0	1
ENG	112	English	64	2	0	2
Math	113	Applied Mathematics	96	3	0	3
Phy	122	Applied Physics	128	1	3	2
Ch	112	Applied Chemistry	128	1	3	2
Comp	142	Computer Application	128	1	3	2
LT	114	Principles of Leather Manufacturing-I	256	2	6	4
LT	124	Heavy Leather Manufacturing	256	2	6	4
LT	134	Tannery Machinery Practice	256	2	6	4
TOTAL				**15**	**27**	**24**

Code		Subject	Total Hrs.	T	P	C
Gen	211	Islamiat and Pak Studies	32	1	0	1
Phy	212	Applied Physics/Applied Mechanics	128	1	3	2
Math	212	Applied Mathematics-II	64	2	0	2
MGM	221	Business Management and Industrial Economics	32	1	0	1
LT	214	Applied Chemistry-II	256	2	6	4
LT	224	Principles of Leather Manufacturing-II	256	2	6	4
LT	234	Crusting of upper and soft Leather	256	2	6	4
LT	244	Shoe Manufacturing	256	2	6	4
TOTAL				**13**	**27**	**22**

Code		Subject	Total Hrs.	T	P	C
Gen	311	Islamiat and Pak Studies	32	1	0	1
LT	314	Principles of Leather Manufacturing-III	256	2	6	4
LT	324	Upper, Light and Specialized Finishes	256	2	6	4
LT	333	Applied Chemistry-III	160	2	3	3
LT	343	Quality Control &Leather Testing	256	2	3	3
LT	353	Evaluation of Chemical Materials and Procedures	160	2	3	3
Ftw	371	Marketing and Brand Management	32	1	0	1
LT	362	Final Design Project	192	0	6	2
TOTAL				**12**	**27**	**21**

حصہ اول

حصہ اسلامیت

تدریسی مقاصد

۱- قرآن مجید

عمومی مقصد: طالب علم یہ سمجھنے کے قابل ہو کہ اسلام کی تعلیمات کا اصل سرچشمہ قرآن مجید ہے

خصوصی مقصد: طالب علم اس قابل ہو جائے گا کہ

☆ قرآن مجید کی تعریف کر سکے گا

☆ قرآن مجید کے نزول کی صورت بیان کر سکے

☆ قرآن مجید کی کی دس مدنی سورتوں کی پہچان کر سکے

☆ منتخب آیات کا ترجمہ و تشریح کر سکے

عمومی مقصد: یہ سمجھنے کے قابل ہو جائے گا کہ منتخب قرآنی آیات کے ذریعے اسلامی تعلیمات کا مفہوم کیا ہے

☆ قرآنی آیات کا ترجمہ تشریح کر سکے

☆ قرآنی تعلیمات کی روشنی میں اپنی اور معاشرتی اصلاح کر سکے

2- سنت

عمومی مقصد: طالب علم سنت نبوی کی اہمیت اور ضرورت کو اچھی طرح سمجھنے کے قابل ہو جائے گا

خصوصی مقصد:

☆ سنت کی تعریف بیان کر سکے

☆ سنت کی اہمیت و ضرورت کی وضاحت کر سکے

☆ سنت کی روشنی میں اسوہ حسنہ پر عمل کر سکے

3- منتخب احادیث نبویہ

عمومی مقصد: احادیث کی روشنی میں اخلاقی اقدار سے آگاہی حاصل کر سکے

خصوصی مقصد: احادیث کا ترجمہ و تشریح کر سکے

رسول اللہ ﷺ کے اسوۂ حسنہ کی پیروی کا جذبہ پیدا ہو سکے

دین اسلام

-4

عمومی مقاصد: دین اسلام کے بنیادی مقاصد اور عبادات کے بارے میں جان سکے اور بیان کر سکے

خصوصی مقاصد

لفظ دین اسلام کے لغوی اور اصطلاحی معنی بیان کر سکے

اسلام کے بنیادی مقاصد کی اہمیت بیان کر سکے

اسلام کے بنیادی مقاصد سے انسان کی انفرادی و اجتماعی زندگی پر پڑنے والے اثرات بیان کر سکے

عبادت کے لغظی و اصطلاحی معنی بیان کر سکے

عقیدے اور عبادت کا فرق بیان کر سکے

عبادات (نماز، روزہ، حج، زکواۃ) کے فوری اثرات اور انسانی زندگی پر ان کی اثرات بیان کر سکے

اسلامی مقاصد و عبادات کے مطابق اپنی زندگی ڈھال کر ایک اچھا مسلمان بن سکے

(غیر مسلم طلباء کے لئے)

نصاب اخلاقیات سال اول — GEN 101

حصہ دوم مطالعہ پاکستان

ک	ع	ی
1	0	1

کل وقت - 20 گھنٹے

موضوعات

اخلاقیات کی تعریف اور اہمیت

اخلاقیات کا معیار (قانون، عقل، الہی کتب)

مندرجہ ذیل اخلاق کی وضاحت

- ☆ دیانت داری
- ☆ وفاداری
- ☆ نظم و ضبط
- ☆ راست گوئی
- ☆ صبر و استقلال
- ☆ حوصلہ مندی
- ☆ وقت کی پابندی
- ☆ صفائی
- ☆ ایثار
- ☆ باہمی احترام
- ☆ مصلحت

نصاب اخلاقیات (سال اول)

تدریسی مقاصد

عمومی مقاصد: اعلیٰ اخلاق کی وجہ سے ملکی ترقی میں مثبت قدر اضافہ کر سکے

خصوصی مقاصد: طالب اس علم سے اس قابل ہو گا کہ

- ☆ موضوعات کا مطلب بیان کر سکے
- ☆ عملی زندگی سے مثالوں کی نشاندہی کر سکے
- ☆ اپنی شخصیت اور معاشرے پر موضوعات کے مثبت اثرات پیدا کرنے کے طریقے بیان کر سکے
- ☆ دیانت داری کی اہمیت بیان کر سکے
- ☆ وفاداری کی اہمیت بیان کر سکے
- ☆ نظم و ضبط کی افادیت بیان کر سکے
- ☆ صدق بیان کی ضرورت بیان کر سکے
- ☆ حوصلہ مندی کے فوائد بیان کر سکے
- ☆ وقت کی پابندی کے فوائد بیان کر سکے
- ☆ صفائی اور باہمی اختیار سے حسن کارکردگی کو بیان کر سکے
- ☆ مصلحت کے فوائد بیان کر سکے

نصاب (سال اول) Gen III

حصہ دوئم　　مطالعہ پاکستان　　کل وقت 2 گھنٹے

موضوعات

☆ حریت فکر : مسلمان قوم میں آزادی فکر کی تاریخ - معاملات میں سیاسی آزادی کی اہمیت اور ضرورت - زمانی و جسمانی غلامی کے تفصیلات

☆ نظریہ پاکستان

قیام پاکستان کی اساس (دین اسلام) قیام پاکستان کی غرض و غایت نظریہ پاکستان کی وضاحت - نظریہ پاکستان اور مسلم اقبال اور قائداعظم کے ارشادات کی روشنی میں

☆ نظریہ پاکستان کا تاریخی پس منظر

محمد بن قاسم کی آمد - مجدد الف ثانی اور شاہ ولی اللہ کی تبلیغی خدمات سید احمد شہید کی تحریک مجاہدین

☆ تعلیمی تحریکیں

علی گڑھ - ندوۃ العلماء (لکھنؤ) - مدرسۃ الاسلام - (سندھ) اسلامیہ کالج (پشاور) انجمن حمایت اسلام (لاہور)

مطالعہ پاکستان (حصہ دوئم)

تدریسی مقاصد

حریت فکر:

عمومی مقصد

طالب علم یہ جان لے کہ اسلام میں اور مسلمان قوم میں آزادی فکر کی کیا اہمیت ہے

خصوصی مقاصد

- ☆ حریت فکر کا معنی و مفہوم بیان کر سکے
- ☆ آزادی فکر کی اہمیت بیان کر سکے
- ☆ خصوصاً اسلام میں آزادی اظہار رائے کی اہمیت بیان کر سکے
- ☆ ذہنی غلامی کے قومی سطح پر نقصانات کے بیان کر سکے
- ☆ جسمانی غلامی قومی سطح پر نقصانات بیان کر سکے

نظریہ پاکستان

عمومی مقصد:

نظریہ پاکستان (دین اسلام) سے پوری طرح واقفیت ہو جائے

خصوصی مقاصد:

- ☆ نظریہ کی تعریف بیان کر سکے اور اس کی وضاحت کر سکے
- ☆ نظریہ پاکستان کی تعریف کر سکے اور اس کا مفہوم بیان کر سکے
- ☆ علامہ اقبال اور قائداعظم کے فرمودات کی روشنی میں نظریہ پاکستان بیان کر سکے

نظریہ پاکستان کا تاریخی پہلو

عمومی مقصد

- ☆ نظریہ پاکستان کے تاریخی پس منظر سے واقفیت حاصل کر سکے

خصوصی مقاصد:

- ☆ محمد بن قاسم کے بارے میں بیان کر سکے

- محمد بن قاسم کے ہندوستان پر حملہ کی وجہ بیان کر سکے
- محمد بن قاسم کے ہندوستان پر حملہ کے اثرات بیان کر سکے
- بیان کر سکے کہ ہندوستان میں ہندو مسلم دو قومی نظریہ کا نکتہ آغاز کیا ہے
- مجدد الف ثانی کی علمی خدمات بیان کر سکے
- شاہ ولی اللہ کی علمی خدمات بیان کر سکے
- مجدد الف ثانی اور شاہ ولی اللہ کے جو تبلیغ دین اور مسلمانوں میں سیاسی شعور پیدا کیا اسے بیان کر سکے

علمی تحریکیں

عمومی مقصد

- برصغیر کی علمی تحریکوں سے آگاہی حاصل ہو سکے

خصوصی مقاصد:

- علی گڑھ - دیوبند - ندوت العلماء مدرسۃ السلام ، اسلامیہ کالج۔ انجمن حمایت اسلام نے تعلیم کے ذریعہ سیاسی شعور مسلمانوں میں پیدا کیا اسے بیان کر سکے
- آزادی ہند کے سلسلہ میں تحریک مجاہدین کی خدمات بیان کر سکے

Eng-112 ENGLISH

Total contact hours

Theory	64	T	P	C
Practical	0	2	0	2

AIMS At the end of the course, the students will be equipped with cognitive skill to enable them to present facts in a systematic and logical manner to meet the language demands of dynamic field of commerce and industry for functional day-to-day use and will inculcate skills of reading, writing and comprehension.

COURSE CONTENTS

ENGLISH PAPER "A"

1. PROSE/TEXT **16 hrs**

1.1 First eight essays of Intermediate. English Book-II

2. CLOZE TEST **4 hrs**

1.2 A passage comprising 50-100 words will be selected from the text. Every 11thword or any word for that matter will be omitted. The number of missing word will range between 5-10. The chosen word may or may not be the one used in the text, but it should be an appropriate word.

ENGLISH PAPER "B"

3. GRAMMAR **26 hrs**

3.1 Sentence Structure.
3.2 Tenses.
3.3 Parts of speech.
3.4 Punctuation,
3.5 Change of Narration.
3.6 One word for several
3.7 Words often confused

4. COMPOSITION **8 hrs**

4.1 Letters/Messages
4.2 Job application letter
4.3 For character certificate/for grant of scholarship
4.4 Telegrams, Cablegrams and Radiograms, Telexes, Facsimiles
4.5 Essay writing
4.6 Technical Education, Science and Our life, Computers,
Environmental Pollution, Duties of a Student. **4 hrs**

5. TRANSLATION **6 hrs**

5.1 Translation from Urdu into English.
For Foreign Students: A paragraph or a dialogue.

RECOMMENDED BOOKS

Technical English developed by Mr. Zia Sarwar, Mr. Habib-ur –Rehman, Evaluated by Mr.Zafar Iqbal Khokhar, Mr. Zahid Zahoor,Vol - I, National Book Foundation

Eng-112 ENGLISH

INSTRUCTIONAL OBJECTIVES

PAPER-A

1. DEMONSTRATE BETTER READING, COMPREHENSION AND VOCABULARY

1.1 Manipulate, skimming and scanning of the text.
1.2 Identify new ideas.
1.3 Reproduce facts, characters in own words
1.4 Write summary of stories

2. UNDERSTAND FACTS OF THE TEXT

2.1 Rewrite words to fill in the blanks recalling the text.
2.2 Use own words to fill in the blanks.

PAPER-B

3. APPLY THE RULES OF GRAMMAR IN WRITING AND SPEAKING

3.1 Use rules of grammar to construct meaningful sentences containing a subjectand a predicate.
3.2 State classification of time, i.e. present, past and future and use verb tensecorrectly in different forms to denote relevant time.
3.3 Identify function words and content words.
3.4 Use marks of punctuation to make sense clear.
3.5 ' Relate what a person says in direct and indirect forms.
3.6 Compose his writings.
3.7 Distinguish between confusing words.

4. APPLY THE CONCEPTS OF COMPOSITION WRITING TO PRACTICALSITUATIONS

4.1 Use concept to construct applications for employment, for character certificate,for grant of scholarship.
4.2 Define and write telegrams, cablegrams and radiograms, telexes, facsimiles
4.3 Describe steps of a good composition writing.
4.4 Describe features of a good composition.
4.5 Describe methods of composition writing.
4.6 Use these concepts to organize facts and describe them systematically inpractical situation;

5. APPLIES RULES OF TRANSLATION

5.1 Describe confusion.
5.2 Describe rules of translation.
5.3 Use rules of translation from Urdu to English in simple paragraph andsentences.

Math-113 APPLIED MATHEMATICS

Total contact hours	96	**T**	**P**	**C**
Theory		3	0	3

Pre-requisite: Must have completed a course of Elective Mathematics at Matric level.

AIMS After completing the course the students will be able to

1. Solve problems of Algebra, Trigonometry, vectors. Menstruation, Matrices and Determinants.
2. Develop skill, mathematical attitudes and logical perception in the use of mathematical instruments as required in the technological fields.
3. Acquire mathematical clarity and insight in the solution of technical problems.

COURSE CONTENTS

1 QUADRATIC EQUATIONS 6 Hrs

1.1 StandardForm
1.2 Solution
1.3 Nature of roots
1.4 Sum &Productof roots
1 .5 Formation
1.6 Problems

2 ARITHMETIC PROGRESSION AND SERIES 3Hrs

2.1 Sequence
2.2 Series
2.3 nth term
2.4 Sum of the first n terms
2.5 Means
2.6 Problems

3 GEOMETRIC PROGRESSION AND SERIES 3Hrs

3.1 nth term
3:2 sum of the first n terms
3.3 Means
3.4 Infinite Geometric progression
3.5 Problems

4 BINOMIAL THEOREM 6 Hrs

4.1 Factorials
4.2 Binomial Expression
4.3 Binomial Co-efficient
4.4 Statement
4.5 The General Term
4.6 The Binomial Series.
4.7 Problems

5 PARTIAL FRACTIONS 6 Hrs

5.1 Introduction
5.2 Linear Distinct Factors Case I
5.3 Linear Repeated FactorsCase II
5.4 Quadratic Distinct Factors Case III
5.5 Quadratic Repeated Factors Case IV

5.6 Problems

6 FUNDAMENTALS OF TRIGONOMETRY 6 Hrs

6.1 Angles
6.2 Quadrants
6.3 Measurements of Angles
6.4 Relation between Sexagesimal& circular system
6.5 Relation between Length of a Circular Arc & the Radian Measure of its centralAngle
6.6 Problems

7 TRIGONOMETRIC FUNCTIONS AND RATIOS 6 Hrs

7.1 trigonometric functions of any angle
7.2 Signs of trigonometric Functions
7.3 Trigonometric Ratios of particular Angles
7.4 Fundamental Identities
7.5 Problems

8 GENERAL INDENTITIES 6 Hrs

8.1 The Fundamental Law
8.2 Deductions
8.3 Sum & Difference Formulae
8.4 Double Angle Identities
8.5 Half Angle Identities
8.6 Conversion of sum or difference to products
8.7 Problems

9 SOLUTION OF TRIANGLES 6 Hrs

9.1 The law of Sines
9.2 The law of Cosines
9.3 Measurement of Heights & Distances
9.4 Problems

10 MENSURATION OF SOLIDS 30 Hrs

10.1 Review of regular plane figures and Simpson's Rule
10.2 Prisms
10.3 Cylinders
10.4 Pyramids
10.5 Cones
10.6 Frusta
10.7 Spheres

11 VECTORS 9 Hrs

11.1 Sealers & Vectors
11.2 Addition & Subtraction
11.3 The unit Vectors I, j, k
11.4 Direction Cosines
11.5 Sealer or Dot Product
11.6 Deductions
11.7 Dot product in terms of orthogonal components
11.8 Deductions
11.9 Analytic Expression for a x b.
11.10 Problems.

12 MATRICES AND DETERMINANTS 9 Hrs

12.1 Definition of Matrix
12.2 Rows & Columns
12.3 Order of a Matrix
12.4 Algebra of Matrices
12.5 Determinants
12.6 Properties of Determinants
12.7 Solution of Linear Equations
12.8 Problems

REFERENCE BOOKS

Applied Mathematics: Math-123, Developed by Nasir -ud-Din Mahmood, Sana-ullah Khan, Tahir Hameed, Evaluated by Syed Tanvir Haider, Javed Iqbal, Vol - I, National Book Foundation

Math-113 APPLIED MATHEMATICS-I

INSTRUCTIONAL OBJECTIVES

1 USE DIFFERENT METHODS FOR THE SOLUTION OF QUADRATIC EQUATIONS

1.1 Define a standard quadratic equation.
1.2 Use methods of factorization and method of completing the square for solvingthe equations.
1.3 Derive quadratic formula.
1.4 Write expression for the discriminant
1.5 Explain nature of the roots of a quadratic equation.
1.6 Calculate sum and product of the roots.
1.7 Form a quadratic equation from the given roots.
1.8 Solve problems involving quadratic equations.

2 UNDERSTAND APPLY CONCEPT OF ARITHMETIC PROGRESSION AND SERIES

2.1 Define an Arithmetic sequence and a series
2.2 Derive formula for the nth term of an A.P.
2.3 Explain Arithmetic Mean between two given numbers
2.4 Insert n Arithmetic means between two numbers
2.5 Derive formulas for summation of an Arithmetic series
2.6 Solve problems on Arithmetic Progression and Series

3 UNDERSTAND GEOMETRIC PROGRESSION AND SERIES

3.1 Define a geometric sequence and a series.
3.2 Derive formula for nth term of a G.P.
3.3 Explain geometric mean between two numbers.
3.4 Insert n geometric means between two numbers.
3.5 Derive a formula for the summation of geometric Series.
3.6 Deduce a formula for the summation of an infinite G.P.
3.7 Solve problems using these formulas.

4 EXPAND AND EXTRACT ROOTS OF A BINOMIAL

4.1 State binomial theorem for positive integral index.
4.2 Explain binomial coefficients: (n,0), (n,1)……..(n,r),…….(n,n)
4.3 Derive expression for the general term.
4.4 Calculate the specified terms.
4.5 Expand a binomial of a given index. -
4.6 Extract the specified roots
4.7 Compute the approximate value to a given decimal place.
4.8 Solve problems involving binomials.

5 RESOLVE A SINGLE FRACTIONINTO PARTIALFRACTIONS USINGDIFFERENT METHODS.

5.1 Define a partial fraction, a proper and an improper fraction.
5.2 Explain all the four types of partial fractions.
5.3 Set up equivalent partial fractions for each type.
5.4 Explain the methods for finding constants involved.
5.5 Resolve a single fraction into partial fractions.
5.6 Solve problems involving all the four types.

6 UNDERSTAND SYSTEMS OF MEASUREMENT OF ANGLES.

6.1 Define angles and the related terms.
6.2 Illustrate the generation of angle.

6.3 Explain sexagesimal and circular systems for the measurement of angles
6.4 Derive the relationship between radian and degree.
6.5 Convert radians to degrees and vice versa.
6.6 Derive a formula for the circular measure of a central angle.
6.7 Use this formula for solving problems.

7 APPLY BASIC CONCEPTS AND PRINCIPLES OF TRIGONOMETRICFUNCTIONS

7.1 Define the basic trigonometric functions/ratios of an angle as ratios of the sidesof a right triangle.
7.2 Derive fundamental identities.
7.3 Find trigonometric ratios of particular angles.
7.4 Draw the graph of trigonometric functions.
7.5 Solve problems involving trigonometric functions.

8 USE TRIGONOMETRIC IDENTITIES IN SOLVING TECHNOLOGICALPROBLEMS

8.1 List fundamental identities
8.2 Prove the fundamental law
8.3 Deduce important results
8.4 Derive-sum and difference formulas
8.5 Establish half angle, double angle & triple angle formulas
8.6 Convert sum or difference into product& vice versa
8.7 Solve problems

9 USE CONCEPTS, PROPERTIES AND LAWS OF TRIGONOMETRIC FUNCTIONS FOR SOLVING TRIANGLES

9.1 Define angle of elevation and angle of depression.
9.2 Prove the law of sins and the law of cosines.
9.3 Explain elements of a triangle.
9.4 Solve triangles and the problems involving heights and distances.

10 USE PRINCIPLES OF MENSTRUATION IN FINDING SURFACES, VOLUMEAND WEIGHTS OF SOLIDS.

10.1 Define menstruation of plane and solid figures
10.2 List formulas for perimeters & areas of plane figure.
10.3 Define pyramid and cone.
10.4 Define frusta of pyramid and cone.
10.5 Define a sphere and a shell.
10.6 Calculate the total surface and volume of each type of solid.
10.7 Compute weight of solids.
10.8 Solve problems of these solids.

11. USE THE CONCEPT AND PRINCIPLES OF VECTORS IN SOLVINGTECHNOLOGICAL PROBLEMS.

11.1 Define vector quantity.
11.2 Explain addition and subtraction of vector
11.3 Illustrate unit vectors I, j, k.
11.4 Express a vector in the component form.
11.5 Explain magnitude, unit vector, directionconsines of a vector.
11.6 Derive analytic expression for dot product and cross product of two vector.
11.7 Deduce conditions of perpendicularly and parallelism of two vectors.
11.8 Solve problems

12. USE THE CONCEPT OFMATRICES & DETERMINANTS IN SOLVING TECHNOLOGICAL PROBLEMS

12.1 Define a matrix and a determinant.
12.2 List types of matrices.
12.3 Define transpose, ad joint and inverse of a matrix.
12.4 State properties of determinants.
12.5 Explain basic concepts.
12.6 Explain algebra of matrices.
12.7 Solve linear equation by matrices.
12.8 Explain the solution of a determinant.
12.9 Use Crammers Rule for solving linear equations

Phy-122 APPLIED PHYSICS

Total Contact Hours

Theory	32	**T**	**P**	**C**
Practical	96	1	3	2

AIMS: The students will be able to understand the fundamental principles and concept of physics, use these to solve problems in practical situations/technical courses and understand concepts to learn advance physics/technical courses,

COURSE CONTENTS

1 MEASUREMENTS. 2 Hrs

1.1 Fundamental units and derived units
1.2 Systems of measurement and S.I. units
1.3 Concept of dimensions, dimensional formula
1.4 Conversion from one system to another
1.5 Significant figures

2. SCALARS AND VECTORS. 4 Hrs

2.1 Revision of head to tail rule
2.2 Laws of parallelogram, triangle and polygon of forces
2.3 Resolution of a vector
2.4 Addition of vectors by rectangular components
2.5 Multiplication of two vectors, dot product and cross product

3. MOTION 4 Hours

3.1 Review of laws and equations of motion
3.2 Law of conservation of momentum
3.3 Angular motion
3.4 Relation between linear and angular motion
3.5 Centripetal acceleration and force
3.6 Equations of angular motion

4. TORQUE, EQUILIBRIUM AND ROTATIONAL INERTIA

4.1 Torque
4.2 Centre of gravity and centre of mass
4.3 Equilibrium and its conditions
4.4 Torque and angular acceleration
4.5 Rotational inertia

5. WAVE MOTION 5 Hrs

5.1 Review Hooke's law of elasticity,
5.2 Motion under an elastic restoring force.
5.3 Characteristics of simple harmonic motion
5.4 S.H.M. and circular motion
5.5 Simple pendulum
5.6 Wave form of S.H.M.
5.7 Resonance
5.8 Transverse vibration of a stretched string

6. SOUND 5 Hrs

6.1 Longitudinal waves

6.2 Intensity, loudness, pitch and quality of sound
6.3 Units of Intensity of level and frequency response of ear
6.4 Interference of sound waves silence zones, beats
6.5 Acoustics
6.6 Doppler effect

7. LIGHT **5 Hrs**

7.1 Review laws of reflection and refraction
7.2 Image formation by mirrors and lenses
7.3 Optical instruments
7.4 Wave theory of light
7.5 Interference, diffraction, polarization of light waves
7.6 Applications of polarization in sunglasses, optical activity and stress analysis

8. OPTICAL FIBER **2 Hrs**

8.1 Optical communication and problems
8.2. Review total internal reflection and critical angle
8.3 Structure of optical fiber
8.4 Fiber material and manufacture
8.5 Optical fiber - uses.

9. LASERS **3 Hrs**

9.1 Corpuscular theory of light
9.2 Emission and absorption of light
9.3 Stimulated absorption and emission of light
9.4 Laser principle
9.5 Structure and working of lasers
9.6 Types of lasers with brief description.
9.7 Applications (basic concepts)
9.8 Material processing
9.9 Laser welding
9.10 Laser assisted machining
9.11 Micro machining
9.12 Drilling scribing and marking
9.13 Printing
9.14 Lasers in medicine

RECOMMENDED BOOKS

Applied Physics by Mr. Khalid Mehmood, Asif Ali, Zafar Tarar, Vol-I, Published by National Book Foundation

Phy-122 APPLIED PHYSICS

INSTRUCTIONAL OBJECTIVES

1 USE CONCEPTS OF MEASUREMENT TO PRACTICAL SITUATIONS AND TECHNOLOGICAL PROBLEMS

1. 1 Write dimensional formulae for physical quantities
1.2 Derive units using dimensional equations
1.3 Convert a measurement from one system to another
1.4 Use concepts of measurement and significant figures in problem solving.

2 USE CONCEPTS OF SCALARS AND VECTORS IN SOLVING PROBLEMS INVOLVING THESE CONCEPTS

2.1 Explain laws of parallelogram, triangle and polygon offorces
2.2 Describe method of resolution of a vector into components
2.3 Describe method of addition of vectors by rectangular components
2.4 Differentiate between dot product and cross product of vectors
2.5 Use the concepts in solving problems involving addition resolution and multiplication of vectors

3 USE THE LAW OF CONSERVATION OF MOMENTUM AND CONCEPTS OF ANGULAR MOTION TO PRACTICAL SITUATIONS

3.1 Use law of conservation' of momentum to practical/technological problems
3.2 Explain relation between linear and angular motion
3.3 Use concepts and equations of angular motion to solve relevant technological problems

4 USE CONCEPTS OF TORQUE, EQUILIBRIUM AND ROTATIONAL INERTIA TO PRACTICAL SITUATION/PROBLEMS

4.1 Explain Torque
4.2 Distinguish between Centre of gravity and centre of mass
4.3 Explain rotational Equilibrium, and its conditions
4.4 Explain. Rotational Inertia giving examples
4.5 Use the above concepts in solving technological problems.

5 USE CONCEPTS OR WAVE MOTION IN SOLVING RELEVANT PROBLEMS

5.1 Explain Hooke's Law of Elasticity
5.2 Derive formula for Motion under an elastic restoring force
5.3 Derive formulae for simple harmonic motion and simple pendulum
5.4 Explain wave form with reference to S.H.M. and circular motion
5.5 Explain Resonance
5.6 Explain Transverse vibration of a stretched 'string
5.7 Use the above concepts and formulae of S.H.M. to solve relevant problems.

6 UNDERSTAND concepts OF SOUND

6.1 Describe longitudinal wave and its propagation
6.2 Explain the concepts: Intensity, loudness, pitch and quality of sound
6.3 Explain units of Intensity of level and frequency response of ear
6.4 Explain phenomena of silence zones, beats
6.5 Explain Acoustics of buildings.
6.6 Explain Doppler Effect giving mathematical expressions.

7 USE THE CONCEPTS OF GEOMETRICAL OPTICS TO MIRRORS AND LENSES

7.1 Explain laws of reflection and refraction

7.2 Use mirror formula to solve problems

7.3 Use the concepts of image formation by mirrors and lenses to describe working of optical instruments, e.g. microscopes, telescopes, camera and sextant.

8 UNDERSTAND WAVE THEORY OF LIGHT

8.1 Explain wave theory of light

8.2 Explain phenomena of interference, diffraction, polarization of light waves

8.3 Describe uses of polarization given in the course contents.

9 UNDERSTAND THE STRUCTURE, WORKING AND USES OF OPTICAL FIBER

9.1 Explain the structure of the Optical Fiber

9.2 Explain its principle of working

9.3 Describe use of optical fiber in industry and medicine.

Phy-122 APPLIED PHYSICS

LIST OF PRACTICALS

1. Draw graphs representing the functions:

a) $y=mx$ for $m=0, 0.5, 1, 2$

b) $y=x^2$

c) $y = l/x$

2. Find the volume of a given solid cylinder using vernier calipers.
3. Find the area of cross-section of the given wire using micrometer screw gauge.
4. Prove that force is directly proportional to (a) mass, (b) acceleration, using fletchers trolley
5. Verify law of parallelogram of forces using Grave-sands apparatus.
6. Verify law of triangle of forces and Lami's theorem
7. Determine the weight of a given body using
   a) Law of parallelogram of forces
   b) Law of triangle of forces
   c) Lami's theorem
8. Verify law of polygon of forces using Grave-sands apparatus.
9. Locate the position and magnitude of resultant of like parallel forces.
10. Determine the resultant of two unlike parallel forces.

II. Find the weight of a given body using principle ofmoments.

12. Locate the centre of gravity of regular and irregular shaped bodies.
13. Find Young's Modules of Elasticity of a metallic wire.
14. Verify Hooke's Law using helical spring.
15. Study of frequency of stretched string with length.
16. Study of variation of frequency of stretched string with tension.
17. Study resonance of air columnin resonance tube and find velocity of sound.
18. Find the frequency of the given tuning fork using resonance tube.
19. Find velocity of sound in rod by Kundt's tube
20, Verify rectilinear propagation of light and study shadow formation.
21. Study effect of rotation of plane mirror on reflection.
22. Compare the refractive indices of given glass slabs.
23. Find focal length of concave mirror by locating centre of curvature.
24. Find focal length of concave mirror by object and image method
25. Find focal length of concave mirror with converging lens.
26. Find refractive index of glass by apparent depth.
27. Find refractive index of glass by spectrometer.
28. Find focal length of converging lens by plane mirror.
29. Find focal length of converging lens by displacement method.
30. Find focal length of diverging lens using converging lens.
31. Find focal length of diverging lens using concave mirror.
32. Find angular magnification of an astronomical telescope.
33. Find angular magnification of a simple microscope (Magnifying Glass)
34. Find angular magnification of a compound microscope.
35. Study working and structure of camera.
36. Study working and structure of sextant.
37. Compare the different scales of temperature and verify the conversion formula.
38. Determine the specific heat of lead shots.
39. Find the coefficient of linear expansion of a metallic rod.
40. Find the heat of fusion of ice.
41. Find the heat of vaporization.
42. Determine relative humidity using hygrometer:

Ch-112 APPLIED CHEMISTRY

T	P	C
1	3	2

Total Contact Hours

Theory **32**

Practical **96**

Pre-requisite: The student must have studied the subject of elective chemistry at Secondary, school level.

AIMSAfter studying this course a student will be able to;

1. Understand the significance and role of chemistry in the development of modern technology.
2. Become acquainted with the basic principles of chemistry as applied in the study of relevant Technology.
3. Know the scientific methods for production, properties and use of materials of industrial & .technological significance.
4. Gains skill for the efficient conduct of practical's in a Chemistry lab.

COURSE CONTENTS

1 INTRODUCTION AND FUNDAMENTAL CONCEPTS 2 Hrs

1.1 Orientation with reference to this technology

1.2 Terms used & units of measurements in the study of chemistry

1.3 Chemical Reactions & their types

2 ATOMIC STRUCTURE 2 Hrs

2.1 Sub-atomic particles

2.2 Architecture of atoms of elements, Atomic No. & Atomic Weight

2.3 The periodic classification of elements periodic law

2.4 General characteristics of a period and group

3 CHEMICAL BOND 2 Hrs

3.1 Nature of chemical Bond

3.2 Electrovalent bond with examples

3.3 Covalent Bond (Polar and Non-polar, sigma & Pi Bonds with examples

3.4 Co-ordinate Bond with examples

4 WATER 2 Hrs

4.1 Chemical nature and properties.

4.2 Impurities

4.3 Hardness of water (types, causes & removal)

4.4 Scales of measuring hardness (Degrees Clark

4.5 Boiler feed water, scales & treatment

4.6 Sea-water desalination, sewage treatment

5 ACIDS, BASES AND SALTS 2 Hrs

5.1 Definitions with examples

5.2 Properties, their strength, basicity & Acidity

5.3 Salts and their classification with examples

5.4 pH-value and scale

6 OXIDATION & REDUCTION 2 Hrs

6.1 The process, definition& examples

6.2 Oxidizing and reducing agents

6.3 Oxides and their classifications

7 NUCLEAR CHEMISTRY 2 Hrs

7.1 Introduction
7.2 Radioactivity (alpha, beta and gamma rays)
7.3 Half life process
7.4 Nuclear reaction & transformation of elements

8 CEMENT 2 Hrs

8.1 Introduction
8.2 Composition and manufacture
8.3 Chemistry of setting and hardening
8.4 Special purpose cements

9 GLASS 2 Hrs

9.1 Composition and raw material
9.2 Manufacture
9.3 Varieties and uses

10 PLASTICS AND POLYMERS 2 Hrs

10.1 Introduction and importance
10.2 Classification
10.3 Manufacture
10.4 Properties and uses

11 PAINTS, VARNISHES AND DISTEMPER 2 Hrs

11.1 Introduction
11.2 Constituents
11.3 Preparation and uses

12 CORROSION 2 Hrs

12.1 Introduction with causes
12.2 Types of corrosion
12.3 Rusting of iron
12.4 Protective measures against-corrosion

13 REFRACTORY MATERIALS AND ABRASIVE 2 Hrs

13.1 Introduction to Refractories
13.2 Classification of Refractories
13.3 Properties and Uses
13.4 Introduction to Abrasives
13.5 Artificial and Natural Abrasives and their uses

14 ALLOYS 2 Hrs

14.1 Introduction with need
14.2 Preparation and Properties
14.3 Some Important alloys and their composition
14.4 Uses

15 FUELS AND COMBUSTION 2 Hrs

15.1 Introduction of fuels

15.2 Classification of fuels
15.3 Combustion
15.4 Numerical Problems of Combustion

16 LUBRICANTS 1 Hr

16.1 Introduction.
16.2 Classification.
16.3 Properties of lubricants.
16.4 Selection of lubricants:

17 POLLUTION 1 Hr

17.1 The problem and its dangers.
17.2 Causes of pollution.
17.3 Remedies to combat the hazards of pollution.

BOOKS RECOMMENDED

Applied Chemistry-112 Vol-I, Published by National Book Foundation

Ch-112 APPLIED CHEMISTRY

INSTRUCTIONAL OBJECTIVES

1 UNDERSTAND THE SCOPE, SIGNIFICANCE AND FUNDAMENTAL ROLE OF THE SUBJECT

1.1 Define chemistry and its important terms
1.2 State the units of measurements in the study of chemistry
1.3 Write chemical formula of common compounds
1.4 Describe types of chemical reactions with examples

2 UNDERSTAND THE STRUCTURE OF ATOMS AND ARRANGEMENT OF SUB ATOMIC PARTICLES IN THE ARCHITECTURE OF ATOMS

2.1 Define atom.
2.2 State the periodic law of elements.
2.3 Describe the fundamental sub atomic particles
2.4 Distinguish between atomic ho. and mass no.; isotopes and isobars
2.5 Explain the arrangements of electrons in different shells and sub energy levels
2.6 Explain the grouping and placing of ^elements' in the periodic table

3 UNDERSTAND THE NATURE OF CHEMICAL LBOUND

3.1 Define chemical bond
3.2 Describe the nature of chemical bond
3.3 Differentiate .between electrovalent an^ covalent bonding
3.4 Explain the formation of polar and non polar, sigma and pi-bond with examples
3.5 Describe the nature of coordinate bond with examples

4 UNDERSTAND THE CHEMICAL NATURE OF WATER

4.1 Describe the chemical nature of water with its formula
4.2 Describe the general impurities present in water
4.3 Explain the causes and methods to removing hardness of water
4.4 Express hardness .in different units like mg/Iiter, p.p.m, degrees Clark and degrees French
4.5 Describe the formation and nature of scales in boiler feed water
4.6 Explain the method for the treatment of scales
4.7 Explain the sewage treatment and desalination of sea water

5 UNDERSTAND THE NATURE OF ACIDS, BASES AND SALTS

5.1 Define acids, bases and salts with examples
5.2 State general properties of acids and bases
5.3 Differentiate between acidity and basicity and use the related terms
5.4 Define salts, state their classification with examples
5.5 Explain p-H value of solution and pH scale

6 UNDERSTAND THE PROCESS OF OXIDATION AND REDUCTION

6.1 Define oxidation
6.2 Explain the oxidation process with examples
6.3 Define reduction
6.4 Explain reduction process with examples
6.5 Define oxidizing and reducing-agents and give it least six examples of each
6.6 Define oxides
6.7 Classify the oxides and give example

7 UNDERSTAND THE FUNDAMENTALS OF NUCLEAR CHEMISTRY

7.1 Define nuclear chemistry and radio activity

7.2 Differentiate between alphas, Beta and Gamma particles
7.3 Explain hall-life process
7.4 Explain at least six nuclei reactions resulting in the transformation of some elements
7.5" State important uses of isotopes

8 UNDERSTAND THE MANUFACTURE, SETTING AND HARDENING CEMENT

8.1 Define port land cement and give its composition
8.2 Describe the method of manufacture
8.3 Describe the chemistry of setting and hardening of cement
8.4 Distinguish between ordinary and special purpose cement

9 UNDERSTAND THE PROCESS OF MANUFACTURE OF GLASS.

9.1 Define glass
9.2 Describe its composition and raw materials
9.3 Describe the manufacture of glass
9.4 explain its varieties and uses

10 UNDERSTAND THE NATURE AND IMPORTANCE OF PLASTICS POLYMERS

10.1. Define plastics and polymers
10.2 Explain the mechanism of polymerization
10.3 Describe the preparation and uses of some plastics/polymers

11 KNOW THE.CHEMISTRY OF PAINTS, VARNISHES AND DISTEMPERS

11.1 Define paints, varnishes and distemper
11.2 State composition of each
11.3 State methods of preparation of each and their uses

12 UNDERSTAND THE PROCESS OF CORROSION WITH ITS CAUSES AND TYPES

12.1 Define corrosion
12.2 Describe different types of corrosion
12.3 State the causes of corrosion
12.4 Explain the process of rusting of iron
J2.5 Describe methods to prevent/control corrosion

13 UNDERSTAND THE NATURE OF REFRACTORY MATERIALS AND ABRASIVE

13.1 Define refractory materials
13.2 Classify refractory materials
13.3 Describe properties and uses of refractories
13.4 Define abrasive.
13.5 Classify natural and artificial abrasives
13.6 Describe uses of abrasives

14 UNDERSTAND THE NATURE AND IMPORTANCE OF ALLOYS

14.1 Define alloy
14.2 Describe different methods for the preparation of alloys
14.3 Describe important properties of alloys
14 4 Enlist some important alloys with their composition, properties and uses

15 UNDERSTAND THE NATURE OF FUELS AND THEIR COMBUSTION

15.1 Define fuels
15.2 Classify fuels and make distinction of solid, liquid & gaseous fuels

15.3 Describe important Fuels
15.4 Explain combustion
15.5 Calculate air quantities in combustion, gases

16 UNDERSTAND THE NATURE OF LUBRICANTS.

16.1 Define a lubricant
16.2 Explain the uses of lubricants
16.3 Classify lubricants and cite examples
16.4 State important properties of oils, greases and solid lubricants
16.5 State the criteria for the selection of lubricant tor, particular purpose/job

17 UNDERSTAND THENATURE OF POLLUTION

17.1 Define Pollution (air. water, food)
17.2 Describe the causes of environmental pollution.
17.3 Enlist some common pollutants.
17.4 Explain methods to prevent pollution

CH-112 APPLIED CHEMISTRY 96 Hours

1. To introduce the common apparatus, glassware and chemical reagents used in the chemistry lab.
2. To purify a chemical substance by crystallization.
3. To separate a mixture of sand and salt.
4. To find the melting point of substance.
5. To find the pH of a solution with pH paper.
6. To separate a mixture of inks by chromatography.
7. To determine the co-efficient of viscosity of benzene with the help of Ostwald vasomotor.
8. To find the surface tension of a liquid with a stalagmometer.
9. To perform electrolysis of water to produce Hydrogen and Oxygen.
10. To determine the chemical equivalent of copper by electrolysis of Cu SO.
11. To get introduction with the scheme of analysis of salts for basic radicals.
12. To analyse 1st group radicals (Ag^{+} - Pb^{++} - Hg^{+}).
13. To make practice for detection 1st group radicals.
14. To get introduction with the scheme of II group radicals.
15. To detect and confirm II-A radicals (hg^{++}, Pb^{++++}, Cu^{+}, Cd^{++}, Bi^{+++}).
16. To detect and confirm II-B radicals Sn^{+++}, Sb^{+++}, As^{+++}).
17. To get introduction with the scheme of III group radicals (Fe^{+++} - Al^{+++}, Cr^{+++})
18. To detect and confirm Fe^{+++}, Al^{+++} and Cr^{+++}.
19. To get introduction with he scheme of IV group radicals.
20. To detect and confirm An^{++} and Mn^{++} radicals of IV group.
21. To detect and conform Co^{++} and Ni^{++} radicals of IV group.
22. To get introduction with the Acid Radical Scheme.
23. To detect dilute acid group.
24. To detect and confirm CO''_3 and HCO'_3 radicals.
25. To get introduction with the methods/apparatus of conducting volumetric estimations.
26. To prepare standard solution of a substance.
27. To find the strength of a given alkali solution.
28. To estimate HCO'_3 contents in water.
29. To find out the %age composition of a mixture solution of KNO_3 and KOH volumetrically.
30. To find the amount of chloride ions (Cl') in water volumetrically.

COMP-142 COMPUTER APPLICATIONS

Total Contact Hours	T	P	C
Theory: 32 Hrs	1	3	2
Practical: 96 Hrs			

Pre-requisites: None

AIMS: This subject will enable the student to be familiar with the fundamental concepts of Computer Science. He will also learn MS-Windows, MS-Office, and Internet to elementary level.

Course Contents:

1. ELECTRONIC DATA PROCESSING (E.D.P.) 6 Hrs

1.1 Basic Terms of Computer Science Data & its, types, Information, Hardware, Software
1.2 Computer & its types
1.3 Block diagram of a computer system
1.4 BIT, Byte, RAM & ROM
1.5 Input &Output devices
1.6 Secondary storage devices
1.7 Types of Software
1.8 Programming Languages
1.9 Applications of computer in different fields
1.10 Application in Engineering, Education & Business

2,MS-WINDOWS 2 Hrs

2.1 Introduction to Windows
2.2 Loading & Shut down process
2.3 Introduction to Desktop items (Creation of Icons, Shortcut, Folder & modify Taskbar)
2.4 Desktop properties
2.5 Use of Control Panel
2.6 Searching a document

3.MS-OFFICE (MS-WORD) 8 Hrs

3.1 Introduction to MS-Office
3.2 Introduction to MS-Word & its Screen
3.3 Create a new document
3.4 Editing & formatting the text
3.5 Saving & Opening a document
3.6 Page setup (Set the Margins & Paper)
3.7 Spell Check & Grammar
3.8 Paragraph Alignment
3.9 Inserting Page numbers, Symbols, Text box & Picture in the document
3.10 Use the different Format menu drop down commands(Drop Cap, Change Case, Bullet & Numbering and Border & Shading)
3.11 Insert the 'Table and it's Editing
3.12 Printing the document
3.13 Saving a document file as PDF format

4.MS-OFFICE (MS-EXCEL) 9 Hrs

4.1 Introduction to MS-Excel & its Screen
4.2 Entering data & apply formulas in worksheet
4.3 Editing & Formatting the Cells, Row & Colum

4.4 Insert Graphs in sheet
4.5 Page setup, Print Preview & Printing
4.6 Types & Categories of Charts

5. MS. OFFICE (MS-POWER POINT) 4 Hrs

5.1 Introduction to MS-Power point
5.2 Creating a, presentation
5.3 Editing & formatting a text box
5.4 Adding pictures & colors to a slide
5.5 Making slide shows
5.6 Slide Transition

6.INTERNET & E-MAIL 3Hrs

6.1 Introduction to Internet & browser window
6.2 Searching, Saving and Print a page from internet
6.3 Creating, Reading & Sending E-Mail
6.4 Explain some advance features over the internet and search engines

COMP-142 COMPUTER APPLICATIONS

Instructional Objectives:

1. UNDERSTAND ELECTRONIC DATA PROCESSING (E.D.P)

1.1. Describe Basic Terms of Computer Science.Data& its Types, Information, Hardware, Software
1.2. Explain Computer & its types
1.3. Explain Block diagram of a computer system
1.4. State the terms such as BIT, Byte, RAM & ROM
1.5. Identify Input & Output devices
1.6. Describe Secondary Storage devices
1.7. Explain Types of Software
1.8. Introduction to Programming Language
1.9. Explain Applications of computer in different fields
1.10. Application in Engineering, Education & Business

2. UNDERSTAND MS-WINDOWS

2.1 Explain Introduction to Windows
2.2 Describe Loading & Shut down process
2.3 Explain Introduction to Desktop items(Creation of Icons, Shortcut, Folder & modify Taskbar)
2.4 Explain Desktop properties
2.5 Describe Use' of Control Panel (add/remove program, time & date, mouse and create user account)
2.6 Explain the method of searching a document

3. UNDERSTAND MS-OFFICE (MS-WORD)

3.1 Explain Introduction to MS-Office
3.2 Describe -Introduction to MS-Word & its Screen
3.3 Describe create a new document
3.4 Explain Editing & formatting the text
3.5 Describe saving & Opening a document
3.6 Explain Page setup, (Set the Margins & Paper)
3.7 Describe Spell Check & Grammar
3.8 Explain Paragraph Alignment
3.9 Explain Inserting Page numbers, Symbols, Text box & Picture in the document
3.10 Describe Use the different Format menu drop down commands(Drop Cap, Change Case, Bullet &Numbering and Border & Shading)
3.11 Explain Insert the Table and its Editing and modifying
3.12 Describe printing the document
3.13 Describe the method of file saving as a PDF Format

4. UNDERSTAND MS-OFFICE (MS-EXCEL)

4.1 Explain Introduction to MS-Excel & its Screen
4.2 Describe Entering data & apply formulas in worksheet
4.3 Describe Editing &Formatting the, Cells, Row & Column
4.4 Explain Insert Graphs in sheet
4.5 Describe Page setup, Print preview & Printing
4.6 Explain in details formulas for sum, subtract, multiply, divide, average
4.7 Explain in details the types of charts e.g pie chart, bar chart

5. UNDERSTAND MS-OFFICE (MS-POWER POINT)

5.1 Describe Introduction to MS-Power point
5.2 Explain creating a presentation

5.3 Describe Editing & formatting a text box
5.4 Explain Adding pictures & colors to a slide
5.5 Describe Making slide shows
5.6 Explain Slide Transitions

6. UNDERSTAND INTERNET &E-MAIL

6.1 Explain Introduction to Internet and browser window
6.2 Explain Searching, Saving and Print a page from internet
6.3 Describe Creating, Reading & Sending E-Mail and attachments
6.4 Explain some advance features over the internet and how to search topics on different search engines

Recommended Textbooks:

1. **Bible Microsoft Office 2007 by John Walkenbach**
2. **Bible Microsoft Excel 2007 by John Walkenbach**
3. **Bible Microsoft PowerPoint 2007 by John Walkenbach**

COMP-142 **COMPUTER APPLICATIONS** **96 Hours**

List of Practical:

Identify key board, mouse, CPU, disk drives, disks, monitor, and printer and **3 Hrs**

MS WINDOWS XP **12 Hrs**

1.1 Practice of loading and shutdown of operating system
1.2 Creating items (icons, shortcut, folders etc) and modifying taskbar
1.3 Changing of wallpaper, screensaver, and resolution
1.4 Practice of control panel items (add/remove, time and date,mouse, and create user account)

MS OFFICE (MS-WORD) **27 Hrs**

1.5 Identifying the MS Word Screen and its menu
1.6 Practice of create a new document, saving and re-opening it fromthe location and spell check & grammar
1.7 Practice of Page Formatting (Borders, Character Spacing, Paragraph,Bullets& Numberings and Fonts)
1.8 Practice of different tool bars like standard, format& drawing tool bars
1.9 Practice of Insert pictures, clipart, and shapes
1.10 Practice of header and footer
1.11 Practice of insert table and also format of table
1.12 Practice of page setup, set the page margins, and printing documents

MS OFFICE (MS-EXCEL) **27 Hrs**

1.13 Identifying the MS EXCEL Screen and its menu
1.14 Practice of create a new sheet, saving and re-opening it from thelocation and spell check
1.15 Practice of insert and delete of row and columns (format of cell)
1.16 Practice of entering data and formulas in worksheet(Add, Subtract, Multiplying, and Divide & Average)
1.17 Repeating practical serial number04
1.18 Practice of insert chart and its types
1.19 Practice of page setup, set the page margins, and printing

MS OFFICE (MS-POWER POINT) **15 Hrs**

1.20 Identifying the MS POWER POINT Screen and its menu
1.21 Practice of create a new presentation and save
1.22 Practice of open saves presentations
1.23 Practice of inset picture and videos

INTERNET & E-MAIL **12 Hrs**

1.24 Identifying internet explorer
1.25 Practice of searching data from any search engine
1.26 Practice of create an E-Mail account and how to send and receivemails, download attachments

LT-114 Principles of Leather Manufacturing-I

Total Contact Hours

Theory	64	**T**	**P**	**C**
Practical	192	2	6	4

COURSE CONTENTS

1. GENERAL INTRODUCTION TO LEATHER MANUFACTURE **6Hrs**

1.1 Leather & its Uses

1.2 History of Leather Manufacture

1.3 Leather Industry in Pakistan

1.4 Flow Chart Operation & Processes in Chrome Leather Manufacture

1.5 Flow Chart Operation & Processes in Vegetable Leather Manufacture

2. RAW HIDES & SKINS **6Hrs**

2.1 Importance of Animal Skin for Living Body

2.2 Definitions, Sources & Uses of Hides & Skin

2.3 Pre-slaughter & Post Mortem Defects in Animal Hides

3. GENERAL STRUCTURE OF ANIMAL HIDE & SKIN **7Hrs**

1.10 Epidermal System

1.11 True Skin

1.12 Adipose Tissues

1.13 Cross-section of Animal Skin (Labeled Diagram)

1.14 Non-fibrous Proteins

1.15 Chemical Composition of Animal Skin

4. CURING OF HIDES & SKINS **7Hrs**

4.1 Objectives & Principles of Curing

4.2 Methods of Curing

- Drying
  - Wet Salting
  - Dry Salting
  - Brine Curing

4.3 Curing by Chilling

4.4 Curing Defects

5. PRINCIPLES & PRACTICE OF BEAM HOUSE PROCESSES **7Hrs**

5.1 Soaking

- Objectives of Soaking
- Soaking of Dry Cured Hides & Skins
- Soaking of Wet-salted Hides & Skins
- Different Types of Soaking Vessels
- Use of Antiseptic during Soaking

5.2 Depilation

- Objectives
- Theory of Hair Destruction by Alkalis & Sulfides
- Hair Loosening by Bacterial Action & Enzymes
- Oxidation Un-hairing
- Depilation by Amines
- Depilation by Hair Saving Processes

5.3 Liming

- Objectives & pH
- The Liming Action upon Various Skin Components
- Effects of Liming on Leather Properties
- Practical Consideration during Liming
- Straight & Sharpened Liming
- Counter Current System of Liming
- Drum Liming

5.4 Fleshing & Pelt Weight

6. PRINCIPLES & MECHANISM OF DELIMING & BATING **5Hrs**

1.1 Deliming

- Functions
- Deliming Materials & their Chemical Reactions

1.2 Bating

- Objectives of Bating.
- Characteristics of Bating Enzymes
- Action of Bating on Skin Components
- Factors Influencing the Efficiency of Bating
- Effect of Bating on the Properties of Leather

6.3 Scud & its Removal

7. DEGREASING **5Hrs**

7.1 Reasons for Degreasing

7.2 Aqueous Degreasing

7.3 Solvent Degreasing

7.4 Factors Influencing Efficiency of Bating

8. PRINCIPLES & MECHANISM OF PICKLING **5Hrs**

8.1 Objectives of Pickling
8.2 Pickling Chemicals
8.3 Pickling pH
8.4 Acid Uptake & Rate of Pickling
8.5 Acid Swelling & Negative Swelling
8.6 Pickling Techniques

8.7 Buffered Pickle
8.8 Pickling for Preservation
8.9 Pickle for Degreasing

9. THEORY & PRINCIPLES OF CHROME TANNING 6Hrs

9.1 Brief History & Importance of Chrome Tanning
9.2 Properties of Chrome Tanned Leather
9.3 Chrome Tanning Salt
- Organically Reduced Salt
- Sulphurdioxide Reduced Salt
- Synthetically Reduce Chrome Salt
- Masking Agents & Masked Chrome Tanning Salts

9.4 Basicity
- Concept of Basicity with reference to Chrome Tanning Salt

9.5 Reaction of Chrome with Pelt
9.6 Information of Two Bath Chrome Tanning
9.7 One Bath Chrome Tanning
- Method
- Factors Effecting on One Bath Chrome Tanning

9.8 pH & Boil Test of Chrome Tanned Leather
9.9 Aging of Chrome Tanned Leather
9.10 Preservation & Storage of Wet Blue Stock

10. INTRODUCTION OF ALUM AND ZIRCONIUM TANNAGE 4Hrs

10.1 Materials & Method of Alum Tannage
10.2 Properties & Uses of Alum Tanned Leather
10.3 Materials, Method & Applications of Zirconium Tannage

11. OIL & COMBINATION TANNAGE 6Hrs

11.1 Materials & Methods of Oil Tannage
11.2 Properties & Uses of Oil Tanned Leather
11.3 Fundamentals of aldehyde tannage
11.4 Mechanism of Oil Tannage
11.5 Combination Tanning

Recommended Books

1. K.T Sarkar- "Theory and Practice of Leather Manufacture", Ajoy Sorcar, 1981
2. Choichi Ogiwara-" Practical Guidelines to Light Leather Processing" -----Limited
3. P.S Briggs,-" Tropical Products Institute Gloving Clothing and Special Leather" J.C Barrett TPI
4. Eric Ogilvie-" Leather Finishing" Nene College Northampton, England
5. Anthony D Covington-" Tanning Chemistry, The Science of Leather" RSC Publishing
6. Alexander Watt-" Leather Manufacture" Published by William Clowes and son ITD, London

LT -114 Principles of Leather Manufacturing-I

INSTRUCTIONAL OBJECTIVES:-

1. GENERAL INTRODUCTION TO LEATHER MANUFACTURE

1.1 Definition and articles names of leather & its Uses

1.2 Introduction of history of Leather Manufacture

1.3 Introduction of leather Industry in Pakistan

1.4 Detail of Flow Chart Operation & Processes in Chrome Leather Manufacture

1.5 Detail of Flow Chart Operation & Processes in Vegetable Leather Manufacture

2. RAW HIDES & SKINS

2.1 Importance of Animal Skin for Living Body

2.2 Definitions, Sources & Uses of Hides & Skin

2.3 Introduction of Pre-slaughter & Post Mortem Defects in Animal Hides

3. GENERAL STRUCTURE OF ANIMAL HIDE & SKIN

3.1 Introduction of grain and Epidermal System

3.2 opening of grain and True Skin

3.3 preface of grain and Adipose Tissues

3.4 Introduction of grain and Cross-section of Animal Skin (Labeled Diagram)

3.5 Explanation of Non-fibrous Proteins

3.6 Introduction of Chemical Composition of Animal Skin

4. CURING OF HIDES & SKINS

4.1 Introduction of Objectives & Principles of Curing

4.2 Explanation of Methods of Curing including Drying, Wet Salting, Dry Salting, Brine Curing,

4.3 Introduction of Curing by Chilling

4.4 Explanation of Curing Defects

5. PRINCIPLES & PRACTICE OF BEAM HOUSE PROCESSES

5.1 Objectives of Soaking, its Dry Cured Hides & Skins

- Soaking of Wet-salted Hides & Skins
- Different Types of Soaking Vessels
- Use of Antiseptic during Soaking

5.2 Depilation

- Objectives
- Theory of Hair Destruction by Alkalis & Sulfides
- Hair Loosening by Bacterial Action & Enzymes
- Oxidation Un-hairing
- Depilation by Amines
- Depilation by Hair Saving Processes

5.3 Liming

- Objectives & pH

- The Liming Action upon Various Skin Components
- Effects of Liming on Leather Properties
- Practical Consideration during Liming
- Straight & Sharpened Liming
- Counter Current System of Liming
- Drum Liming

5.4 Fleshing & Pelt Weight

6. PRINCIPLES & MECHANISM OF DELIMING & BATING

6.1 De-liming

- Functions
- De-liming Materials & their Chemical Reactions

6.2 Bating

- Objectives of Bating.
- Characteristics of Bating Enzymes
- Action of Bating on Skin Components
- Factors Influencing the Efficiency of Bating
- Effect of Bating on the Properties of Leather

6.3 Scud & its Removal

7. DEGREASING

7.1 Reasons for Degreasing

7.2 Aqueous Degreasing

7.3 Solvent Degreasing

7.4 Factors Influencing Efficiency of Bating

8. PRINCIPLES & MECHANISM OF PICKLING

8.1 Objectives of Pickling
8.2 Pickling Chemicals
8.3 Pickling pH
8.4 Acid Uptake & Rate of Pickling
8.5 Acid Swelling & Negative Swelling
8.6 Pickling Techniques
8.7 Buffered Pickle
8.8 Pickling for Preservation
8.9 Pickle for Degreasing

9. THEORY & PRINCIPLES OF CHROME TANNING

9.1 Brief History & Importance of Chrome Tanning

9.2 Properties of Chrome Tanned Leather

9.3 Chrome Tanning Salt

- Organically Reduced Salt

- Sulphurdioxide Reduced Salt
- Synthetically Reduce Chrome Salt
- Masking Agents & Masked Chrome Tanning Salts

9.4 Basicity

- Concept of Basicity with reference to Chrome Tanning Salt

9.5 Reaction of Chrome with Pelt

9.6 Information of Two Bath Chrome Tanning

9.7 One Bath Chrome Tanning

- Method
- Factors Effecting on One Bath Chrome Tanning

9.8 pH & Boil Test of Chrome Tanned Leather

9.9 Aging of Chrome Tanned Leather

9.10 Preservation & Storage of Wet Blue Stock

10. INTRODUCTION OF ALUM AND ZIRCONIUM TANNAGE

10.1 Materials & Method of Alum Tannage

10.2 Properties & Uses of Alum Tanned Leather

10.3 Materials, Method & Applications of Zirconium Tannage

11 . OIL & COMBINATION TANNAGE

11.1 Materials & Methods of Oil Tannage

11.2 Properties & Uses of Oil Tanned Leather

11.3 Fundamentals of aldehyde tannage

11.4 Mechanism of Oil Tannage

11.5 Combination Tanning

LT -114 Principles of Leather Manufacturing-I

List of Practical:

- RAW MATERIAL STUDY
  - Physical Appearance
  - Softness, Flexibility
  - Hair slip, Puncture Strength
  - Area Substance & Weight
- CURING
  - Wet salting
  - Dry curing on frame
  - Dry salting
- SOAKING
  - Soaking of Wet Salted, Dry Cured & Dry Salted Raw Material
  - Softness, Flexibility after Soaking
  - Hair slip, Putrefaction & Puncture Strength after Soaking
  - Soak Weight
- DEPILATION & LIMING
  - Sodium Sulfide
  - Breaking of Drum
  - Dissolving
  - Lime
  - Slaking
  - Seiving
  - Dissolving to make Slurry
  - Painting
  - Preparation of Paint
  - Application of Paint
  - Liming
  - Plumping
  - Pelt Weight
  - New Lime & its Effect
- DELIMING
  - Use of different Deliming Material
  - Pelt Condition (Degree of Swelling)
  - Grain Clearance & Physical Appearance
  - Degree of Deliming
  - Deliming pH

- BATING
  - Use of Enzymatic Bates
  - Study of Physical Effects of Bating
  - Degree & Test of Bating
  - Cross-section pH
- PICKLING
  - Use of different Pickling Agents
  - Acid Swelling
  - Negative Swelling
- CHROME TANNING
- ZIRCONIUM TANNING
- ALUM TANNING
- ALDEHYDE TANNING

LT-124 Heavy Leather Manufacturing

	Total Contact Hours			
Theory	64	**T**	**P**	**C**
Practical	192	2	6	4

Course Contents

1. RAW HIDES & USES OF MAJOR TYPES OF HEAVY LEATHER 6Hrs

1.1 Heavy & Light Sole Leather
1.2 Flexible & Water Proof Sole Leather
1.3 Dressing Leather
1.4 Belting, Harness & Saddlery Leather
1.5 Insole Leather
1.6 GENERAL PROPERTIES OF SOLE LEATHER

2. VEGETABLE TANNING MATERIALS AND PREPARATION OF TANNING EXTRACTS 7Hrs

2.1 Country of Origin & Chemical Composition
2.2 Characteristics & Tanning Properties of Various Tanning Materials
2.3 Leaching of Babool Bark as Practiced in Pakistan
2.4 Concentration
- Solidification
- Spray Drying
- Bleaching
- Solubilization

2.5 Sulfated & Bleached Mimosa Extracts
2.6 Sulfated Quebracho
2.7 Sweetened Chestnut
2.8 Significance of Acid & Salts in Vegetable Tanning Extracts
2.9 Blending of Tanning Extracts
2.10 Factors Effecting Diffusion of Tanning Extract in Pelt.
2.11 Tannins & Non-tannins

3. PRACTICAL TANNING PROCESS OF HEAVY LEATHER 7Hrs

3.1 Soaking
- Objectives & Methods
- Soaking Aids

3.2 Liming
- Counter Current System

3.3 Pelt Yield
- Importance & Calculation of Pelt Yield
- Rounding & Rounding Percentage
- Causes & Remedies for Loss in Pelt Yield

3.4 Deliming
- Objectives, Method & Deliming Degree of Sole Tannage

3.5 Pickling & Pre-tanning

- Objectives & Methods
- Use of Syntans & Chrome for Pre-tannage

4. TANNING OF HEAVY LEATHERS 5Hrs

4.1 Pit Tanning Method
4.2 Pit Drum Tanning System
4.3 Rapid Vegetable Tannage
4.4 Dry Powder Tannage
4.5 Bag Tannage

5. POST TANNING TREATMENT OF HEAVY /SOLE LEATHER 6Hrs

5.1 Bleaching

- American Process
- Conventional Process
- Syntan bleaching

5.2 Washing & sammying
5.3 Loading Method, Material & Effects
5.4 Fat-liquoring Objects & Methods
5.5 Piling, Signification of Piling
5.6 Method of Drying, Factors effecting the rate of drying
5.7 Precautions during Drying, Drying chamber construction and working.

6. FINISHING OF SOLE LEATHER 7Hrs

6.1 Conditioning & Drum Setting

- Importance of Conditioning
- Drum Setting Operations

6.2 Scouring - Objectives & Method
6.3 Hand Oiling - Reasons & Materials for Hand Oiling
6.4 Hand Setting - Importance & Method
6.5 Final Drying Method
6.6 Rolling of Sole Leather

7. PROCESSING DEFECTS IN SOLE LEATHER 7Hrs

7.1 Causes and Remedies of following Sole Leather Defects

- Lime Blast
- Kiss Marks
- Darkening of Color
- Iron Stains
- Grain Cracking

8. MANUFACTURING OF DIFFERENT TYPES OF HEAVY LEATHER 6Hrs

8.1 Properties of Belting Leather

8.2 Production of Belting, Saddlery & Harness Leather from Vegetable Crust Leather.

8.3 Manufacture of Vegetable Upholstery Hides

8.4 Full-chrome Upholstery Leather

9. PRODUCTION OF FLEXIBLE AND ECONOMICS OF SOLE LEATHER 7Hrs

9.1 Manufacture, Properties & Uses of Flexible Chrome Retanned Sole Leather

9.2 Pelt Yield

9.3 Calculations Regarding Pelt Yield

9.4 Causes & Remedies for Loss in & Pelt Yield

9.5 Dry Leather Weight & Leather Yield

9.6 Significance of Dry Leather Weight

9.7 Calculation of Leather Yield

9.8 Causes & Remedies for Loss in Dry Leather Yield

10. STUDY OF GRAIN DEFECTS IN VEGETABLE TANNED LEATHER 6Hrs

10.1 Causes and Remedies for following Grain Defects:

10.2 Grain Cracking

10.3 Drawn & Pebbled Grain

10.4 Frizzed & Scuffed Grain

10.5 Delaminate Grain

Recommended Books

1. K.T Sarkar- "Theory and Practice of Leather Manufacture", Ajoy Sorcar, 1981
2. Choichi Ogiwara-" Practical Guidelines to Light Leather Processing" -----Limited
3. P.S Briggs,-" Tropical Products Institute Gloving Clothing and Special Leather" J.C Barrett TPI
4. Eric Ogilvie-" Leather Finishing" Nene College Northampton, England
5. Anthony D Covington-" Tanning Chemistry, The Science of Leather" RSC Publishing
6. Alexander Watt-" Leather Manufacture" Published by William Clowes and son ITD, London

LT-124 Heavy Leather Manufacturing

INSTRUCTIONAL OBJECTIVES:

1. RAW HIDES & USES OF MAJOR TYPES OF HEAVY LEATHER

1.1 Definition of Heavy & Light Sole Leather
1.2 Specification of Flexible & Water Proof Sole Leather
1.3 Kinds and uses of Dressing Leather
1.4 Uses of Belting, Harness & Saddlery Leather
1.5 Definition and Specification of Insole Leather
1.6 EXPLANATION OF GENERAL PROPERTIES OF SOLE LEATHER

2. VEGETABLE TANNING MATERIALS AND PREPARATION OF TANNING EXTRACTS

2.1 Classes of Country of Origin & Chemical Composition
2.2 Explanation and Characteristics & Tanning Properties of Various Tanning Materials
2.3 Definition of Leaching of Babool Bark as Practiced in Pakistan
2.4 Definition and explanation of Concentration:
- Solidification
- Spray Drying
- Bleaching
- Solubilization

2.5 Definition and explanation Sulfited & Bleached Mimosa Extracts
2.6 Definition and explanation Sulfited Quebracho
2.7 Definition and explanation Sweetened Chestnut
2.8 Definition and explanation Significance of Acid & Salts in Vegetable Tanning Extracts
2.9 Definition and explanation Blending of Tanning Extracts
2.10 Definition and explanation Factors Effecting Diffusion of Tanning Extract in Pelt.
2.11 Definition and explanation Tannins & Non-tannins

3. PRACTICAL TANNING PROCESS OF HEAVY LEATHER

3.1 Practical functions of Soaking
- Objectives & Methods
- Soaking Aids

3.2 Practical functions of Liming
- Counter Current System

3.3 Practical functions of Pelt Yield
- Importance & Calculation of Pelt Yield
- Rounding & Rounding Percentage
- Causes & Remedies for Loss in Pelt Yield

3.4 Practical functions of Deliming
- Objectives, Method & Deliming Degree of Sole Tannage

3.5 Pickling & Pre-tanning
- Objectives & Methods

- Use of Syntans & Chrome for Pre-tannage

4. TANNING OF HEAVY LEATHERS

4.1 Procedure of Pit Tanning Method
4.2 Description of Pit Drum Tanning System
4.3 Precautions of Rapid Vegetable Tannage
4.4 Methodology of Dry Powder Tannage
4.5 History of Bag Tannage

5. POST TANNING TREATMENT OF HEAVY /SOLE LEATHER

5.1 Objectives and history of Bleaching

- American Process
- Conventional Process
- Syntan bleaching

5.2 Definition of Washing & sammying
5.3 Definition of Loading Method, Material & Effects
5.4 Aims and procedure of Fat-liquoring Objects & Methods
5.5 Procedure and objectives of Piling, Signification of Piling
5.6 Explanation and Method of Drying, Factors effecting the rate of drying
5.7 Definition of Precautions during Drying, Drying chamber construction and working.

6. FINISHING OF SOLE LEATHER

6.1 Method of Conditioning & Drum Setting

- Importance of Conditioning
- Drum Setting Operations

6.2 Aims and definition of Scouring - Objectives & Method
6.3 Objectives and explanation of Hand Oiling - Reasons & Materials for Hand Oiling
6.4 Uses and method of Hand Setting - Importance & Method
6.5 Procedure of Final Drying Method
6.6 Method of Rolling of Sole Leather

7. PROCESSING DEFECTS IN SOLE LEATHER

7.1 Chemical reaction of Causes and Remedies of following Sole Leather Defects

- Lime Blast
- Kiss Marks
- Darkening of Color
- Iron Stains
- Grain Cracking

8. MANUFACTURING OF DIFFERENT TYPES OF HEAVY LEATHER

8.1 Kinds and uses of Properties of Belting Leather

8.2 Definition and specification of Production of Belting, Saddlery & Harness Leather from Vegetable Crust Leather.

8.3 Kinds and uses of Manufacture of Vegetable Upholstery Hides

8.4 Kinds and uses of Full-chrome Upholstery Leather

9. PRODUCTION OF FLEXIBLE AND ECONOMICS OF SOLE LEATHER

9.1 Definition of Manufacture, Properties & Uses of Flexible Chrome Retanned Sole Leather
9.2 Definition of Pelt Yield
9.3 Calculations Regarding Pelt Yield
9.4 Reasons, Causes & Remedies for Loss in & Pelt Yield
9.5 Practical implementation of Dry Leather Weight & Leather Yield
9.6 Practical implementation of Significance of Dry Leather Weight
9.7 Practical implementation of Calculation of Leather Yield
9.8 Practical implementation of Causes & Remedies for Loss in Dry Leather Yield

10. STUDY OF GRAIN DEFECTS IN VEGETABLE TANNED LEATHER

10.1 specification of Causes and Remedies for following Grain Defects:
10.2 Kinds of Grain Cracking
10.3 Types of Drawn & Pebbled Grain
10.4 Definition of Frizzed & Scuffed Grain
10.5 Remedies of Delaminate Grain

Lt-124 Heavy Leather Manufacturing

List of Practical:

- RAW MATERIAL STUDY
  - Physical Appearance
  - Softness, Flexibility
  - Hair slip, Puncture Strength
  - Area Substance & Weight
- CURING
  - Wet salting
  - Dry curing on frame
  - Dry salting
- SOAKING
  - Soaking of Wet Salted, Dry Cured & Dry Salted Raw Material
  - Softness, Flexibility after Soaking
  - Hair slip, Putrefaction & Puncture Strength after Soaking
  - Soak Weight
- DEPILATION & LIMING
  - Sodium Sulfide
  - Breaking of Drum
  - Dissolving
  - Lime
  - Slaking
  - Seiving
  - Dissolving to make Slurry
  - Painting
  - Preparation of Paint
  - Application of Paint
  - Liming
  - Plumping
  - Pelt Weight
  - New Lime & its Effect
- DELIMING
  - Use of different Deliming Material
  - Pelt Condition (Degree of Swelling)
  - Grain Clearance & Physical Appearance
  - Degree of Deliming

- Deliming pH

- BATING
  - Use of Enzymatic Bates
  - Study of Physical Effects of Bating
  - Degree & Test of Bating
  - Cross-section pH

- PICKLING
  - Use of different Pickling Agents
  - Acid Swelling
  - Negative Swelling

- TANNING
  - Vegetable Tanning
  - With Babool Bark
  - With Mimosa Extract
  - With Babool & Mimosa Extracts
  - Chrome Pre-tannage
  - Chrome Tanning
  - Tanning with Basic Chromium Sulfate
  - Boil Test
  - Neutralization & Fat-liquoring
  - Wet Blue Stock
  - Substance
  - Area
  - Physical Appearance

LT-134 Tannery Machinery Practice

Total Contact Hours

Theory	64	**T**	**P**	**C**
Practical	192	2	6	4

Course Contents

1. Drums **9Hrs**

1.1 Introduction
1.2 Wooden Tannery Drums
1.3 Experimental Wooden and Stainless Steel Drums
1.4 Poly propylene Drums
1.5 Dye Drums

2. Fleshing Machine **9Hrs**

2.1 Introduction
2.2 Fleshing Machine
2.3 Un-hairing Machine
2.4 Hand Fleshing Equipments

3. Mechanical operation after Wet Blue **10Hrs**

3.1 Introduction
3.2 Samming Machine
3.3 Splitting Machine
3.4 Shaving Machine

4. Mechanical operation after Crust **10Hrs**

4.1 Introduction
4.2 Samming and Setting out
4.3 Vacuum Dryer
4.4 Tunnel Dryer
4.5 Conveyor Dryer

5. Operation after Drying **10Hrs**

5.1 Introduction
5.2 Conditioning
5.3 Staking
5.4 Buffing Machines
5.5 Dedusting

6. Finishing Machinery **8Hrs**

6.1 Introduction
6.2 Spray Gun
6.3 Automatic Spraying
6.4 Friction Glazing
6.5 Embossing Machines

7. Area Measuring **8Hrs**

7.1 Introduction
7.2 Trimming
7.3 Measuring by Hand

7.4 Measuring by Machines
7.5 Packing

Recommended Books

1. K.T Sarkar- “Theory and Practice of Leather Manufacture”, Ajoy Sorcar, 1981
2. Choichi Ogiwara-“ Practical Guidelines to Light Leather Processing” -----Limited
3. P.S Briggs,-“ Tropical Products Institute Gloving Clothing and Special Leather” J.C Barrett TPI
4. Eric Ogilvie-“ Leather Finishing” Nene College Northampton, England
5. Anthony D Covington-“ Tanning Chemistry, The Science of Leather” RSC Publishing
6. Alexander Watt-“ Leather Manufacture” Published by William Clowes and son ITD, London

LT-134 Tannery Machinery Practice

INSTRUCTIONAL OBJECTIVES:

1. Drums

1.1 Description and Introduction
1.2 Structure of Wooden Tannery Drums
1.3 Study of Experimental Wooden and Stainless Steel Drums
1.4 Material for Poly propylene Drums
1.5 Uses of Dye Drums

2. Fleshing Machine

2.1 Description and Introduction
2.2 Working criteria Fleshing Machine
2.3 Advantages of Un-hairing Machine
2.4 Application of Hand Fleshing Equipments

3. Mechanical operation after Wet Blue

3.1 Description and Introduction
3.2 Working Criteria of Samming Machine
3.3 Working Criteria of Splitting Machine
3.4 Working Criteria of Shaving Machine

4. Mechanical operation after Crust

4.1 Description and Introduction
4.2 Working Capacity of Samming and Setting out
4.3 Uses of Vacuum Dryer
4.4 Uses and purpose of Tunnel Dryer
4.5 Uses and purpose of Conveyor Dryer
4.6 Uses and purpose of Toggle Dryer

5. Operation after Drying

5.1 Description and Introduction
5.2 Uses and purpose of Conditioning
5.3 Effect of Staking
5.4 Purpose and working of Buffing Machines
5.5 Uses and purpose of Dedusting

6. Finishing Machinery

6.1 Description and Introduction
6.2 Function of Spray Gun
6.3 Production Capacity of Automatic Spraying
6.4 Description of Friction Glazing
6.5 Uses and purpose of Embossing Machines

7. Area Measuring

7.1 Description and Introduction
7.2 Art of Trimming
7.3 Method of Measuring by Hand
7.4 Method of Measuring by Machines
7.5 Skill of Packing

LT-134 Tannery Machinery Practice

List of Practical:

Adjustment, Start-up, Operation, Maintenance, Practice & Safety Measures on the following Tannery Machines:

- Fleshing Machine
- Tanning & other Drums
- Splitting Machine
- Shaving Machine
- Sammying Machine
- Setting Out Machine
- Pasting Dryer
- Vacuum Dryer
- Toggle Dryer.
- Vibration Staker
- Buffing Machine
- De-dusting Machine
- Automatic Spraying
- Friction Glazing
- Embossing Press
- Ironing
- Area Measuring

اسلامیات / مطالعہ پاکستان

مضمون (سال دوم)	GEN 211	ٹی	پی	سی
حصہ اول اسلامیات		1	0	1
حصہ دوم مطالعہ پاکستان		کل وقت: 20 گھنٹے		

موضوعات

1. سورۃ المومنون آیت ۱ تا ۱۱ مع ترجمہ
2. درس منتخب احادیث مع ترجمہ و تشریح
   - ☆ خیارکم من تعلم القرآن وعلمہ
   - ☆ لا ایمان لمن لا امانۃ لہ ولا دین لمن لا عہد لہ
   - ☆ وایاکم والظن فان الظن اکذب الحدیث
   - ☆ من احدث فی امرنا ہذا ما لیس منہ فہو رد
   - ☆ من حمل علینا السلاح فلیس منا
   - ☆ انا و کافل الیتیم فی الجنۃ
   - ☆ لا ضرر ولا ضرار فی الاسلام
   - ☆ کلکم راع و کلکم مسئول عن رعیتہ
3. سیرۃ طیبہ
   - ☆ مکی زندگی۔ دارارقم۔ ہجرت حبشہ۔ ہجرت
   - ☆ مدنی زندگی۔ مواخات۔ میثاق مدینہ۔ غزوہ بدر (اسباب و نتائج)
4. حضور ﷺ بحیثیت
   - ☆ خطیب حجۃ الوداع
   - معلم کامل، سربراہ خاندان
5. اسلامی معاشرہ

نظام تعلیم اور اس کے مقاصد۔ عدل و انصاف۔ امر بالمعروف۔ نہی عن المنکر

جہاد۔ کسب حلال۔ سچ (اہمیت و فضیلت)

6. اسلامی ریاست کی تعریف۔ اسلامی ریاست کی خصوصیات۔ اسلامی حکومت کے فرائض۔ اسلامی طرز حکومت

اسلامیات

تدریس مقاصد

عمومی مقاصد بطالبعلم یہ جان سکے کہ آیات قرآنی کی روشنی میں مومن کے اوصاف کیا ہیں

قرآن مجید — منتخب آیات قرآنی

خصوصی مقاصد :

☆ قرآنی آیات کا ترجمہ بیان کر سکے

☆ قرآنی آیات کی تشریح کر سکے

☆ قرآنی آیات کی روشنی میں ایک مومن کے اوصاف بیان کر سکے

☆ قرآنی آیات میں بیان کردہ مومن کے اوصاف اپنے اندر پیدا کر سکے

احادیث نبویہ

☆ عمومی مقصد احادیث کی روشنی میں اسلامی اخلاقی اقدار (انفرادی و اجتماعی) سے آگاہ ہو سکے

خصوصی مقاصد :

☆ احادیث کا ترجمہ بیان کر سکے

☆ احادیث کی تشریح کر سکے

☆ احادیث کی روشنی میں اسلام کی اخلاقی اقدار کی وضاحت کر سکے

☆ ان احادیث کی دی گئی تعلیمات کے مطابق اپنی زندگی گزار سکے

سیرت طیبہ

☆ عمومی مقصد: حضور ﷺ کی سیرت طیبہ کے بارے میں جان سکے

خصوصی مقاصد:

☆ حضور ﷺ کی ابتدائی زندگی اختصار کے ساتھ بیان کر سکے

☆ حضور ﷺ کی ہجرت کا واقع بیان کر سکے

☆ حضور ﷺ کی مدنی زندگی اختصار سے بیان کر سکے

☆ حضور ﷺ کی بطور معلم خصوصیات بیان کر سکے

☆ حضور ﷺ کی بطور سربراہ خاندان بیان کر سکے

اسلامی معاشرہ

عمومی مقصد: اسلامی معاشرہ کی خصوصیات سے آگاہی حاصل کر سکے

خصوصی مقاصد:

☆ اسلامی معاشرہ کا معنی و مفہوم بیان کر سکے

☆ اسلامی معاشرہ کی امتیازی خصوصیات بیان کر سکے

☆ اسلامی معاشرہ میں عدل و احسان کی اہمیت بیان کر سکے

☆ تبلیغ کے لغوی معنی بیان کر سکے

☆ تبلیغ کی اہمیت و ضرورت بیان کر سکے

☆ جہاد کے لفظی و اصطلاحی معنی بیان کر سکے

☆ جہاد کی اہمیت بیان کر سکے

☆ جہاد اور قتال میں فرق بیان کر سکے

☆ جہاد کی مختلف اقسام بیان کر سکے

☆ لفظ مسجد کی تعریف کر سکے

مسجد کی سابقہ حیثیت کو بحال کرنے کے بارہ میں اقدامات کو بیان سکے

اسلامی ریاست

عمومی مقاصد۔ اسلامی ریاست کی خصوصیت بیان کر سکے

خصوصی مقاصد:

☆ ریاست کی تعریف بیان کر سکے

☆ اسلامی ریاست میں طرز حکومت سے آگاہی حاصل کر سکے

☆ اسلامی ریاست کی خصوصیات بیان کر سکے

☆ اسلامی ریاست کے اغراض و مقاصد بیان کر سکے

☆ اسلامی ریاست کے قیام کیلئے جدوجہد کر سکے

نصاب مطالعہ پاکستان

ٹی	پی	سی
1	0	1

کل وقت: 1½ گھنٹے

سال دوم

حصہ دوم

موضوعات

- ☆ دو قومی نظریہ
- ☆ تحریک پاکستان
- ☆ انڈین کانگریس
- ☆ مسلم لیگ
- ☆ تقسیم بنگال
- ☆ میثاق لکھنؤ
- ☆ تحریک خلافت
- ☆ سندھ تحریک
- ☆ تجاویز دہلی
- ☆ نہرو رپورٹ
- ☆ قائداعظم کے چودہ نکات
- ☆ خطبہ الہ آباد
- ☆ اقلیت 1938 اور اختتام مجوزہ
- ☆ قرارداد پاکستان

حصہ دوم

مطالعہ پاکستان

تدریس مقاصد

تحریک پاکستان

عمومی مقصد: قیام پاکستان کے اسباب و محرکات کو بیان کر سکے

خصوصی مقاصد:

- ☆ قومیت کے مفہوم کو بیان کر سکے
- ☆ دو قومی نظریہ کی تعریف و توضیح کر سکے
- ☆ دو قومی نظریہ اہمیت بیان کر سکے
- ☆ ہندوستانی مسلمانوں کی محرومیوں کو بیان کر سکے
- ☆ قومی تشخص کو بحال رکھنے کے لئے مسلمانان ہند کی مساعی بیان کر سکے
- ☆ آزادی ہند اور قیام پاکستان علامہ اقبال اور قائداعظم کی مساعی بیان کر سکے
- ☆ قیام پاکستان سے مستقبل اسلامی مملکت کے قیام کے لئے مسلم عوام کی کوششوں کو بیان کر سکے
- ☆ مسلم لیگ کے قیام پاکستان کے لئے جدوجہد بیان کر سکے

(غیر مسلم طلباء کے لئے)

نصاب اخلاقیات — ٹی ٹی سی

سال دوم — 1 0 1

کل وقت: 20 گھنٹے

موضوعات

معاشرتی اقدار اکائی بہبود۔ قوم۔ قومی سطح۔ شہری سطح۔ صنعتی ادارہ کی سطح۔ ضروریات۔ ورثہ

- ☆ حقوق و فرائض
- ☆ قوت برداشت
- ☆ قوت ارادی
- ☆ لگن و جذبہ
- ☆ وسیع النظری
- ☆ بے غرضی
- ☆ مثالی دوستی
- ☆ حفاظتی شعور
- ☆ پاس آزادی
- ☆ کامل انکساری
- ☆ تغیرات کو قبول کرنا
- ☆ خود شناسی

نصاب اخلاقیات

سال دوم

تدریس مقاصد

عمومی مقاصد :

طالب علم: اخلاقیات کی اہمیت و ضرورت سے آگاہ ہو سکے اور بیان کر سکے

خصوصی مقاصد : طالب علم اس قابل ہو کہ

- ☆ موضوعات کا مطلب بیان کر سکے
- ☆ عملی زندگی سے مثالوں کی نشاندہی کر سکے
- ☆ اپنی شخصیت اور معاشرے پر موضوعات کے مطابق مثبت اثرات پیدا کرنے کے طریقے بیان کر سکے
- ☆ اعلیٰ اخلاقی اقدار میں سے

قوت برداشت۔ قوت ارادی۔ لگن جذبہ۔ وسیع النظری۔ بے غرضی۔ انسانی دوستی حفاظتی۔ شعور۔ پس آزادی۔ کامل اکائی اور خود شناسی کی اہمیت بیان کر سکے

- ☆ اخلاقیات سے متصف ہو کر قومی خدمت بہتر طور پر انجام دے سکے

Phy-212 APPLIED MECHANICS/APPLIED MECHANICS

Total Contact Hours		T	P	C
Theory	32 Hours	1	3	2
Practical	96 Hours			

AIMS
1. Apply the concepts of Applied Physics to understand Mechanics
2. Apply laws and principles of Mechanics in solving technological problems
3. Use the knowledge of App. Mechanics in learning advance technical courses.
4. Demonstrate efficient skill of practical work in Mechanics Lab.

COURSE CONTENTS

1. MEASUREMENTS **2 Hours**
- 1.1 Review: Dimensional formula of Equations of Motion
- 1.2 Review: Systems of measurement, S.I. Units, conversion
- 1.3 Significant Figures
- 1.4 Degree of accuracy

2. EQUILIBRIUM OF CON-CURRENT FORCES **4 Hours**
- 2.1 Concurrent forces
- 2.2 Addition and Resolution of Vectors
- 2.3 Toggle Joint, Hanging Chains
- 2.4 Roof Trusses, Cranes.
- 2.5 Framed structures

3. MOMENTS AND COUPLES: **3 Hours**
- 3.1 Principle of Moments - Review
- 3.2 Levers
- 3.3 Safety valve
- 3.4 Steel yard
- 3.5 Parallel forces, couple
- 3.6 Torque

4. EQUILIBRIUM OF NON CONCURRENT FORCES: **4 Hours**
- 4.1 Non-concurrent forces
- 4.2 Free body diagram
- 4.3 Varignon's theorem
- 4.4 Conditions of total Equilibrium (Review)
- 4.5 Ladders

5. MOMENT OF INERTIA: **4 Hours**
- 5.1 Review: Rotational Inertia
- 5.2 Moment of Inertia, Theorems
- 5.3 Moment of Inertia of symmetrical bodies
- 5.4 M.I. of Fly wheel with applications
- 5.5 Energy stored by Fly wheel

6. FRICTION: **4 Hours**

6.1 Review: Laws of friction
6.2 Motion of body along an inclined plane (up & down)
6.3 Rolling friction & Ball Bearings
6.4 Fluid Friction, Stokes' Law

7. WORK, ENERGY AND POWER **3 Hours**

7.1 Work-Energy relationship
7.2 Work done by variable .
7.3 Power
7.4 I.H.P, B.H.P and Efficiency
7.5 Dynamometer.

8. **TRANSMISSION OF POWER**

8.1 Belts, Ropes
8.2 Chains
8.3 Gears
8.4 Clutches, functionsand types with application.

9. MACHINES: **3 Hours**

9.1 Efficiency of machines
9.2 Inclined plane - Review
9.3 Reversibility of machines
9.4 Single purchase crab
9.5 Double purchase crab.
9.6 Worm and worm wheel.
9.7 Differential Screw Jack.
9.8 Differential Pulley, Wheel and Axle

10. VIBRATORY MOTION: **2 Hours**

10.1 S.H.M. - Review
10.2 Pendulums
10.3 Speed Governors
10.4 Helical spring
10.5 Cams
10.6 Quick return motion

11. ELASTICITY: **3 Hours**

11.1 Three Moduli of Elasticity
11.2 Loaded Beams, Types of Beam & Loads
11.3 Bending Stress
11.4 S.F & B.M diagram
11.5 Torsion and Torsional Stresses

12. Simple Mechanism

12.1 Introduction

12.2 Kinematic link or element

12.3 Kinematic pair and types

12.4 Kinematic chains and types

13. Velocity in mechanism

13.1 Introduction

13.2 Instantaneous center

13.3 Instantaneous velocity

13.4 Velocity of a link by Instantaneous center method

13.5 Relative velocity of two bodies in straight line

13.6 Velocity of a link by relative velocity method

Phy. 212 APPLIED MECHANICS/APPLIED MECHANICS

INSTRUCTIONAL OBJECTIVES

1. USE THE CONCEPTS OF MEASUREMENT IN PRACTICAL SITUATIONS/PROBLEMS

1.1 Explain Dimensional formula
1.2 Explain systems of measurement
1.3 Use concept of significant figures and degree of accuracy to solve problems

2. USE THE CONCEPT OF ADDITION AND RESOLUTION OF VECTORS TO PROBLEMS ON EQUILIBRIUM INVOLVING CONCURRENT FORCES

2.1 Describe concurrent forces
2.2 Explain resolution of vectors
2.3 Use the analytical method of addition of vectors for solving problems.
2.4 Use the graphical method of addition of vectors for solving problems.
2.5 Solve problems on forces with emphasis on roof trusses, cranes simple frames and framed structures.

3. USE THE PRINCIPLE OF MOMENTS AND CONCEPT OF COUPLE TO SOLVE PROBLEMS.

3.1 Describe the principle of moments.
3.2 Use the principle of moments to solve problems on compound levers, safety valve, and steel-yard.
3.3 Describe couple and torque.
3.4 Use the concept to solve problems on torque.

4. USE THE LAWS OF TOTAL EQUILIBRIUM OF FORCES TO SOLVE PROBLEMS INVOLVING FORCES IN EQUILIBRIUM.

4.1 Distinguish between concurrent and non-concurrent forces.
4.2 Prepare a free body diagram of an object or a structure.
4.3 Explain Varignon's theorem
4.4 Explain second condition of equilibrium
4.5 Use laws of total equilibrium to solve problems on forces involving framed structure and ladders.

5. USE CONCEPTS OF MOMENT OF INERTIA TO PRACTICAL SITUATIONS AND PROBLEMS.

5.1 Explain moment of inertia.
5.2 Explain the theorems of Parallel and perpendicular Axis.
5.3 Describe the M.I. of regular bodies
5.4 Explain M.I. of Fly wheel
5.5 Explain Energy stored by Fly Wheel
5.6 Use these concepts to solve simple problems.

6. UNDERSTAND THE CONCEPTS AND LAWS OF SOLID AND FLUID FRICTION.

6.1 Define Coefficient of friction between a body placed on an inclined plane and the surface.
6.2 Explain motion of a body placed on an inclined plane
6.3 Calculate the force needed to move a body up and down an inclined plane.
6.4 Explain rolling friction and use of ball bearings.
6.5 Describe fluid friction and Stoke's law.

7. UNDERSTAND WORK, ENERGY AND POWER.

7.1 Derive work-energy relationship
7.2 Use formulae for work done by a variable force to solve problems.
7.3 Explain Power, I.H.P, B.H.P and efficiency.
7.4 Describe dynamometers.
7.5 Use the concepts to solve problems on power and work-energy

8. Understand transmission of power through ropes and belts

8.1 Describe the need for transmission of power

8.2 Describe the method of transmission of power

8.3Understand transmission of power through ropes and belts

8.4 Write formula for power transmitted through ropes and belts

8.5 Describe transmission of power through friction gears and write formula

8.6 Describe transmission of power through chains and toothed wheels/gears

8.7 Use the formula to solve/problem on transmission of power

8.8 Describe types and functions of clutches with applications

9. USE THE CONCEPTS OF MACHINES TO PRACTICAL SITUATIONS.

9.1 Explain theoretical, actual mechanical advantage and efficiency of simple machines.

9.2 Use the concept to calculate efficiency of an inclined plane.

9.3 Describe reversibility of machines.

9.4 Calculate the efficiency of:

i. Single purchase crab.

ii. Double purchase crab.

iii. Worm and worm wheel.

iv. Differential screw jack, Diff. Pulley, Wheel and Axle.

9.5 Use the formulae to solve the problems involving efficiency, M.A of the above machines.

10. USE THE CONCEPTS OF VIBRATORY MOTION TO PRACTICAL SITUATIONS.

10.1 Define vibratory motion giving examples.

10.2 Describe circular motion and its projection on diameter of the circular path.

10.3 Relate rotatory motion to simple vibratory motion.

10.4 State examples of conversion of rotatory motion to vibratory motion and vice versa.

10.5 Derive formulae for position, velocity and acceleration of a body executing S.H.M.

10.6 Use the concept of S.H.M to helical springs.

10.7 Use the concept S.H.M to solve problems on pendulum.

11. UNDERSTAND BENDING MOMENTS AND SHEARING FORCES.

11.1 Define three types of stresses and moduli of elasticity.

11.2 Describe types of beams and loads.

11.3 Explain shearing force and bending moment.

11.4 Use these concepts to calculate S.F and B.M in a given practical situation for point loads, uniformly distributed loads.

11.5 Prepare S.F and B.M diagram for loaded cantilever and simply supported beams.

11.6 Describe torsion and torsional stresses giving formula

12. Understand Simple Mechanism

12.1 Define simple mechanism

12.2 Define kinematics

12.3 Explain kinematic links or elements

12.4 Explain kinematic chains

12.5 Distinguish between types of kinematic chains

13. Understand the method of finding velocity in mechanisms

13.1 Explain relative velocity

13.2 Explain instantaneous center

13.3 Explain instantaneous velocity

13.4 Explain the method of finding velocity of a link by:

i. Relative velocity method

ii. Instantaneous center method

LIST OF EXPERIMENTS

1. Find the weight of the given body using Law is theorem.
2. Find unknown forces in a given set of concurrent forces in equilibrium using Grave-sands apparatus
3. Set a jib crane and analyze forces in its members
4. Set a Derrick Crane and analyze forces in its members
5. Study forces shared by each member of a Toggle Joint
6. Set a Roof Truss and find forces in its members
7. Verify Principle of Moments in a compound lever
8. Calibrate a steelyard
9. Find the Reactions at the ends of a loaded beam
10. Use reaction of beams apparatus to study resultant of parallel forces

10. Find the Moment of Inertia of a Flywheel
11. Find the angle of reaction for a wooden block placed on an inclined plane
12. Find the B.H.P. of a motor
13. Find M.A. and Efficiency of worm and worm wheel
14. Study the transmission of power through friction gears
15. Study the transmission of power through belts
16. Study the transmission of power through toothed wheels
17. Study the function of clutches
18. Find M.A. and efficiency of differential wheel and axle
19. Find the efficiency of a screw
20. Find the efficiency of a differential pulley
21. Verify Hooke's Law using Helical Spring
22. Study conversion of rotatory motion to S.H.M using S.H.M Model/apparatus
23. Study conversion of rotatory motion to vibratory motion of piston in a cylinder
24. Study the reciprocating motion
25. Study the working of cams
26. Study the quick return motion
27. Compare the Elastic constants of the given wires
28. Verify Hooke’s Law using Helical Spring

29. Find the coefficient of Rigidity of a wire using Maxewell's needle

30. Find the coefficient of rigidity of a round bar using torsion apparatus

31. Find the coefficient of Rigidity of a rectangular bar using Deflection of Beam Apparatus

32. Determine S.F. and B.M. in a loaded canti-lever (Point Loads)

33. Determine S.F. and B.M. in a simply supported Beam (Point Loads)

34. Determine S.F. and B.M. in a simply supported Beam (Point loads and uniformly distributed load)

35. Determine S.F. and B.M. in a simply supported Beam (Point loads and uniformly distributed)

36. Study working and function of link mechanism of different types

BOOKS RECOMMENDED:

1. Applied Mechanics by R.S. Khurmi
2. Applied Mechanics by A.P.S Sahihney&Prakash D. Manikpyny.
3. Applied Mechanics by Inchley and Morley
4. Theories of Machines by R.S. Khurmi and J.K. Gupta.
5. Applied Mechanics by Junarker.
6. Engineering Science Vol-I by Brown and Bryant
7. Practical Physics by MehboobIlahi Malik &Ikram-ul-Haq
8. Experimental Physics Note Book by M. Aslam Khan & M. AkramSandhu
9. Experimental Mechanics (Urdu Process) by M. AkramSandhu

MATH-212 **Applied Mathematics-II**

	T	P	C
Total Contact Hours:			
	2	0	2

Theory: 64 Hours.

Aims & Objectives:

After completing the course the students will be able to:Solve the problems of calculus and analytical Geometry.

COURSE CONTENTS:

1. FUNCTIONS & LIMITS. 4 **Hours**

1.1 Constants and variables
1.2 Functions & their types
1.3 The concept of limit
1.4 Limit of a function
1.5 Fundamental theorems on limit
1.6 Some important limits
1.7 Problems

2. DIFFERENTIATION. **4 Hours**

2.1 Increments
2.2 Different Coefficient or Derivative
2.3 Differentiation ab-initio or by first principle
2.4 Geometrical Interpretation of Differential Coefficient
2.5 Differential Coefficient of Xa, (ax + b)a
2.6 Three important rules
2.7 Problems.

3. DIFFERENTIATION OF ALGEBRIC FUNCTION.

4 Hours

3.1 Explicit function
3.2 Implicit function
3.3 Parametric forms
3.4 Problems

4. DIFFERENTATION OF TRIGNOMETRIC FUNCTION.

4 Hours

4.1 Differentional coefficient of sin x ,cos x ,tang x from first principle.
4.2 Differentional coefficient of Cosec x, Sec x, Cot x.
4.3 Differentiation of inverse trigonometric function.
4.4 Problems.

5. DIFFERENTIATION OF LOGARITHIMIC & EXPONENTIAL FUNCTION. 4 Hours

5.1 Differentiation of In x
5.2 Differentiation of log ax
5.3 Differentiation of ax
5.4 Differentiation of ex

5.5 Problems.

6. RATE OF CHANGE OF VARIABLE. 4 Hours

6.1 Increasing and decreasing function
6.2 Maxima and Minima values
6.3 Criteria for maximum and minimum values.
6.4 Method of finding maxima and minima.
6.5 Problems.

7. INTEGRATION. 8 Hours

7.1 Concept
7.2 Fundamental Formulas
7.3 Important Rules
7.4 Problems.

8. METHOD FOR INTEGRATION. 6 Hours

8.1 Integration by substitution
8.2 Integration by parts
8.3 Problems.

9. DEFINITE INTEGRALS. 6 Hours

9.1 Properties
9.2 Application to Area
9.3 Problems

10. PLANE ANALYTIC GEOMETRY & STRAIGHT LINE. 6 Hours

10.1 Coordinate System
10.2 Distance Formula
10.3 The Ratio Formulas
10.4 Inclination and slope of a line
10.5 The Slope Formula
10.6 Problems.

11. EQUATION OF STRAIGHT LINE. 6 Hours

11.1 Some Important Forms
11.2 General form
11.3 Angle formula
11.4 Parallelism and perpendicularity
11.5 Problems

12. THE EQUATION OF THE CIRCLE. 8 Hours

12.1 Standard form of equation
12.2 Central form of equation
12.3 General form of equation
12.4 Radius & coordinate of the Centre
12.5 Problems

MATH -212 APPLIED MATHEMATICS –II

INSTRUCTIONAL OBJECTIVES

1. USE THE CONCEPT OF FUNCTION AND THEIR LIMITS IN SOLVING SIMPLE PROBLEMS

1.1 Define a function
1.2 List all types of function
1.3 Explain the concept of limit and limit of a function
1.4 Explain fundamental theorem on limits
1.5 Derive some important limits
1.6 Solve simple problems on limits

2. UNDERSTAND THE CONCEPT OF DIFFERENTIAL COEFFICIENT

2.1 Derive mathematics expression for a differential coefficient.
2.2 Explain geometrical interpretation of different ional coefficient.
2.3 Differentiate a content, constant associated with a variable and the sum of finite number of function.
2.4 Solved related problems.

3. USE RULES OF DIFFERENTIAL TO SOLVE PROBLEMS OF ALGEBRIC FUNCTIONS.

3.1 Differentiate ab-initio Xn and (ax+b)n
3.2 Derive product, quotient and chain rules.
3.3 Find derivative of implicit function & explicit function.
3.4 Differentiate parametric forms; function w.r.t another function and by rationalization.
3.5 Solve problems using these formulas.

4. USE RULES OF DIFFERENTIATION TO SOLVE PROBLEMS OF ALGEBRIC FUNCTIONS.

4.1 Differentiate from first principle sin x ,cosx,tang x.
4.2 Derive formula for derivation of sec x,cosec x, cot x.
4.3 Find differential coefficient of inverse trigonometric functions.

5. USE RULES OF DIFFERENTIATION TO LOGARITHMIC AND EXPONENTIAL FUNCTIONS.

5.1 Derive formulas for differential coefficient of logarithmic and exponential functions.
5.2 Solve problems using these formulas.

6. UNDERSTAND RATE OF CHANGE OF ONE VARRIABLE WITH RESPECT TO ANOTHER.

6.1 Write expression for velocity, acceleration, and slope of a line.
6.2 Define an increasing and decreasing function, maxima and minima values, ofinflection.
6.3 Explain criteria for maxima and minima values of a function.
6.4 Solve problems involving rate of change of variables.

7. APPLY CONCEPT OF INTEGRATION IN SOLVING TECHNOLOGICALPROBLEMS

7.1 Explain the concept of integration
7.2 Write basic theorem of integration
7.3 List some important rules of integration
7.4 Derive fundamental formulas of integration
7.5 Solve problems based on these formulas /rules.

8. UNDERSTAND DIFFERENT METHODS OF INTEGRATION.

8.1 List standard formulas
8.2 Integrate a function by substitution method
8.3 Find integrals by the method of integration by parts
8.4 Solve problems using these methods.

9. UNDERSTAND THE METHOD OF SOLVING DEFENITE INTEGRALS.

9.1 Define definite integral
9.2 List properties of definite integrals using definite integrals.
9.3 Find areas under curves
9.4 Solve problems of definite integrals.

10. UNDERSTAND THE CONCEPT OF PLANE ANALYTIC GEOMETRY.

10.1 Explain the rectangular coordinate system
10.2 Locate points in different quadrants
10.3 Derive distance formula
10.4 Prove section formula
10.5 Derive slope formula
10.6 Solve problems using the above formulas.

11. USE EQUATIONS OF STRAIGHT LINE IN SOLVING PROBLEMS.

11.1 Define a straight line
11.2 State general form of equation of a straight line
11.3 Derive slope intercept and intercept forms of equations.
11.4 Derive expression for angle between two straight lines
11.5 Derives conditions of perpendicularity and parallelism lines
11.6 Solve problems involving these equations/formulas.

12. SOLVE TECHNOLOGICAL PROBLEMS USING EQUATION OF CIRCLE.

12.1 Define a circle
12.2 Describe standards, central and general forms of the equation of a circle.
12.3 Convert general forms to the central forms of equation of a circle.
12.4 Deduce formulas for the radius and the coordinates of the centre of a circle fromthe general form.
12.5 Derive equation of the circle passing through three given points.
12.6 Solve problems involving these equations

Mgm-221 BUSINESS MANAGEMENT AND INDUSTRIAL ECONOMICS

Total Contact Hours

Theory	32	T	P	C
Practical	0	1	0	1

AIMS The students will be able to develop management skills, get acquainted the learner with the principles of management and economic relations and develop commercial/economic approach to solve the problems in the industrial set-up.

COURSE CONTENTS

1. ECONOMICS 2 Hours

1.1 Definition: Adam Smith, Alfred Marshall, Prof. Robins.
1.2 Nature and scope
1.3 Importance for technicians.

2. BASIC CONCEPTS OF ECONOMICS 1 Hour

2.1 Utility
2.2 Income
2.3 Wealth
2.4 Saving
2.5 Investment
2.6 Value.

3. DEMAND AND SUPPLY. 2 Hours

3.1 Definition of demand.
3.2 Law of demand.
3.3 Definition of supply.
3.4 Law of supply.

4. FACTORS OF PRODUCTION. 2 Hours

4.1 Land
4.2 Labour
4.3 Capital
4.4 Organization.

5. BUSINESS ORGANIZATION. 3 Hours

5.1 Sole proprietorship.
5.2 Partnership
5.3 Joint stock company.

6. ENTERPRENEURIAL SKILLS 4 Hours

6.1 Preparing, planning, establishing, managing, operating and evaluating relevant resources in small business.
6.2 Business opportunities, goal setting.
6.3 Organizing, evaluating and analyzing opportunity and risk tasks.

7. SCALE OF PRODUCTION. 2 Hours

7.1 Meaning and its determination.

7.2 Large scale production.
7.3 Small scale production.

8. ECONOMIC SYSTEM **3 Hours**
8.1 Free economic system.
8.2 Centrally planned economy.
8.3 Mixed economic system.

9. MONEY. **1 Hour**
9.1 Barter system and its inconveniences.
9.2 Definition of money and its functions.

10. BANK. **1 Hour**
10.1 Definition
10.2 Functions of a commercial bank.
10.3 Central bank and its functions.

11. CHEQUE **1 Hour**
11.1 Definition
11.2 Characteristics and kinds of cheque.
11.3 Dishonor of cheque.

12. FINANCIAL INSTITUTIONS **2 Hours**
12.1 IMF
12.2 IDBP
12.3 PIDC

13. TRADE UNION **2 Hours**
13.1 Introduction and brief history.
13.2 Objectives, merits and demerits.
13.3 Problems of industrial labor.

14. INTERNATIONAL TRADE. **2 Hours**
14.1 Introduction
14.2 Advantages and disadvantages.

15. MANAGEMENT **1 Hour**
15.1 Meaning
15.2 Functions

16. ADVERTISEMENT **2 Hours**
16.1 The concept, benefits and draw-backs.
16.2 Principal media used in business world.

17. ECONOMY OF PAKISTAN **1 Hour**
17.1 Introduction
17.2 Economic problems and remedies.

BOOKS RECOMMENDED

1. Nisar-ud-Din, Business Organization, Aziz Publisher, Lahore
2. M. SaeedNasir,Introduction to Business, IlmiKitabKhana, Lahore.
3. S.M. Akhtar, An Introduction to Modern Economics, United Limited, Lahore.

Mgm-221 BUSINESS MANAGEMENT AND INDUSTRIAL ECONOMICS.

INSTRUCTIONAL OBJECTIVES

1. UNDERSTAND THE IMPORTANCE OF ECONOMICS.

1.1 State definition of economics given by Adam Smith, Alfred Marshall and Professor Robins.
1.2 Explain nature and scope of economics.
1.3 Describe importance of study of economics for technicians.

2. UNDERSTAND BASIC TERMS USED IN ECONOMICS.

2.1 Define basic terms, utility, income, wealth, saving, investment and value.
2.2 Explain the basic terms with examples

3. UNDERSTAND LAW OF DEMAND AND LAW OF SUPPLY.

3.1 Define Demand.
3.2 Explain law of demand with the help of schedule and diagram.
3.3 State assumptions and limitation of law of demand.
3.4 Define Supply.
3.5 Explain law of Supply with the help of schedule and diagram.
3.6 State assumptions and limitation of law of supply.

4. UNDERSTAND THE FACTORS OF PRODUCTION

4.1 Define the four factors of production.
4.2 Explain labour and its features.
4.3 Describe capital and its peculiarities.

5. UNDERSTAND FORMS OF BUSINESS ORGANIZATION.

5.1 Describe sole proprietorship, its merits and demerits.
5.2 Explain partnership, its advantages and disadvantages.
5.3 Describe joint stock company, its merits and demerits.
5.4 Distinguish public limited company and private limited company.

6. UNDERSTAND ENTERPRENEURIAL SKILLS

6.1 Explain preparing, planning, establishing and managing small business set up
6.2 Explain evaluating all relevant resources
6.3 Describe organizing analyzing and innovation of risk of task

7. UNDERSTAND SCALE OF PRODUCTION.

7.1 Explain scale of production and its determination.
7.2 Describe large scale production and it merits.
7.3 Explain small scale of production and its advantages and disadvantages.

8. UNDERSTAND DIFFERENT ECONOMIC SYSTEMS.

8.1 Describe free economic system and its characteristics.
8.2 Explain centrally planned economic system, its merits and demerits.
8.3 State mixed economic system and its features.

9. UNDERSTAND WHAT IS MONEY

9.1 Define money
9.2 Explain barter system and its inconveniences.
9.3 Explain functions of money.

10. UNDERSTAND BANK AND ITS FUNCTIONS.

10.1 Define bank.
10.2 Describe commercial bank and its functions.
10.3 State central bank and its functions.

11. UNDERSTAND CHEQUE AND DISHONOR OF CHEQUE.

11.1 Define cheque.
11.2 Enlist the characteristics of cheque.
11.3 Identify the kinds of cheque.
11.4 Describe the causes of dishonor of a cheque.

12. UNDERSTAND FINANCIAL INSTITUTIONS.

12.1 Explain IMF and its objectives.
12.2 Explain organizational set up and objectives of IDBP.
12.3 Explain organizational set up and objectives of PIDC.

13. UNDERSTAND TRADE UNION, ITS BACKGROUND AND FUNCTIONS.

13.1 Describe brief history of trade union.
13.2 State functions of trade union.
13.3 Explain objectives, merits and demerits of trade unions.
13.4 Enlist problems of industrial labour.

14. UNDERSTAND INTERNATIONAL TRADE.

14.1 Explain international trade.
14.2 Enlist its merits and demerits.

15. UNDERSTAND MANAGEMENT

15.1 Explain meaning of management.
15.2 Describe functions of management.
15.3 Identify the problems of business management.

16. UNDERSTAND ADVERTISEMENT.

16.1 Explain the concept of advertisement.
16.2 Enlist benefits and drawbacks of advertisement.
16.3 Describe principal media of advertisement used in business world.

17. UNDERSTAND THE ECONOMIC PROBLEMS OF PAKISTAN.

17.1 Describe economy of Pakistan.
17.2 Explain economic problems of Pakistan
17.3 Explain remedial measures for economic problems of Pakistan.

LT-214 Applied Chemistry-II

Total Contact Hours

		T	P	C
Theory	64			
Practical	192	2	6	4

Course Contents

1. WATER **7Hrs**

1.1 Occurrence & Impurities
1.2 Hard & Soft Water
1.3 Water for Boiler & Vacuum Dryer
1.4 Water as a Solvent
1.5 Water for Tannery
1.6 Requirements for

- Beam House Processes
- Chrome & Vegetable Tanning
- Dyeing & Fat-liquoring
- Finishing

2 COMPOUNDS OF SODIUM & CALCIUM **6Hrs**

2.1 Availability, Properties, Impurities & Uses in Leather Industry of

- Chloride Carbonate & Bicarbonate of Sodium
- Oxide & Hydroxide of Calcium
- Sulfite of Sodium
- Sodium Sulfate & Sodium Hydroxide

3 ALUM AND AMMONIUM COMPOUNDS **7Hrs**

3.1 ALUM **(**Preparation, Properties & Use in Leather Industry)

3.2 AMMONIUM COMPOUNDS

3.3 Availability, Properties & Use in Leather Industry: Ammonium Chloride, Sulfate & Hydroxide

4. CHEMICAL EQUILIBRIUM **6Hrs**

4.1 Reversible & Irreversible Reactions
4.2 Chemical Equilibrium Static, Dynamic Equilibrium & Static Equilibrium
4.3 Forward & Reverse Reaction
4.4 Law of Mass Action
4.5 Equilibrium Constant & its Derivation with Units
4.6 Applications of Chemical Equilibrium Constant
4.7 Common Ion Effect
4.8 Buffer Solutions

5. MODERN THEORIES OF COVALENT BONDING **7Hrs**

5.1 Valence Shell Electron Pair Repulsion Theory (VSEPR Concept)
5.2 Types of Molecules in VSEPR Theory (AB_2 Type, AB_3 Type & AB_4 Type Molecules)
5.3 Molecular Orbital Theory (MOT)
5.4 Diatomic Molecules
5.5 Paramagnetic Behavior of O_2 molecules
5.6 Hybridization
5.7 Sp^3(Methane & Ethane)
5.8 sp^2 (Ethene)
5.9 sp (Ethyne)

6 THE CHEMISTRY OF PERIODIC TABLE 6Hrs

6.1 PERIODIC CLASSIFICATION OF ELEMENTS / PERIODICITY

Different Blocks of Periodic Table (s, p & d)

HYDROGEN

- Physical Properties
- Reaction with Halogens
- Reaction with Oxygen
- Oxidation & Reduction
- Position of hydrogen in periodic table

7 OXYGEN AND SULFUR COMPOUNDS 6Hrs

7.1 Preparation, Properties & Use in Leather Industry of:

- Hydrogen Peroxide
- Sulfur Dioxide
- Sulfuric Acid

8 CHROMIUM & ITS COMPOUNDS 7Hrs

8.1 Fundamental Chemistry of Chromium

8.2 Dichromates of Sodium and Potassium

8.3 Chrome Tanning Salt

9 CHEMISTRY OF SOLUTIONS 6Hrs

9.1 Solution, its Components & Types
9.2 Concentration of Solution & its Units
9.3 Molarity (M), Molality (m), Mole Fraction (X) & Parts Per Million (P.P.m)
9.4 Solubility & Factors affecting it
9.5 Buffer solution

10 HYDRO CARBONS 6Hrs

10.1 Alkanes

10.2 Nomenclature

10.3 Homologous Series

10.4 Methane & Ethane

10.5 Chemical Reactions of Alkanes

10.6 Cyclo Alkanes

10.7 Alkenes

10.8 Nomenclature

10.9 Homologous Series

10.10 Ethene

10.11 General Reactions of Alkenes

10.12 Alkynes

10.13 Nomenclature

10.14 Acetylene

BOOKS RECOMMENDED

1. Text Book of Intermediate Chemistry (I & II)
2. Ilmi Applied Science by Sh. Atta Muhammad
3. Polytechnic Chemistry by J. N. Reedy Tata McGraw Hill (New Delhi)
4. Chemistry for Engineers by P.C. Jain (New Delhi, India)

LT-214 Applied Chemistry-II

Instructional objectives:

1. WATER

1.1 Define hard and soft water.
1.2 State the use of water as solvent and tannery.
1.3 Write water hardness units and methods of removal of water hardness.
1.4 Describe requirement of water Beam House Processes, Chrome & Vegetable Tanning, Dyeing, Fat-liquoring & Finishing.

2 COMPOUNDS OF SODIUM & CALCIUM

2.1 Describe the position of sodium and calcium in periodic table.
2.2 State the uses of in Leather Industry of Chloride Carbonate & Bicarbonate of Sodium.
2.3 Describe the chemistry of Sodium Sulfate & Sodium Hydroxide.
2.4 Describe the chemistry of Sodium Sulfite, Bisulfite & Thiosulfate.

3 ALUM AND AMMONIUM COMPOUNDS

3.1 Define alum and write its formula.
3.2 Describe the Preparation, Properties & Use of alum in Leather Industry.
3.3 Describe Availability, Properties & Use of Ammonium Chloride, Sulfate & Hydroxide in Leather Industry.

4 CHEMICAL EQUILIBRIUM

4.1 Define reversible and irreversible reactions.
4.2 Describe equilibrium constant, static equilibrium state and dynamic equilibrium state.
4.3 State Forward and Reverse Reaction.
4.5 State and prove the law of action.
4.5 State Equilibrium Constant & its Derivation with Units.
4.6 State Applications of Chemical Equilibrium Constant.
4.7 Describe Common Ion Effect and Buffer Solutions.

5 MODERN THEORIES OF COVALENT BONDING

5.1 Define a chemical bond with example.
5.2 Describe the basic postulates of Valence Shell Electron Pair Repulsion Theory(VSEPR Concept).
5.3 Describe the Types of Molecules in VSEPR Theory (AB_2 Type, AB_3 Type & AB_4 Type Molecules).
5.4 Describe the postulates of Molecular Orbital Theory (MOT).
5.5 Explain w.r.t MOT the Diatomic Molecules and Paramagnetic Behavior of O_2 molecule.
5.6 Define Hybridization and explain its following types.
Sp^3(Methane & Ethane)sp^2 (Ethene) sp (Ethyne)

6. THE CHEMISTRY OF PERIODIC TABLE

6.1 Define the periodic table and periodicity of properties.
6.2 Explain the Different Blocks (s, p & d) of Periodic Table.
6.2.1 Describe the names of elements present in s, p and d Blocks.
6.2.2 Explain the general properties of s, p and d block of Periodic Table.

HYDROGEN

- Describe the Physical Properties of hydrogen.
- Explain the Reaction of hydrogen with Halogens and Reaction with Oxygen.
- Explain Oxidation & Reduction.
- Explain reduction process with examples.
- Define oxidizing and reducing-agents and give it least six examples of
- each.

7. OXYGEN AND SULFUR COMPOUNDS

7.1 Describe Preparation, Properties & Use in Leather Industry of Hydrogen Peroxide.

7.2 Describe Preparation, Properties & Use in Leather Industry of Sulfur Dioxide.

7.3 Describe Preparation, Properties & Use in Leather Industry of Sulfuric Acid.

8 CHROMIUM & ITS COMPOUNDS

8.1 Describe the Fundamental Chemistry of Chromium.

8.2 Explain the chemistry of Dichromates of Sodium and Potassium

8.3 Describe the chemistry of Chrome Tanning Salt.

8.4 Describe the uses of chromium compounds in leather industry.

9 CHEMISTRY OF SOLUTIONS

9.1 Define a solution with examples.

9.2 Describe the components of solution.

9.3 Describe the types of solutions.

9.4 Explain Concentration of Solution & its Units.

9.5 Define Molarity (M), Molality (m), Mole Fraction (X) & Parts Per Million (P.P.m).

9.6 Describe buffer solutions in detail.

10 HYDRO CARBONS

10.1. Define hydrocarbons with examples:Alkanes

10.2 Describe the Nomenclature of alkanes.

10.3 Explain Homologous Series.

10.4 Discuss the chemistry of Methane & Ethane.

10.5 Discuss Chemical Reactions of Alkanes.

Alkenes

10.6 Describe Nomenclature of alkenes.

10.7 Explain Homologous Series.

10.8 Discuss the General Reactions of Alkenes.

Alkynes

10.9 Describe the Nomenclature of alkynes.

10.10 Discuss the chemistry of Acetylene.

LT-214 Applied Chemistry-II

List of Practical:-

1. To determine the percentage impurity of NaOH in the given solution volumetrically.
2. To determine the impurity of NaHCO3 in baking soda the given sample of baking.
3. To determine the percentage composition of given solution of K2C2O4 volumetrically.
4. Purify the given sample of impure sodium chloride by passing HCl gas.
5. To determine the solubility of Mohr's salt at room temperature volumetrically.
6. To determine the percentage purity of Mohr's salt volumetrically.
7. Separate the mixture of inks by paper chromatography.
8. Separate the given mixture of iron fillings and sand by physical method.
9. Determine the melting point of given solids (naphthalene and biphenyl).
10. Determine the boiling point of given liquids (acetone and ethyl alcohol).
11. Demonstrate sublimation using ammonium chloride.
12. Prepare 100cm^3 of 0.01M hydrochloric acid solution from given 1M solution.
13. Prepare 100cm^3 of 0.1M sodium hydroxide solution from given 1M solution.
14. Demonstrate the effect of temperature on solubility.
15. Determine the PH of given solutions.
16. Detection of acid radicals.
17. Detection of basic radicals.
18. Find the volume of different liquids by volumetric cylinder.
19. Find the mass of different compounds by electric balance.
20. Titrate the given acid and base to find unknown composition

Total Contact Hours

Theory	64	T	P	C
Practical	192	2	6	4

COURSE CONTENTS

1. PRE-DYEING OPERATIONS 9Hrs

1.1 Preservation of Tanned Stock
1.2 Ageing Effect
1.3 Selection & Sorting
1.4 Sammying & Setting
1.5 Splitting
1.6 Shaving

2. NEUTRALIZATION 7Hrs

2.1 Objectives & Function of Neutralization
2.2 Degree of Neutralization
2.3 Neutralizing Agents
2.4 Neutralization Procedure for Chrome & Vegetable Tanned Leather

3. RETANNING 8Hrs

3.1 Objectives & Methods
3.2 Vegetable Retanning Agents
3.3 Syntans

- Classification
- Properties

3.4 Rechroming
3.5 Retanning with Zirconium
3.6 Methods

4. DYEING OF LEATHER 8Hrs

4.1 Types of Anionic Dyestuffs

- Acid Dyes
- Acid selected Dyes
- Pre-metalized Dyes
- Direct Dyes
- Dye Woods
- Comparison of Light Fastness & Penetration of various types of Anionic Dyes

4.2 Acid Dyes

- Structure of Acid Dye Molecule
- Effect of Temperature & Concentration
- Effect of Tannage & pH

- Properties of Common Yellow, Red & Blue Acid Dyes

4.3 Cationic dyes

- Structure of Cationic Dye Molecule
- Application of Cationic Dyes in Leather Dyeing

4.4 Drum Dyeing of Chrome Tanned Leather

- Factors Effecting Drum Dyeing
- Dyeing of Full Chrome Leather
- Dyeing of Chrome Retanned Leather
- Dyeing of Chrome Crust Stock
- No Float Dyeing
- Sandwich Dyeing

4.5 Brush Staining Method

- Spray & Curtain Coating Techniques of Dyeing
- Dyeing of Vegetable Tanned Leather

5. FAT-LIQUORING OF LEATHER 9Hrs

5.1 Types of Fat-liquors

- Non-ionic
- Cationic and Anionic
- Multi-charge Fat-liquors

5.2 Factors Effecting Fat-liquoring of Chrome Leather

5.3 Fat-liquoring Methods & Techniques

6. DRYING OF LEATHER 7Hrs

6.1 Mechanism of Drying & Rate of Drying

6.2 Drying Methods

- Hanging
- Toggle Drying
- Paste Drying
- Vacuum Drying
- Micro Wave Drier & High Frequency Drying
- Freeze Drying of Raw Hides & Skins

7. SOFTENING PROCESSES 8Hrs

7.1 Staking

- Hand Staking & Perching
- Slocomb Staking Machine
- Rotary Staking Machine

- Vertical Frame Staker
- Schlageter & Molissa System

7.2 Dry drumming

7.3 Boarding

8. WATER REPELLENCY & WATER PROOFING 8Hrs

8.1 Methods for Water Repellency
8.2 Materials for Water Repellency
8.3 Water Proofing of Chrome Tanned Leather
8.4 Water Proofing of Vegetable Tanned Leather

Recommended Books

7. K.T Sarkar- "Theory and Practice of Leather Manufacture", Ajoy Sorcar, 1981
8. Choichi Ogiwara-" Practical Guidelines to Light Leather Processing" -----Limited
9. P.S Briggs,-" Tropical Products Institute Gloving Clothing and Special Leather" J.C Barrett TPI
10. Eric Ogilvie-" Leather Finishing" Nene College Northampton, England
11. Anthony D Covington-" Tanning Chemistry, The Science of Leather" RSC Publishing
12. Alexander Watt-" Leather Manufacture" Published by William Clowes and son ITD, London

LT-224 Principles of Leather Manufacturing-II

Instructional objectives:

1. PRE-DYEING OPERATIONS

1.1 Explanation of different materials in Preservation of Tanned Stock
1.2 Precautions for Ageing Effect
1.3 Importance of Selection & Sorting
1.4 Effects of Sammying & Setting
1.5 Importance of Splitting
1.6 Importance of Shaving

2. NEUTRALIZATION

2.1 Definition of Objectives & Function of Neutralization
2.2 Explanation about Degree of Neutralization
2.3 Chemicals used in Neutralizing Agents
2.4 Methods and precautions of Neutralization Procedure for Chrome & Vegetable Tanned Leather

3. RETANNING

3.1 Objectives & Methods of retanning
3.2 Explanation of different materials in Vegetable Retanning Agents
3.3 Explanation of different synthetic retanning materials in Syntans

- Classification
- Properties

3.4 Importance of Rechroming
3.5 Importance of Retanning with Zirconium
3.6 Methods of different retanning

4. DYEING OF LEATHER

4.1 Study and Explanation of the Types of Anionic Dyestuffs

- Acid Dyes
- Acid selected Dyes
- Pre-metalized Dyes
- Direct Dyes
- Dye Woods
- Comparison of Light Fastness & Penetration of various types of Anionic Dyes

4.2 Study and Explanation of Acid Dyes

- Structure of Acid Dye Molecule
- Effect of Temperature & Concentration
- Effect of Tannage & pH
- Properties of Common Yellow, Red & Blue Acid Dyes

4.3 Study and Explanation of Cationic dyes

- Structure of Cationic Dye Molecule
- Application of Cationic Dyes in Leather Dyeing

4.4 Study and Explanation of Drum Dyeing of Chrome Tanned Leather

- Factors Effecting Drum Dyeing
- Dyeing of Full Chrome Leather
- Dyeing of Chrome Retanned Leather
- Dyeing of Chrome Crust Stock
- No Float Dyeing
- Sandwich Dyeing

4.5 Study and Explanation of Brush Staining Method

- Spray & Curtain Coating Techniques of Dyeing
- Dyeing of Vegetable Tanned Leather

5 FAT-LIQUORING OF LEATHER

5.1 Explanation of Types of Fat-liquors

- Non-ionic
- Cationic and Anionic
- Multi-charge Fat-liquors

5.2 Explanation of Factors Effecting Fat-liquoring of Chrome Leather

5.3 Explanation of Fat-liquoring Methods & Techniques

6 DRYING OF LEATHER

6.1 Importance of Mechanism of Drying & Rate of Drying

6.2 Procedures of Drying Methods

- Hanging
- Toggle Drying
- Paste Drying
- Vacuum Drying
- Micro Wave Drier & High Frequency Drying
- Freeze Drying of Raw Hides & Skins

7 SOFTENING PROCESSES

7.1 Process of Staking

- Hand Staking & Perching
- Slocomb Staking Machine
- Rotary Staking Machine
- Vertical Frame Staker
- Schlageter & Molissa System

7.2 Process of Dry drumming

7.3 Process of Boarding

8 WATER REPELLENCY & WATER PROOFING

8.1 Different Methods for Water Repellency
8.2 Different chemicals of Materials for Water Repellency
8.3 Chemicals for Water Proofing of Chrome Tanned Leather
8.4 Chemicals for Water Proofing of Vegetable Tanned Leather

LT-224 Principles of Leather Manufacturing-II

List of Practical:

- MANUFACTURE OF CHROME AND VEGETABLE CRUST

1. From Buff Calf
    - Soaking
    - Liming and depilation
    - Deliming and bating
    - Degreasing
    - Pickling
    - Tanning
    - Samming, splitting, shaving
    - Retanning, dying, fat liquoring
    - Machine operations

2 From Cow Calf

- Soaking
- Liming and depilation
- Deliming and bating
- Degreasing
- Pickling
- Tanning
- Samming, splitting, shaving
- Retanning, dying, fat liquoring
- Machine operations

3 From Goat

- Soaking
- Liming and depilation
- Deliming and bating
- Degreasing
- Pickling
- Tanning
- Samming, splitting, shaving
- Retanning, dying, fat liquoring
- Machine operations

4 From Sheep

- Soaking
- Liming and depilation
- Deliming and bating
- Degreasing
- Pickling
- Tanning
- Samming, splitting, shaving
- Retanning, dying, fat liquoring
- Machine operations

LT-234 Crusting of upper and soft Leather

Total Contact Hours

		T	P	C
Theory	64			
Practical	192	2	6	4

COURSE CONTENTS

1. MANUFACTURE OF CALF & COW SIDE UPPER LEATHER 8 Hrs

1.1 Full Grain Leather

- Full Chrome
- Chrome Retanned
- Glazed Finish

1.2 Corrected Grain Leather

1.3 Suede from Calf

1.4 Softie Upper Leather

2. BUFF CALF LEATHER 7 Hrs

2.1 Leathers from small Buffalo Calves

2.2 Semi-chrome Leather

2.3 BUFFALO SIDE LEATHER

- Full Grain Buff side
- Corrected Grain Leather
- Cow Calf Suede

3. MANUFACTURE OF GOAT SKIN UPPER LEATHER 7 Hrs

3.1 Glazed Kid

3.2 Softie Nappa

3.3 Goat Skin Suede

4. MANUFACTURE OF SPECIALIZED UPPER LEATHERS 5Hrs

4.1 White Finished Leather

4.2 Nubuck

4.3 Shrunken Grain Upper Leather

4.4 Zuggrain Leather

4.5 Water Proof Leather

4.6 Washable Leather

4.7 Chrome Tanned Lining

4.8 Vegetable Tanned Lining

5. TYPE & USES OF LIGHT LEATHERS 9Hrs

5.1 Raw Materials, Type of Tannage & Uses for following Kinds of Light Leather

5.2 Glove Leather

5.3 Clothing Leather

5.4 Wool Sheep Skin

5.5 Chamois Leather

6. PROPERTIES OF GARMENT & GLOVING LEATHER 7Hrs

6.1 Required Physical Properties

6.2 Pattern & Cutting Area

6.3 Artistic Merits & Uniformity

6.4 Weight & Color

6.5 Stitch Tear Strength

6.6 Tensile Strength & Elongation at Break

6.7 Dye-Fastness & Resistance to Water Spotting

6.8 Water Repellency

6.9 Rub Fastness & Perspiration Resistance

6.10 Dry Cleanability & Resistance to Pressing

6.11 Requirements of Gloving Leather

6.12 Men's & Ladies Gloves

6.13 Sports Gloves, Working Gloves

6.14 Non-elastic Stretch

6.15 Required Tannage for Gloving & Garment Leather

6.16 From Cow Hides

6.17 From Sheep Skins

6.18 From Goat Skins

7. MANUFACTURE OF GLOVING LEATHER 7Hrs

7.1 From Sheep & Goat Skins

7.2 From Buff Calf & Cow Calf

7.3 From Camel Hide Skins

7.4 From Deer Skins

7.5 From Kangaroo Skins

7.6 Work Gloves Leather from Splits

8. FOOTBALL AND SPECIALIZED LEATHER 8Hrs

8.1 Hand Ball Leathers from Cow Bends

8.2 Foot Bait Feathers from Cow

8.3 Finishing of Football Leather

8.4 Leather for Sports Gloves

8.5 Chamois

8.6 Wool Sheep Skins

8.7 Gas Meter Leather

9. SPECIALIZED FINISHING 6Hrs

9.1 Patent

9.2 Pearfised & Metallic Effects

9.3 Antique Effect

9.4	Polish & Waxy Finish
9.5	Hunting Suede for Upper
9.6	Pigmented Lining & Socks
9.7	Embossed Splits for Leather Goods
9.8	Processing of Vegetable Splits

Recommended Books

1. K.T Sarkar- “Theory and Practice of Leather Manufacture”, Ajoy Sorcar, 1981
2. Choichi Ogiwara-“ Practical Guidelines to Light Leather Processing” -----Limited
3. P.S Briggs,-“ Tropical Products Institute Gloving Clothing and Special Leather” J.C Barrett TPI
4. Eric Ogilvie-“ Leather Finishing” Nene College Northampton, England
5. Anthony D Covington-“ Tanning Chemistry, The Science of Leather” RSC Publishing
6. Alexander Watt-“ Leather Manufacture” Published by William Clowes and son ITD, London

LT-234 Crusting of upper and soft Leather

Instructional objectives:

1. MANUFACTURE OF CALF & COW SIDE UPPER LEATHER

1.1 Explanation the recepies of Full Grain Leather

- Full Chrome
- Chrome Retanned
- Glazed Finish

1.2 Explanation the recepies of Corrected Grain Leather

1.3 Explanation the recepies of Suede from Calf

1.4 Explanation the recepies of Softie Upper Leather

2. BUFF CALF LEATHER

2.1 Explanation the recepies of Leathers from small Buffalo Calves

2.2 Explanation the recepies of Semi-chrome Leather

2.3 Explanation the recepies of BUFFALO SIDE LEATHER

- Full Grain Buff side
- Corrected Grain Leather
- Cow Calf Suede

3. MANUFACTURE OF GOAT SKIN UPPER LEATHER

3.1 Explanation the recepies of Glazed Kid

3.2 Explanation the recepies of Softie Nappa

3.3 Explanation the recepies of Goat Skin Suede

4. MANUFACTURE OF SPECIALIZED UPPER LEATHERS

4.1 Explanation the recepies of White Finished Leather

4.2 Explanation the recepies of Nubuck

4.3 Explanation the recepies of Shrunken Grain Upper Leather

4.4 Explanation the recepies of Zuggrain Leather

4.5 Explanation the recepies of Water Proof Leather

4.6 Explanation the recepies of Washable Leather

4.7 Explanation the recepies of Chrome Tanned Lining

4.8 Explanation the recepies of Vegetable Tanned Lining

5. TYPE & USES OF LIGHT LEATHERS

5.1 Introduction of Raw Materials, Type of Tannage & Uses for following Kinds of Light Leather

5.2 Explanation of different types of Glove Leather

5.3 Explanation of different types of Clothing Leather

5.4 Explanation of different types of Wool Sheep Skin

5.5 Explanation of different types of Chamois Leather

6. PROPERTIES OF GARMENT & GLOVING LEATHER

6.1 Importance and quality control of Required Physical Properties
6.2 Importance and quality control of Pattern & Cutting Area
6.3 Importance and quality control of Artistic Merits & Uniformity
6.4 Importance and quality control of Weight & Color
6.5 Importance and quality control of Stitch Tear Strength
6.6 Importance and quality control of Tensile Strength & Elongation at Break
6.7 Importance and quality control of Dye-Fastness & Resistance to Water Spotting
6.8 Importance and quality control of Water Repellency
6.9 Importance and quality control of Rub Fastness & Perspiration Resistance
6.10 Properties and quality control of Dry Cleanability & Resistance to Pressing
6.11 Importance and quality control of Requirements of Gloving Leather
6.12 Importance and quality control of Men's & Ladies Gloves
6.13 Importance and quality control of Sports Gloves, Working Gloves
6.14 Importance and quality control of Non-elastic Stretch
6.15 Importance and quality control of Required Tannage for Gloving & Garment Leather
6.16 Importance and quality control of From Cow Hides
6.17 Importance and quality control of From Sheep Skins
6.18 Importance and quality control of From Goat Skins

7. MANUFACTURE OF GLOVING LEATHER

7.1 Recipies of From Sheep & Goat Skins
7.2 Recipies of From Buff Calf & Cow Calf
7.3 Recipies of From Camel Hide Skins
7.4 Recipies of From Deer Skins
7.5 Recipies of From Kangaroo Skins
7.6 Recipies of Work Gloves Leather from Splits

8. FOOTBALL AND SPECIALIZED LEATHER

8.1 Introduction and properties of Hand Ball Leathers from Cow Bends
8.2 Definition of Foot Bait Feathers from Cow
8.3 Explanation of Finishing of Football Leather
8.4 Introduction and properties of Leather for Sports Gloves
8.5 Introduction and properties of Chamois
8.6 Introduction and properties of Wool Sheep Skins
8.7 Introduction and properties of Gas Meter Leather

9. SPECIALIZED FINISHING

9.1 Recipies of Patent
9.2 Recipies of Pearfised & Metallic Effects
9.3 Recipies of Antique Effect
9.4 Recipies of Polish & Waxy Finish

LT-234 Crusting of upper and soft Leather

List of Practical:

- BELTING LEATHER
    - Soaking
    - Liming and depilation
    - Deliming and bating
    - Pickling
    - Vegetable tanning
    - Bleaching
    - Neutralization
    - Retanning, dying, fat liquoring
- Manufacturing of Belting, Saddlery & Harness Leather from Vegetable Crust
- UPHOLSTERY LEATHER
    - Soaking
    - Liming and depilation
    - Deliming and bating
    - Pickling
    - Vegetable tanning
    - Bleaching
    - Neutralization
    - Retanning, dying, fat liquoring
- Manufacture of Vegetable Upholstery Leather
- SOLE LEATHER
    - Soaking
    - Liming and depilation
    - Deliming and bating
    - Pickling
    - Pre-tanning
    - Vegetable tanning
    - Machine operations
- Chrome Retanned Sole Leather
- Water Proof Sole Leather
- DYEING OF VEGETABLE TANNED LEATHER
- MANUFACTURE OF SEMI-CHROME LEATHER
- Buff Calf for Glazed Finish
- Goat for Glazed Finish

LT-244 Shoe Manufacturing

Total Contact Hours

Theory	64	T	P	C
Practical	192	2	6	4

Course Contents

1. INTRODUCTION TO BOOTS AND SHOES 8Hrs

1.1 Parts of a shoe
1.2 Distinguish factor of different footwear styles
1.3 Edge treatment techniques
1.4 Decorations

2. FOOT AND FOOT MEASUREMENTS 8Hrs

2.1 Shape of the foot
2.2 Pressure distribution under the foot during walking
2.3 Foot prints

3. SHOE SIZES AND SIZING SYSTEM 6Hrs

3.1 Principles of size and fit
3.2 French size system (Paris points)
3.3 English size system
3.4 Mondo-point system

4. UPPER AND LINING MATERIALS 8Hrs

4.1 Shoe upper leather
4.2 Woven and knitted fabrics
4.3 Synthetic upper material
4.4 Lining leather
4.5 Lining fabrics
4.6 Lining coated fabrics
4.7 Miscellaneous insole materials

5. INSOLE MATERIALS 6Hrs

5.1 Insole leather
5.2 Leather board
5.3 Cellulose board
5.4 Non-Woven materials

6. SOLING MATERIALS 10Hrs

6.1 Sole leather
6.2 Rubber Soling materials
6.3 Polyvinylchloride (PVC)
6.4 Thermo-plastic rubber (T.P.R)
6.5 Polyurethane soling materials
6.6 Microcellular rubber
6.7 Ethylene vinyl acetate (EVA)
6.8 Miscellaneous soling materials

7. MISCELLANEOUS SOLING MATERIAL USED IN SHOE MANUFACTURING 10Hrs

7.1 Toe puffs and stiffeners
7.2 Shanks
7.3 Heels

7.4 Sewing threads
7.5 Adhesives
7.6 Other materials

8. MODELING & PATTERN ENGINEERING OF SHOE UPPERS 8Hrs

8.1 Form cutting (Copying last)
8.2 Paper method
8.3 Tape method
8.4 Folding copies
8.5 Standard design light boots for men
8.6 Standard design oxford boots for men
8.7 Standard design Gibson boot for men
8.8 Standard design of insole by plain foot method
8.9 Standard design of insole by Dr Shady.

Recommended Books

1. Eric Ogilvie-" Leather Finishing" Nene College Northampton, England
2. Anthony D Covington-" Tanning Chemistry, The Science of Leather" RSC Publishing
3. Alexander Watt-" Leather Manufacture" Published by William Clowes and son ITD, London
4. J.A.J Luijten, P.W.J Velden- Principles of Shoe Designing Vol.1 & 2, TNO Leather & Shoe Research Institute
5. J.A.J Luijten, P.W.J Velden- Design, Pattern Engineering and Grading of Footwear Vol.1 & 2, TNO Leather & Shoe Research Institute

LT-244 Shoe Manufacturing

Instructional Objectives

1 INTRODUCTION TO BOOTS AND SHOES

1.1 Describe Parts of a shoe

1.2 Explain distinguish factor of different footwear styles

1.3 Describe Edge treatment techniques

1.4 Explain Decorations

2 FOOT AND FOOT MEASUREMENTS

2.1 Describe Shape of the foot

2.2 Explain pressure distribution under the foot during walking

2.3 Describe foot prints

3 SHOE SIZES AND SIZING SYSTEM

3.1 Explain principles of size and fit

3.2 Describe french size system (Paris points)

3.3 Explain english size system

3.4 Describe mondo-point system

4 UPPER AND LINING MATERIALS

4.1 Explain shoe upper leather

4.2 Describe woven and knitted fabrics

4.3 Explain synthetic upper material

4.4 Explain lining leather

4.5 Describe lining fabrics

4.6 Explain lining coated fabrics

4.7 Describe miscellaneous insole materials

5 INSOLE MATERIALS

5.1 Explain Insole leather

5.2 Describe leather board

5.3 Explain Cellulose board

5.4 Explain non-Woven materials

6 SOLING MATERIALS

6.1 Describe Sole leather

6.2 Explain rubber Soling materials

6.3 Describe polyvinylchloride (PVC)

6.4 Explain thermo-plastic rubber (T.P.R)

6.5 Describe Polyurethane soling materials

6.6 Explain microcellular rubber

6.7 Describe ethylene vinyl acetate (EVA)

6.8 Describe miscellaneous soling materials

7 MISCELLANEOUS SOLING MATERIAL USED IN SHOE MANUFACTURING

7.1 Explain toe puffs and stiffeners

7.2 Describe shanks

7.3 Explain heels

7.4 Describe sewing threads

7.5 Explain adhesives

7.6 Describe other materials

8. Modeling & Pattern Engineering of Shoe Uppers

8.1Describe form cutting (Copying last)

8.2 Explain paper method

8.3 Describe tape method

8.4 Explain folding copies

8.5 Describe standard design light boots for men

8.6 Explain standard design oxford boots for men

8.7 Explain tandard design Gibson boot for men

8.8 Describe dtandard design of insole by plain foot method

8.9 Explain standard design of insole by Dr Shady.

LT-244 Shoe Manufacturing

List of Practical:

- Making form cutting (Copying last)
- Create a mean form by using paper method
- Create a mean form by using tape method
- Create a mean form by using folding copies
- Practice to perform toe puffs and stiffeners
- Practice to perform shanks
- Practice to perform heel attaching
- Practice to perform sewing threads in machines
- Apply different adhesives
- Create a standard design light boots for men
- Create a standard design oxford boots for men
- Create a standard design Gibson boot for men
- Create a standard design of insole by plain foot method
- Create a standard design of insole by Dr Shady.
- Perform French size system (Paris points)
- Perform English size system
- Perform mondo-point system
- Create a shape of the foot by using formula
- Create foot prints with sketching the human foot
- Create some styles of fashion shoes
    - Gents shoe
    - Ladies shoe
    - Chappal
    - Sandal

اسلامیات/مطالعہ پاکستان

نصاب (سال سوم)

		ٹی	پی	سی
حصہ اول	اسلامیات Gen 311	1	0	1

حصہ دوم مطالعہ پاکستان

موضوعات کل وقت 20 گھنٹے

1 قرآن مجید

سورۃ الفاتحہ۔ آیۃ الکرسی۔ سورۃ البقرہ کی آخری آیات از امن الرسول تا آخر اور سورہ اخلاص معہ ترجمہ وتشریح

2 دس منتخب احادیث معہ ترجمہ وتشریح

- بنی الاسلام علی خمس شهادة ان لا اله الا الله و اقام الصلوة و ايتاء الزكوة و حج البيت وصوم رمضان
- الدين النصيحه
- المستشار الموتمن
- للمومن على المومن ست خصال يعوده اذا مرض و يشمته اذامات ويجيبه اذا دعاه ويسلم عليه اذالقيه و يشمت اذا عطس و ينصح له اذاغاب او شهد لا تخن من خانک
- لا يدخل الجنة قاطع
- ان الله حرم عليكم عقوق الامهات و اضاعة المال
- يسرا ولا تعسرا بشراً ولا تنفرا
- ذاق طعم الايمان من رضى بالله و بالاسلام دينا و بمحمدنبياً
- افضل الذكر لااله الا الله

3 حقوق وفرائض

حصول تعلیم بطور فرض ، والدین اور اولاد کے حقوق وفرائض، ہمسایہ کے حقوق

4 اسلام کی اخلاقی اقدار

صبر واستقلال۔ عفو ودرگزر۔ ایفائے عہد۔ اخوت۔ ایثار وقربانی

نصاب اخلاقیات (غیر مسلم طلباء کے لئے)

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سال سوم Gen-311

کل وقت 20 گھنٹے

موضوعات

- احساس ذمہ داری
- مثبت ذہن
- عدل وانصاف
- قومی خدمت کا جذبہ
- فکر ونظر کی پاکیزگی
- احترام آدمیت
- شائستگی
- عفو ودرگذر
- بردباری
- خود انحصاری
- اثر ونفوذ
- جامعیت
- اپنی ذات کی معرفت (بذریعہ ہم عصر طلباء۔ اساتذہ۔ اہم شخصیات، ادارہ)

منتخب احادیث

عمومی مقصد۔ احادیث کی روشنی میں اسلامی تعلیمات پر عمل پیرا ہو سکے۔

خصوصی مقاصد

- احادیث کا ترجمہ بیان کر سکے۔
- احادیث کی تشریح کر سکے۔
- معاشرتی اور انفرادی زندگی میں احادیث سے راہنمائی حاصل کر سکے۔

حقوق و فرائض

عمومی مقصد ۔ اسلامی معاشرے کا ایک اچھا فرد بن سکے۔

خصوصی مقاصد

- والدین کے حقوق و فرائض بیان کر سکے۔
- ہمسائیوں کے حقوق بیان کر سکے۔
- اسلام میں حقوق و فرائض کی اہمیت بیان کر سکے۔
- حقوق و فرائض کی آگاہی کی صورت میں اپنے اندر خدمت خلق کا جذبہ پیدا کر سکے۔

اسلامی اقدار

عمومی مقصد ۔ طالب علم:

جان سکے گا کہ تعلیم کا مقصد حسن اخلاق سے متصف ہونا ہے

خصوصی مقاصد

- اخلاق کے معنی و مفہوم کو بیان کر سکے۔
- اسلام میں حسن اخلاق کی اہمیت بیان کر سکے۔
- قرآن و سنت کی روشنی میں صبر و استقلال کی اہمیت بیان کر سکے۔
- اسلام میں عفو و درگذر کی اہمیت بیان کر سکے۔
- ایفائے عہد کی اہمیت بیان کر سکے۔
- اخوت کے معنی و مفہوم کو بیان کر سکے۔
- اخوت اسلامی کی اہمیت بیان کر سکے۔
- اسلام کی اعلیٰ اقدار کو اپنا کر مثالی معاشرہ پیدا کر سکے۔

نصاب (سال سوم)

مطالعہ پاکستان	Gen-311	ٹی	پی	سی
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حصہ دوم

کل وقت 12 گھنٹے

قیام پاکستان

موضوعات

- باؤنڈری کمیشن
- ریڈکلف ایوارڈ
- تقسیم بنگال وکلکتہ
- تقسیم پنجاب
- مسئلہ مہاجرین
- ریاستوں کا الحاق
- ریاست جموں وکشمیر
- نہری پانی کا تنازعہ
- قرارداد مقاصد
- علماء کے بائیس نکات
- 1956 - 1962 اور 1973 کے دساتیر کی اسلامی دفعات
- پاکستان کا محل وقوع اور اس کی جغرافیائی اہمیت
- قدرتی وسائل (تیل، گیس، کوئلہ)

مطالعہ پاکستان

حصہ دوم

قیام پاکستان

تدریسی مقاصد

عمومی مقصد قیام پاکستان کے بعد درپیش مسائل سے آگاہی حاصل کرے اور بیان کرے۔

خصوصی مقاصد

- باؤنڈری کمیشن کی تشکیل اور اس کے فرائض بیان کر سکے۔
- ریڈکلف اور اس کے ایوارڈ کے بارے میں بیان کر سکے۔
- بنگال اور کلکتہ کی تقسیم کی وجوہات بیان کر سکے۔
- پنجاب کی تقسیم کی تفصیل بیان کر سکے۔
- مہاجرین کی آمد سے جو مسائل پیدا ہوئے انہیں بیان کر سکے۔
- ریاستوں کے الحاق کے بارے میں تفصیل بیان کر سکے۔
- ریاست جموں کشمیر کے بارے میں بیان کر سکے۔
- نہری پانی کے تنازعہ کو بیان کر سکے۔
- قرارداد مقاصد کی تفصیلات بیان کر سکے۔
- 22 علماء کے متفقہ اسلامی نکات بیان کر سکے۔
- قیام پاکستان کے بعد نفاذ اسلام کی کوششوں کو بیان کر سکے۔
- پاکستان کے محل وقوع اور اس کی جغرافیائی اہمیت بیان کر سکے۔
- پاکستان میں قدرتی وسائل (تیل، گیس، کوئلہ) کے بارے میں بیان کر سکے۔

LT-314 Principles of Leather Manufacturing-III

Total Contact Hours				
Theory	64	**T**	**P**	**C**
Practical	192	2	6	4

Course Contents

1. LEATHER FINISHING OBJECTIVES — 10 Hrs

1.1 Need of Finishing of Leather

1.2 Properties Required from Leather Finishes

1.3 Various Types of Leather Finishes

2. COMPOSITION OF LEATHER FINISHES — 9 Hrs

2.1 Coloring Material

- Definition & Types of Pigments
- Source of White, Black, Yellow, Red & Blue Pigments
- Pigment Dispersion

2.2 Film Forming Materials

- Protein Binders
- Acrylic Resins, General Properties & Types
- Diene Resins & Co-polymers
- Poly Urethane

2.3 Lacquers Solvents & Diluent

- Nitro-cellulose Lacquers
- Solvents for Lacquers
- Plasticisers for Cellulose Lacquers

2.4 Auxiliaries

- Plasticisers & Fixing Agents for Protein Binders
- Wetting Agents, Dispersing Agents
- Waxes, Fillers & Plate Releasing Agents
- Thickeners
- Mating Agents or Duller
- Silicones, Modifiers & Slip Agents

3. FORMULATION & APPLICATION OF LEATHER FINISHES — 9 Hrs

3.1 Basic Film Formulations

- Impregnation Mixtures
- Staining

- Sealer Coat
- Base Coats
- Seasons & Top Coats

3.2 Specific Finish Formulation

- Plain Finish
- Glaze Finishes
- Resin Finishes
- Patent & Wet Look Finish

3.3 Application of Leather Finishes

- Spraying - Manual, Auto, Airless
- Padding - Manual, Machine
- Roller Coating - Forwards, Reverse
- Curtain Coating.

4. MECHANICAL OPERATIONS IN FINISHING **7 Hrs**

4.1 Buffing & De dusting
4.2 Polishing
4.3 Boarding
4.4 Ironing & Smooth Plating
4.5 Embossing
4.6 Glazing.
4.7 Milling

5. CAUSES & REMEDIES FOR DEFECTS IN FINISH MIXTURE **9 Hrs**

5.1 Putrefaction
5.2 Settling of Pigments
5.3 Coagulation of Finishes
5.4 Change in Color
5.5 Flocculation of Pigments

6. PROBLEMS IN LEATHER FINISHING **11 Hrs**

6.1 Impregnation Defects – Causes & Remedies
6.2 Insufficient Rate or Depth of Penetration
6.3 Inadequate Break Improvement
6.4 Firming of Leather
6.5 Difficulties in Re-wetting
6.6 Difficulties in Rebuffing
6.7 Finish Application Defects – Causes & Remedies
6.8 Streaking of Pad Coat
6.9 Balling-up of Pad Coats
6.10 Poor Wetting-out of Pad Coats
6.11 Poor Wetting-out of Spray Coats

6.12 Blushing of Lacquers & Lacquer Emulsions
6.13 Mechanical & Handling difficulties during Finishing
6.14 Sticking & Air Marking during Smooth Plating
6.15 Embossing Problems
6.16 Sticking of Leather in Piles

7. CAUSES & REMEDIES FOR FINISHED LEATHER DEFECTS 9 Hrs

7.1 Poor Break of Grain
7.2 Poor Wet Rub Resistance
7.3 Poor Dry Rub & Abrasion Resistance
7.4 Poor Flexibility, Elasticity & Adhesion of Finish
7.5 Inadequate Heat Resistance
7.6 Lack of Uniformity
7.7 Insufficient Coverage
7.8 Poor Light Fastness
7.9 Spewing

Recommended Books

1. K.T Sarkar- "Theory and Practice of Leather Manufacture", Ajoy Sorcar, 1981
2. Choichi Ogiwara-" Practical Guidelines to Light Leather Processing" -----Limited
3. P.S Briggs,-" Tropical Products Institute Gloving Clothing and Special Leather" J.C Barrett TPI
4. Eric Ogilvie-" Leather Finishing" Nene College Northampton, England
5. Anthony D Covington-" Tanning Chemistry, The Science of Leather" RSC Publishing
6. Alexander Watt-" Leather Manufacture" Published by William Clowes and son ITD, London

LT-314 Principles of Leather Manufacturing-III

INSTRUCTIONAL OBJECTIVES:

1. LEATHER FINISHING OBJECTIVES

1.1 Definition of Need of Finishing of Leather

1.2 Explanation of Properties Required from Leather Finishes

1.3 Application of Various Types of Leather Finishes

2. COMPOSITION OF LEATHER FINISHES

2.1 Pigment and dies of Coloring Material

- Definition & Types of Pigments
- Source of White, Black, Yellow, Red & Blue Pigments
- Pigment Dispersion

2.2 Definition of Film Forming Materials

- Protein Binders
- Acrylic Resins, General Properties & Types
- Diene Resins & Co-polymers
- Poly Urethane

2.3 Introduction and importance of Lacquers Solvents & Diluent

- Nitro-cellulose Lacquers
- Solvents for Lacquers
- Plasticisers for Cellulose Lacquers

2.4 Different helping chemicals of Auxiliaries

- Plasticisers & Fixing Agents for Protein Binders
- Wetting Agents, Dispersing Agents
- Waxes, Fillers & Plate Releasing Agents
- Thickeners
- Mating Agents or Duller
- Silicones, Modifiers & Slip Agents

3. FORMULATION & APPLICATION OF LEATHER FINISHES

3.1 Different finish mixtures of Basic Film Formulations

- Impregnation Mixtures
- Staining
- Sealer Coat
- Base Coats
- Seasons & Top Coats

3.2 Different types of leather finishes of Specific Finish Formulation

- Plain Finish
- Glaze Finishes
- Resin Finishes
- Patent & Wet Look Finish

3.3 Introduction of Application of Leather Finishes

- Spraying - Manual, Auto, Airless
- Padding - Manual, Machine
- Roller Coating - Forwards, Reverse
- Curtain Coating.

4. MECHANICAL OPERATIONS IN FINISHING

4.1 Introduction on machinery involved in finishing of leather of Buffing & De dusting
4.2 Introduction on machinery involved in finishing of leather of Polishing
4.3 Introduction on machinery involved in finishing of leather of Boarding
4.4 Introduction on machinery involved in finishing of leather of Ironing & Smooth Plating
4.5 Introduction on machinery involved in finishing of leather of Embossing
4.6 Introduction on machinery involved in finishing of leather of Glazing.
4.7 Introduction on machinery involved in finishing of leather of Milling

5. CAUSES & REMEDIES FOR DEFECTS IN FINISH MIXTURE

5.1 Causes and remedies of Putrefaction
5.2 Causes and remedies of Settling of Pigments
5.3 Causes and remedies of Coagulation of Finishes
5.4 Causes and remedies of Change in Color
5.5 Causes and remedies of Flocculation of Pigments

6. PROBLEMS IN LEATHER FINISHING

6.1 Causes and remedies of Impregnation Defects – Causes & Remedies
6.2 Causes and remedies of Insufficient Rate or Depth of Penetration
6.3 Causes and remedies of Inadequate Break Improvement
6.4 Causes and remedies of Firming of Leather
6.5 Causes and remedies of Difficulties in Re-wetting
6.6 Causes and remedies of Difficulties in Rebuffing
6.7 Causes and remedies of Finish Application Defects – Causes & Remedies
6.8 Causes and remedies of Streaking of Pad Coat
6.9 Causes and remedies of Balling-up of Pad Coats
6.10 Causes and remedies of Poor Wetting-out of Pad Coats
6.11 Causes and remedies of Poor Wetting-out of Spray Coats
6.12 Causes and remedies of Blushing of Lacquers & Lacquer Emulsions
6.13 Causes and remedies of Mechanical & Handling difficulties during Finishing
6.14 Causes and remedies of Sticking & Air Marking during Smooth Plating
6.15 Causes and remedies of Embossing Problems
6.16 Causes and remedies of Sticking of Leather in Piles

7. CAUSES & REMEDIES FOR FINISHED LEATHER DEFECTS

7.1 Preventing measures during finishing of Poor Break of Grain
7.2 Preventing measures during finishing of Poor Wet Rub Resistance
7.3 Preventing measures during finishing of Poor Dry Rub & Abrasion Resistance
7.4 Preventing measures during finishing of Poor Flexibility, Elasticity & Adhesion of Finish
7.5 Preventing measures during finishing of Inadequate Heat Resistance
7.6 Preventing measures during finishing of Lack of Uniformity
7.7 Preventing measures during finishing of Insufficient Coverage
7.8 Preventing measures during finishing of Poor Light Fastness
7.9 Preventing measures during finishing of Spewing

LT-314 Principles of Leather Manufacturing-III

List of Practical:

- MANUFACTURE OF COW, COW CALF LEATHERS

- Upper from Light Cow & Cow Calf
- Side Upper Leather, Resin & Glaze Finishing
- Shrunk Grain Leather
- Upper Leather for Sports Shoes

- MANUFACTURE OF BUFFALO, BUFFALO CALF LEATHERS

- Glazed Finish Upper Leather from Small Buffalo Calf
- Resin Finish Upper Leather from Small Buffalo Calf
- Shrunk Grain Leather
- Chrome Tanned Upholstery Leathery
- Full Grain Side Upper Leather

- MANUFACTURE OF SHEEP & GOAT SKINS LEATHERS

- Garment with Specialized Finishes & Effects
- Suede from Goat Skins
- Wool Sheep Skins

- PROCESSING OF CHROME SPLITS

- For Hunting Suede
- Pigment Finished, Plain, Embossed

- MANUFACTURE OF SPECIAL LEATHER

- Nubuck (Dyed)
- Nubuck (White Cut) Leather

LT-324 Upper, Light and Specialized Finishes

Total Contact Hours

		T	P	C
Theory	64			
Practical	192	2	6	4

Course Contents

1. Importance of Leather Finishing **8Hrs**

1.1 Introduction
1.2 Quality of Leather Finishing
1.3 Properties related to Finished Leather
1.4 Types of Finishes

2. Materials used in Leather Finish **7Hrs**

2.1 Introduction
2.2 Finishing Colours
2.3 Binders
2.4 Lacquers
2.5 Helping Chemicals

3. Machinery Used in Leather Finishing **9Hrs**

3.1 Introduction
3.2 Spray Gun
3.3 Auto Spray Plant
3.4 Curtain Coater
3.5 Roller Coater

4. Mechanical operation after Finishing **6Hrs**

4.1 Introduction
4.2 Finiflex (Ironing)
4.3 Glazzing
4.4 Roto Press
4.5 Embossing Press

5. Operations before Specialized Finishing **6 Hrs**

5.1 Introduction
5.2S hoe upper Leather Crust (Dyed and Natural)
5.3 Glove Leather Crust (Dyed and Natural)
5.4 Garment Leather Crust (Dyed and Natural)
5.5 Specialized Leather Crust (Dyed and Natural)

6. Shoe Upper Leather Finish **8Hrs**

6.1 Introduction
6.2 Aniline
6.3 Pigmented
6.4 Glazed
6.5 Embossed Finish

7. Gloves Leather Finish **6Hrs**

7.1 Introduction
7.2 Finishing of Gloves
7.3 Working Gloves Finishing
7.4 Motor Bike Gloves

7.5 Fashion Gloves
7.6 Sports Gloves

8. Garment Leather Finish **7Hrs**

8.1 Introduction
8.2 Mens Garments Finish
8.3 Ladies Garments Finish
8.4 Children Garments Finish

9. Specialized Leather Finish **7Hrs**

9.1 Introduction
9.2 Upholstery Finish
9.3 Nubuck Finish
9.4 Patent Finish
9.5 Split Finish

Recommended Books

1. K.T Sarkar- "Theory and Practice of Leather Manufacture", Ajoy Sorcar, 1981
2. Choichi Ogiwara-" Practical Guidelines to Light Leather Processing" -----Limited
3. P.S Briggs,-" Tropical Products Institute Gloving Clothing and Special Leather" J.C Barrett TPI
4. Eric Ogilvie-" Leather Finishing" Nene College Northampton, England
5. Anthony D Covington-" Tanning Chemistry, The Science of Leather" RSC Publishing
6. Alexander Watt-" Leather Manufacture" Published by William Clowes and son ITD, London

LT-324 Upper, Light and Specialized Finishes

INSTRUCTIONAL OBJECTIVES:

Importance of Leather Finishing

1.5 Description and Introduction of Leather Finishing
1.6 Explanation of Quality of Leather Finishing
1.7 Differentiation of Properties related to Finished Leather
1.8 Different Types of Finishes

Materials used in Leather Finish

2.1 Description and Introduction
2.2 Different kinds of Finishing Colours
2.3 Film Forming Materials Binders
2.4 Top Coat Lacquers
2.5 Auxiliaries Helping Chemicals

Machinery Used in Leather Finishing

3.1 Description and Introduction
3.2 Use of Spray Gun
3.3 Operating Techniques of Auto Spray Plant
3.4 Advantage and Disadvantage of Curtain Coater
3.5 Advantage and Disadvantage of Roller Coater

Mechanical Operation after Finishing

4.1 Description and Introduction
4.2 Mechanical Advantage of Finiflex (Ironing)
4.3 Shining Operation Glazzing
4.4 Shining Roto Press
4.5 Printing and Embossing Press

Operations before Specialized Finishing

5.1 Description and Introduction
5.2 Flow Chart Process from Soaking to Crust of Shoe upper Leather Crust (Dyed and Natural)
5.3 Flow Chart Process from Soaking to Crust of Glove Leather Crust (Dyed and Natural)
5.4 Flow Chart Process from Soaking to Crust of Garment Leather Crust (Dyed and Natural)
5.5 Flow Chart Process from Soaking to Crust of Specialized Leather Crust (Dyed and Natural)

Shoe Upper Leather Finish

6.1 Description and Introduction
6.2 Types of Aniline
6.3 Description of Pigmented Finish
6.4 Description of Glazed finish
6.5 Types of Embossed Finish

Gloves Leather Finish

7.1 Description and Introduction
7.2 Types and Uses of Finishing of Gloves
7.3 Types and Uses of Working Gloves Finishing
7.4 Types and Uses of Motor Bike Gloves

7.5 Types and Uses of Fashion Gloves
7.6 Types and Uses of Sports Gloves

Garment Leather Finish
8.1 Description and Introduction
8.2 Types and Uses of Men Garments Finish
8.3 Types and Uses of Ladies Garments Finish
8.4 Types and Uses of Children Garments Finish

Specialized Leather Finish
9.1 Description and Introduction
9.2 Different types and Uses of Upholstery Finish
9.3 Different types and Uses of Nubuck Finish
9.4 Different types and Uses of Patent Finish
9.5 Different types and Uses of Split Finish

Lthr-324 Upper, Light and Specialized Finishes

List of Practical:

1) Raw to Crust (Dyed and Natural) different types of Leather from

1.1 Cow and Cow Calf

1.2 Buff and Buff Calf

1.3 Sheep Skin

1.4 Goat Skin

Finishing

1.5 Shoe upper Finish

1.6 Glove Finishing

1.7 Garment Finishing

1.8 Upholstery Finish

1.9 Proteineous Finish

1.10 Finishing of Different Splits

LT-333 Applied Chemistry-III

Total Contact Hours				
Theory	64	**T**	**P**	**C**
Practical	96	2	3	3

1 Alkyl halides & their derivatives 9Hrs

1.1 General Chemical Reactions of Monohalo Alkanes
1.2 Preparation & Properties of Methyl Chloride
1.3 Preparation & Properties of Dichloromethane & Trichloromethane
1.4 Preparation & Properties of Carbon Tetra Chloride
1.5 Organo-Metallic Compounds (Grignard Reagent)
1.6 SN1 & SN2 Mechanism
1.7 Grignard Reagent
1.8 Preparation, properties & Reactions

1. ALCOHOLS 6Hrs

2.1 General Reactions of Alcohols
2.2 Preparation & Properties & Uses of Specific Alcohols
2.3 Tests for distinction between primary, secondary & tertiary alcohols
2.4 Methyl & Ethyl Alcohols
2.5 Iso Propyl Alcohols
2.6 Di hydric & tri Hydric Alcohol, Preparation, Properties & Uses of Ethylene Glycol & Glycerol
2.7 Unsaturated Alcohols
2.8 Allyl Alcohols

3 CRBONYL COMPOUNDS (ALDEHYDES & KETONE) 7Hrs

3.1 Nomenclature
3.2 General Chemical Reactions
3.3 Aldol Condensation & Cannizarro's Reaction
3.4 Preparation & Properties & Uses of:
3.5 Formaldehyde
3.6 Acetaldehyde
3.7 Acetone
3.8 Ethyl Methyl Ketones

4 CARBOXYLIC ACIDS 5Hrs

4.1 Nomenclature of Saturated, Unsaturated & Derived Acid
4.2 The Nature of Carboxylic Group
4.3 General Chemical Reactions of Carboxylic Acids
4.4 Mono Carboxylic
4.5 Formic Acid
4.6 Dicarboxylic Acids
4.7 Oxalic Acid
4.8 Hydroxy Acids
4.9 Unsaturated Acids
4.10 Acrylic Acids
4.11 Metha-acralic Acids
4.12 Fatty Acids
4.13 Oleic Acids
4.14 Linoleic Acid
4.15 Linolenic Acid

5 ALIPHATIC NITROGEN COMPOUNDS 6Hrs

5.1 Cyanide & Vinyl Cyanide
5.2 Nomenclature
5.3 General Reaction
5.4 Nitro Alkanes

5.5 Nomenclature
5.6 General Reactions, Preparation & Properties
5.7 Amines
5.8 Amino Acids

6 BENZENE & ITS DERIVATIVES 7Hrs

6.1 Nomenclature
6.2 Sources
6.3 Benzene & its Homologous
6.4 Chemical Reactions
6.5 Nitro Benzene
6.6 Amino Compounds Aniline, its Preparation & Properties
6.7 Diamines
6.8 Di-azonium Salts
6.9 Di-azotization
6.10 Benzene Di-azonium Chloride
6.11 Benzoic Acid
6.12 Pathalic Acid & its Derivatives
6.13 Benzene Sulphonic Acid
6.14 Sulphanilic Acid

7 POLY NUCLEAR HYDROCARBON & THEIR DERIVATIVES 6Hrs

7.1 Isolated System
7.2 Biphenyl
7.3 Benzidine
7.4 Condensed System
7.5 Naphthalene
7.6 Naphthalene Sulphonic Acid
7.7 Naphthols
7.8 Anthracene
7.9

PHENOLS (HYDROXY COMPOUNDS) 6Hrs

7.10 Monohydric Phenoles
7.11 Phenoles & Cresoles
7.12 Amino Phenoles
7.13 Nitro Phenoles
7.14 Di-hydric Phenoles
7.15 Catechole & Resorcinols
7.16 Tri-hydric Phenoles
7.17 Pyro Gallol

8 CHEMICAL INDUSTRIES 5Hrs

8.1 Urea Manufacture
8.2 Solvay's process for Sodium Carbonate manufacture
8.3 Caustic Soda manufacture
8.4 Preparation of Sodium metal

9 ENVIRONMENTAL CHEMISTRY 7Hrs

9.1 Components of Environment
9.2 Pollution & its Types
9.3 Air Pollution
9.4 Water Pollution
9.5 Acid Rain
9.6 Photochemical Smog
9.7 Factors affecting the Quality of Water
9.8 Solid Waste Management

BOOKS RECOMMENDED

1. Text Book of Intermediate Chemistry (I & II)
2. Ilmi Applied Science by Sh. Atta Muhammad
3. Polytechnic Chemistry by J. N. Reedy Tata McGraw Hill (New Delhi)
4. Chemistry for Engineers by P.C. Jain (New Delhi, India)

LT-333 Applied Chemistry-III

INSTRUCTIONAL OBJECTIVES:

1 Alkyl halides & their derivatives

1.1 Explain General Chemical Reactions of Mono halo Alkanes.
1.2 Describe Preparation & Properties of Methyl Chloride.
1.3 Explain Preparation & Properties of Dichloromethane & Tri chloromethane.
1.4 Describe Preparation & Properties of Carbon Tetra Chloride.
1.5 Explain SN1 & SN2 Mechanism in detail.
1.6 Describe the preparation, properties and reactions of Grignard reagent.

1 Alcohols

2.1 Explain Nomenclature of alcohols.
1.2 Describe General Reactions of Alcohols.
1.3 Give Tests for distinction between primary, secondary & tertiary alcohols.
1.4 Explain Preparation & Properties & Uses of Specific Alcohol's Methyl & Ethyl Alcohols.
1.5 Explain the chemistry of Iso Propyl Alcohols.
1.6 Describe Di hydric & tri Hydric Alcohol, Preparation, Properties & Uses of Ethylene Glycol & Glycerol.
1.7 Explain Unsaturated Alcohols.

2 (CRBONYL COMPOUNDS) ALDEHYDES & KETONE

3.1 Explain Nomenclature of Crbonyl compounds.
2.2 Describe General Chemical Reactions of Aldehydes & ketones.
2.3 Describe Aldol Condensation & Cannizarro's Reaction of Aldehydes & ketones.
2.4 Explain Preparation & Properties & Uses of:

- Formaldehyde
- Acetaldehyde
- Acetone
- Ethyl Methyl Ketones

3 CARBOXYLIC ACIDS

4.1 Describe Explain Nomenclature of Saturated, Unsaturated & Derived Acid.
3.2 Describe The Nature of Carboxylic Group.
3.3 Explain General Chemical Reactions of Carboxylic Acids.
3.4 Describe Mono Carboxylic,Formic Acid
3.5 Explain Dicarboxylic Acids Oxalic Acid
3.6 Explain Hydroxy Acids
3.7 Describe Unsaturated Acids Acrylic Acids ,Metha-acralic Acids
3.8 Explain Fatty Acids Oleic Acids, Linoleic Acid, Linolenic Acid

5.ALIPHATIC NITROGEN COMPOUNDS

5.1 Explain Cyanide & Vinyl Cyanide.
5.2 Explain Nomenclature of ALIPHATIC NITROGEN COMPOUNDS.
5.3 Describe General Reactions of ALIPHATIC NITROGEN COMPOUNDS.
5.4 Describe Nitro Alkanes , their Nomenclature.
5.5 Give General Reactions, Preparation & Properties of Nitro Alkanes.
5.6 Explain Amines.
5.7 Describe Amino Acids.

6. BENZENE & ITS DERIVATIVES

6.1 Explain Nomenclature of BENZENE & ITS DERIVATIVES.
6.2 Describe Sources of aromatic compounds.
6.3 Explain Benzene & its Homologous.

6.4 Describe Chemical Reactions of aromatic compounds.
6.5 Explain Nitro Benzene.
6.6 Describe Amino Compounds , Aniline, its Preparation & Properties.
6.7 Explain Diamines.
6.8 Explain Di-azonium Salts.
6.9 Describe Di-azotization and Benzene Di-azonium Chloride.
6.10 Explain Benzoic Acid.
6.11 Explain Pathalic Acid & its Derivatives.
6.12 Benzene Sulphonic Acid.
6.13 Explain Sulphanilic Acid.

7 POLY NUCLEAR HYDROCARBON & THEIR DERIVATIVES

7.1 Explain Isolated System

- Biphenyl
- Benzidine

7.2 Describe Condensed System

- Naphthalene
- Naphthalene Sulphonic Acid
- Naphthols
- Anthracene

8 PHENOLES (HYDROXY COMPOUNDS)

8.1 Explain Monohydric Phenoles.
8.2 Describe Phenoles & Cresoles.
8.3 Describe Amino Phenoles.
8.4 Expalin Nitro Phenoles.
8.5 Describe Di-hydric Phenoles.
8.6 Describe Catechole & Resorcinols.
8.7 Explain Tri-hydric Phenoles.
8.8 Describe Pyro Gallol.

CHEMICAL INDUSTRIES

- Describe Urea Manufacture.
- Describe Solvay's process for Sodium Carbonate manufacture.
- Explain the steps of Caustic Soda manufacture.
- Explain Preparation of Sodium metal by Down's cell.

9 ENVIRONMENTAL CHEMISTRY

9.1 Describe the Components of Environment.
9.2 Explain Pollution & its Types.
9.3 Describe Air Pollution, its causes and effects.
9.4 Describe Water Pollution, its causes and effects.
9.5 Describe Acid Rain its causes and effects.
9.6 Describe Photochemical Smog its causes and effects.
9.7 Describe Factors affecting the Quality of Water.
9.8 Explain Solid Waste Management.

LT-333 Applied Chemistry-III

List of Practical:

1. Test for phenols.
2. Test for Aldehydes.
3. Test for carboxylic acids.
4. Preparation of a pure sample of Iodoform.
5. Preparation of a pure sample of Copper amine complex.
6. Crystallization of benzoic acid from water.
7. Determine the heat of neutralization of NaOH & HCl.
8. To standardize the given solution of KMnO4.
9. To determine the amount of acetic acid in a given sample of vinegar.
10. To determine the amount of free alkali in a given sample of soap

LT-343 Quality Control & Leather Testing

Total Contact Hours

		T	P	C
Theory	64			
Practical	96	2	3	3

Course Contents

1. INTRODUCTION TO QUALITY CONTROL IN TANNERY 8Hrs

1.1 Purpose & Importance of Quality Control in Tannery
1.2 Need for Quality Standards
1.3 General Quality Concentration in a Tannery

2. QUALITY CONCENTRATION IN SEMI PROCESSED & FINISHED LEATHERS 7Hrs

2.1 Pickled Pelts
2.2 Vegetable Crust
2.3 Wet Blue Leather
2.4 Finished Leather

3. QUALITY IMPROVEMENT IN RAW HIDE & SKINS 5Hrs

3.1 Controlling Defects in Living Animals
3.2 Method to Improve Slaughtering
3.3 Quality Control during Curing
3.4 Storage of Raw Stock

4. STAGE WISE QUALITY CONTROL IN LEATHER MANUFACTURE 9Hrs

4.1 Beam House
4.2 Tan Yard Processes
4.3 Dye House Operations & Processes
4.4 Finishing
4.5 Storage of Finished Leather

5. QUALITY STANDARDS FOR LEATHER 7Hrs

5.1 Standards for Upper Leather
5.2 Standards for Garment Leather
5.3 Requirements for Glove Leather

6. INTERNATIONAL METHODS OF LEATHER TESTING 9Hrs

6.1 Methods of Chemical Analysis (IUC)
6.2 Methods of Physical Testing (IUP)
6.3 Sampling for Chemical & Physical Leather Testing

7. PRACTICAL TESTS FOR QUALITY CONTROL IN TANNERY 5Hrs

7.1 Cured Hides
7.2 Beam House
7.3 Wet Blue
7.4 Dye House Materials & Processes
7.5 Crust Leather

8. CHEMICALS IN TANNERY 7Hrs

8.1 Beam House Chemicals

- Source & Availability
- Storage & Handling

8.2 Tan Yard Chemicals

- Application & Handling of Acids
- Origin, Source of Tanning Materials

8.3 Dyestuff, Fat-liquors, Retanning & Pasting Materials

- Chemical Nature
- Storage

9. EFFLUENT TREATMENT 7Hrs

9.1 Nature of Tannery Effluent

- Beam House
- Chrome Tanning
- Vegetable Taming
- Dyeing

9.2 Volume of Waste Water

9.3 Effluent (Waste Water) Treatment System

Recommended Books

1. K.T Sarkar- "Theory and Practice of Leather Manufacture", Ajoy Sorcar, 1981
2. Choichi Ogiwara-" Practical Guidelines to Light Leather Processing" -----Limited
3. P.S Briggs,-" Tropical Products Institute Gloving Clothing and Special Leather" J.C Barrett TPI
4. Eric Ogilvie-" Leather Finishing" Nene College Northampton, England
5. Anthony D Covington-" Tanning Chemistry, The Science of Leather" RSC Publishing
6. Alexander Watt-" Leather Manufacture" Published by William Clowes and son ITD, London

LT-343 Quality Control & Leather Testing

INSTRUCTIONAL OBJECTIVES:-

1. INTRODUCTION TO QUALITY CONTROL IN TANNERY

1.1 Description of Purpose & Importance of Quality Control in Tannery
1.2 Explanation of Need for Quality Standards
1.3 Elaboration of General Quality Concentration in a Tannery

2. QUALITY CONCENTRATION IN SEMI PROCESSED & FINISHED LEATHERS

2.1 Definition of Pickled Pelts
2.2 Tanning method of Vegetable Crust
2.3 Tanning method of Wet Blue Leather
2.4 Process of Finished Leather

3. QUALITY IMPROVEMENT IN RAW HIDE & SKINS

3.1 Explanation of Pre slaughter Controlling Defects in Living Animals
3.2 Explanation of Method to Improve Slaughtering
3.3 Preservation of raw stock of Quality Control during Curing
3.4 Description of Storage of Raw Stock

4. STAGE WISE QUALITY CONTROL IN LEATHER MANUFACTURE

4.1 Quality consideration during process of leather in Beam House
4.2 Quality consideration during process of leather in Tan Yard Processes
4.3 Quality consideration during process of leather in Dye House Operations & Processes
4.4 Quality consideration during process of leather in Finishing
4.5 Quality consideration during process of leather in Storage of Finished Leather

5. QUALITY STANDARDS FOR LEATHER

5.1 Explanation of Standards for Upper Leather
5.2 Explanation of Standards for Garment Leather
5.3 Definition of Requirements for Glove Leather

6. INTERNATIONAL METHODS OF LEATHER TESTING

6.1 Introduction of Methods of Chemical Analysis (IUC)
6.2 Introduction of Methods of Physical Testing (IUP)
6.3 Introduction of Sampling for Chemical & Physical Leather Testing

7. PRACTICAL TESTS FOR QUALITY CONTROL IN TANNERY

7.1 Quality tests of Cured Hides
7.2 Quality tests of Beam House
7.3 Quality tests of Wet Blue
7.4 Quality tests of Dye House Materials & Processes
7.5 Quality tests of Crust Leather

8. CHEMICALS IN TANNERY

8.1 Introduction of chemicals related to quality production in Beam House Chemicals

8.1.1 Source & Availability

8.1.2 Storage & Handling

8.2 Introduction of chemicals related to quality production in Tan Yard Chemicals

8.2.1 Application & Handling of Acids

8.2.2 Origin, Source of Tanning Materials

8.3 Introduction of chemicals related to quality production in Dyestuff, Fat-liquors, Retanning & Pasting Materials

8.3.1 Chemical Nature

8.3.2 Storage

9. EFFLUENT TREATMENT

9.1 Describe Water treatment related to leather process in Nature of Tannery Effluent

9.1.2 Interpret Beam House

9.1.3 Explain Chrome Tanning

9.1.4 Describe Vegetable Taming

9.1.5 Interpret Dyeing

9.2 Explain Water treatment related to leather process in Volume of Waste Water

9.3 Explain Water treatment related to leather process in Effluent (Waste Water) Treatment System

LT-343 Quality Control & Leather Testing

List of Practical:

- **QUALITY STANDARDS FOR LEATHER**
    - Standards for Upper Leather
    - Standards for Garment Leather
    - Requirements for Glove Leather
- **INTERNATIONAL METHODS OF LEATHER TESTING**
    - Methods of Chemical Analysis (IUC)
    - Methods of Physical Testing (IUP)
    - Sampling for Chemical & Physical Leather Testing
- **PRACTICAL TESTS FOR QUALITY CONTROL IN TANNERY**
    - Cured Hides
    - Beam House
    - Wet Blue
    - Dye House Materials & Processes
    - Crust Leather

LT-353 Evaluation of Chemical Materials and Procedures

Total Contact Hours				
Theory	64	**T**	**P**	**C**
Practical	96	2	3	3

Course Contacts

1. BACKGROUD OF RAW MATERIAL SOURCE, QUALITY & AVAILABILITY 10Hrs

1.1 Environmental influence, (climate, vegetation etc.)
1.2 Animal breeding
1.3 Structural properties of hides and skins.
1.4 Availability of raw material.

2. HIDES & SKINS-HISTOLOGY & STRUCTURE 9Hrs

2.1 Structure
2.2 Chemical composition
2.3 Physiological function of skins components
2.4 Chemistry of hide-protein

3. MOISTURE ANALYSIS OF SKIN/HIDE AND LEATHER 7Hrs

3.1 Concept of moisture.
3.2 Forms of water present in leather
3.3 Effect on moisture content at different stages of tannery operation

4 ASH ANALYSIS 9Hrs

4.1 Definition and objectives
4.2 Types of Ash in leather
4.3 Ash content in vegetable and chrome tanned leather

5 LIPIDS EXTRACTION AND CHARACTERIZATION 11Hrs

5.1 Introduction and objectives
5.2 Lipid in Native hides
5.3 Effects of processes on natives lipids
5.4 Lipids in leather
5.5 Lipids Added to leather
5.6 Determination of fats in leather / fatliquors

6 pH MEASUREMENT AND BUFFERS 7Hrs

6.1 Introduction and objectives
6.2 Determination of pH
6.3 Buffer solution

7. CONCEPT OF MATERIAL EVALUATION PHYSICAL 11Hrs

7.1 Introduction of properties
7.2 Physical properties of leather

Recommended Books

1. K.T Sarkar- “Theory and Practice of Leather Manufacture”, Ajoy Sorcar, 1981
2. Choichi Ogiwara-“ Practical Guidelines to Light Leather Processing” -----Limited
3. P.S Briggs,-“ Tropical Products Institute Gloving Clothing and Special Leather” J.C Barrett TPI
4. Eric Ogilvie-“ Leather Finishing” Nene College Northampton, England
5. Anthony D Covington-“ Tanning Chemistry, The Science of Leather” RSC Publishing
6. Alexander Watt-“ Leather Manufacture” Published by William Clowes and son ITD, London

LT-353 Evaluation of Chemical Materials and Procedures

INSTRUCTIONAL OBJECTIVES

1. BACKGROUND OF RAW MATERIAL SOURCE, QUALITY & AVAILABILITY

1.1 Environmental influence, (climate, vegetation, etc.)

1.1.1. Explain different factors of environmental influence
1.1.2. Describe components of environment (Biotic and A biotic)
1.1.3. Explain factors of environment effecting living organisms
1.1.4. Describe raw material defects related to environment

3.9 Animal breeding

1.2.1 Define animal breeding
1.2.2 Enlist types of animal breed
1.2.3 Describe co-relation between animal breed and quality of raw material

3.10 Structural properties of hides and skins

3.10.1 Describe skins and hides
3.10.2 Explain grain structure of different hides and skins
3.10.3 Describe general mechanical behavior of different hides and skins

3.11 Availability of raw material

3.11.1 Enlist types of sources of raw material
3.11.2 Discuss world wide availability of raw materials
3.11.3 Describe quality of raw material with respect to origin

2. HIDES & SKINS-HISTOLOGY & STRUCTURE

2.1 Structure

2.1.1 Explain skin components
2.1.1 Describe variability in skin components with respect to animal breed

2.2 Chemical composition

2.2.1 Define bio molecular composition of skin/hide
2.2.2 Define protein

2.3 Physiological function of skins components

2.3.1 Define physiological function of skins
2.3.2 Describe mechanical function of skin

2.4 Chemistry of hide-protein

2.4.1 Define peptide linkage in protein
2.4.2 Describe types of amino acid
2.4.3 Explain structure and properties of collagen properties

3 MOISTURE ANALYSIS OF SKIN/HIDE AND LEATHER

3.1 Concept of moisture.

3.1.1 Explain moisture analysis

3.2 Forms of water present in leather

3.2.1 Define bond water, free water, associated water

3.3 Effect on moisture content at different stages of tannery operations

3.3.1 Explain curing, soaking , tanning etc

4 ASH ANALYSIS

4.1 Define ash analysis
4.2 Types of ash in leather
4.3 Define total ash
4.4 Define soluble ash and insoluble ash.
4.5 Ash content in vegetable and chrome tanned leather
4.6 Explain scope and procedure of determination of Ash content

5 LIPIDS EXTRACTION AND CHARACTERIZATION

5.1 Define lipids
5.2 Explain lipid in Native hides
5.3 Explain effects of processes on natives lipids
5.4 Curing and soaking
5.5 Liming
5.6 Lipids in leather
5.7 Define lipids in leather
5.8 Lipids added to leather
5.9 Explain different classes of lipids added to leather
5.10 Determination of fats in leather / fatliquors
5.11 Define scope and principle
5.12 Describe apparatus and reagents
5.13 Describe procedure and calculation

6 pH MEASUREMENT AND BUFFERS

6.1 Define pH measurement and buffers
6.2 Determination of pH
6.3 Determination of pH of hide powder
6.4 Determination of pH of Alkaline liquor
6.5 Determination of pH of chrome liquor
6.6 Buffer solution
6.7 Discuss its use in leather
6.8 Explain preparation of buffer solutions
6.9 Describe standard buffers

7 CONCEPT OF MATERIAL EVALUATION PHYSICAL

7.1 Introduction of properties
7.1.1 Define material evaluation physical
7.1.2 Discuss properties (physical and chemical)
7.2 Physical properties of leather
7.2.1 Define physical properties of leather
7.2.2 Describe parameter to evaluate the physical properties of leather

LT-353 Evaluation of Chemical Materials and Procedures

List of Practical:

1. Determination of moisture content
2. Determination of Ash content
3. Determination of Fat content (leather and Fatliquor)
4. Determination of pH (leather and liquors)
5. Preparation of buffer solutions
6. Determination of purity of sulphuric acid, formic acid, Acetic acid, Oxalic acid.
7. Determination of purity of sodium carbonate, sodium bicarbonate, Ammonium sulphate / chloride.
8. Determination of chrome oxide content
9. Determination of chrome salt
10. Determination of solid contents of substances
11. Determination of Iodine and acid value of fatliquors and oils
12. Determination of Alkalies
13. Determination of hard Water
14. Preparation of indicator BCG, BCP and phenolphthalein.

Ftw-371 Marketing & Brand Management

Total Contact Hours				
Theory	32	T	P	C
Practical	00	1	0	1

COURSE CONTENTS

1. Introduction to Marketing **4Hrs**

1.7 Nature Scope and Definition of Marketing
1.8 Importance of Marketing
1.9 External Macro environment External Microenvironment
1.10 Definition and need of Marketing Information system
1.11 Scope of Marketing research

2. Marketing Planning **4Hrs**

2.1 Managing a Marketing system.
2.2 Nature and scope of planning
2.3 Strategic Company Planning
2.4 Strategic Marketing Planning Materials and Other Auxiliaries

3. Marketing Segmentation **4Hrs**

3.1 Nature of Market Segmentation
3.2 Bases for Market Segmentation
3.3 Target – Market Strategies
3.4 Forecasting Market Demand

4. Basic Methods of Setting Price **4Hrs**

4.1 Meaning and importance of pricing objectives
4.2 Prices Based on a Balance between supply and Demand
4.3 Prices set in relation to Market
4.4 pricing strategies and policies
4.5 psychological pricing

5. Promotion Strategic **4Hrs**

5.1 Nature and importance of Sales Promotion strategic
5.2 Sales promotion methods
5.3 Consumer promotion techniques
5.4 Nature and importance of personal selling
5.5 management of Sales Promotion
5.6 Nature and objectives of Advertising
5.7 Development of Advertising and Campaign
5.8 organizing for Advertising Publicity and Public Relations

6. Brand and Brand Management **12Hrs**

6.1 Introduction of Brands and Brand Management
6.2 Brand Orientation
6.3 Brand Positioning and Values
6.4 Choosing Brand Elements to Build Brand Equity
6.5 Designing Marketing Programs to Build Brand Equity
6.6 Developing Brand Equity Measurement and Management System
6.7 Measuring Sources of Brand Equity
6.8 Design and Implementing Branding Strategies
6.9 Introducing and Naming New Products and Brand Extensions
6.10 Managing Brands over Geographical Boundaries and Market Segments

Recommended Books

- “Positioning” By Al Ries& Jack Trout
- “Content Rules” By Ann Handley & C.C. Chapman
- “Influence: The Psychology of Persuasion” By Robert Cialdini
- “Web Analytics” By Avinash Kaushik
- “Permission Marketing” By Seth Godin
- “Selling the Invisible: A Field Guide to Modern Marketing” By Harry Beckwith
- “Never Eat Alone” By Keith Ferrazzi

Ftw-371 Marketing & Brand Management

Instructional objectives:

1. Introduction to Marketing

1.1 To Define the Nature Scope and Definition of Marketing
1.2 Explain the Importance of Marketing
1.3 Explain the External Macro environment External Microenvironment
1.4 Explain the Definition and need of Marketing Information system
1.5 Explain the Scope of Marketing research

2. Marketing Planning

2.1 To Explain Managing a Marketing system.
2.2 To Explain Nature and scope of planning
2.3 To Explain Strategic Company Planning
2.4 To Explain Strategic Marketing Planning Materials and Other Auxiliaries

3. Marketing Segmentation

3.1 To Explain Nature of Market Segmentation
3.2 To Explain Bases for Market Segmentation
3.3 To Explain Target – Market Strategies
3.4 To Explain Forecasting Market Demand

4. Basic Methods of Setting Price

4.1 To Explain Meaning and importance of pricing objectives
4.2 To Explain Prices Based on a Balance between supply and Demand
4.3 To Explain Prices set in relation to Market
4.4 To Explain pricing strategies and policies
4.5 To Explain psychological pricing

5. Promotion Strategic

5.1 To Explain Nature and importance of Sales Promotion strategic
5.2 To Explain Sales promotion methods
5.3 To Explain Consumer promotion techniques
5.4 To Explain Nature and importance of personal selling
5.5 To Explain management of Sales Promotion
5.6 To Explain Nature and objectives of Advertising
5.7 To Explain Development of Advertising and Campaign
5.8 To Explain organizing for Advertising Publicity and Public Relations

6. Brand and Brand Management

6.1 To Explain Introduction of Brands and Brand Management
6.2 To Explain Brand Orientation
6.3 To Explain Brand Positioning and Values
6.4 To Explain Choosing Brand Elements to Build Brand Equity
6.5 To Explain Designing Marketing Programs to Build Brand Equity
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6.7 To Explain Measuring Sources of Brand Equity
6.8 To Explain Design and Implementing Branding Strategies
6.9 To Explain Introducing and Naming New Products and Brand Extensions
6.10 To Explain Managing Brands over Geographical Boundaries and Market Segments

LT-362 Final Design Project

Total Contact Hours

Theory	00	T	P	C
Practical	192	0	6	2

The Project & Viva

- As an essential part of DAE Leather Technology course, each student will have to complete a project including the following: -

1-Article development

a) Quality of shoe upper leather
b) Quality of garments leather
c) Quality of gloving leather
d) Upholstery leather
e) Different types of suede leather
f) Different types of nubuk leather

2-Establishment of Tannery site

a) Chrome recovery plant
b) Effluent treatment plant
c) Management of chemical store
d) Management of production yard
e) Management of mechanical yard

3-Physical Testing

4-Layer wise distribution of fat contents

5-Improvement of different types of dyes fixation

6-Comparison between different un-hairing methods

7-Comparison between different bating materials

8-Comparison between different fat liquors

9-Comparison between different

- CP & DP Viva

Recommended Books

1. K.T Sarkar- "Theory and Practice of Leather Manufacture", Ajoy Sorcar, 1981
2. Choichi Ogiwara-" Practical Guidelines to Light Leather Processing" -----Limited
3. P.S Briggs,-" Tropical Products Institute Gloving Clothing and Special Leather" J.C Barrett TPI
4. Eric Ogilvie-" Leather Finishing" Nene College Northampton, England
5. Anthony D Covington-" Tanning Chemistry, The Science of Leather" RSC Publishing
6. Alexander Watt-" Leather Manufacture" Published by William Clowes and son ITD, London

LIST OF LABS AND WORKSHOPS

1. Having one Beam house workshop with relevant tools and equipment for 25 students
2. Having one Dying workshop with relevant tools and equipment for 25 students
3. Having one Finishing workshop with relevant tools and equipment for 25 students
4. Having one Chemical & Chemistry laboratory with relevant tools and equipment for 25 students
5. Having one Physics laboratory with relevant tools and equipment for 25 students
6. Having one Physical laboratory with relevant tools and equipment for 25 students
7. Having One class room with 25 Chair

1. List of Tools, Machinery & Equipment (for 25 Students)

Occupational title	DAE Leather
Duration	3 years

Sr. #	Name of Tool / Equipment	Quantity in Nos.
1	Analytical Balance	08
2	Light Fastness	01
3	Thermograph	01
4	Spectro Photo Meter	01
5	Steam Distilation	01
6	Thickness Gauge	01
7	Water Permeability Machine	01
8	Pentro Meter	01
9	Stiffness Tester	01
10	Rub Fastness Machine	01
11	Lasto Meter machine	01
12	Tensile Machine	01
13	Leather Grinding Mill	01
14	Rotary Shaker	01
15	B.O.D Cabnit	01
16	Air Conditioner	02
17	De-Humidity Fire	01
18	Humiditifier (Defenser)	01
19	Vacuum Distillation apparatus	02
20	Microscope Monotype	02

21	Muffel Furnace Mod	01
22	Hot Plate Model	03
23	Multi Hot Plate	02
24	Microscope Stereotype	01
25	Bench top PH meter with PH Electrode	02
26	Fume Hood	01
27	Volt Meter	15
28	Weight Box	01
29	Watch Glass	05
30	Experiment Drum SS	10
31	Staking Machine	01
32	Splitting Machine	01
33	Measuring Machine	01
34	Hyd. Press Machine	01
35	Hyd. Flashing Machine	01
36	Shaving Machine	01
37	Glayzing Machine	01
38	Buffing Machine	01
39	Toggling Machine	01
40	Spray Machine	01
41	Pasting Unit	01
42	Samming Setting out Machine	01
43	Buffing Machine	01
44	Drum Setting	01
45	Embossing Press	01
46	Splitting Machine	01
47	Staking Horse	01
48	Working Table	02
49	Air Compressor	02
50	Boiler	01
51	Wooden Drum	10

2. List of Consumable Material/ Supplies (For 25 Students)

Occupational title	DAE Leather
Duration	3 years

Sr. #	Name of Item/ Equipment / Tools	Quantity
1	Acid Sulphuric	25 litre
2	Replacement syntan	25kg
3	Binder	20 litre
4	Brown Dye	05kg
5	Derma Blue	05kg
6	Dye Brown Dark	05kg
7	Fat liquors	50 litre
8	Dye green	05kg
9	Dye Yellow	05 kg
10	pigment Brown	05kg
11	Sodium chloride	100kg
12	Sodium bisulphite	10kg
13	Sodium sulphide	100kg
14	Ammonium Sulphate	25kg
15	Dispersing agent	25kg
16	Neuterlizing agent	25kg
17	Lime	100kg
18	Dyes(Different)	05kg
19	Sodium Bi Carbonate	25kg
20	Formic acid	50kg
21	Mamoosa	50kg
22	Chrome	150kg
23	Bacterial cidle	05kg
24	Fungicide	05kg

25	Alum	02kg
26	Aldehyde	02kg
27	Amonia liquor	05kg
28	Ph paper	02 dozen
29	Acid Bate	02kg
30	Wetting agent	25kg
31	Boame meter	2 dozen
32	Ammonium chloride	10kg
33	Ammonium sulphate	25kg
34	Raw Neat Foot Oil	10kg
35	Indicators	01kg
36	Auxiliaries	25kg
37	Oxalic acid	05kg
38	Acetic Acid	05kg
39	Beaker 100ml	2 dozen
40	Cylinder GD	2 dozen
41	Cylinder Measuring 100ml	1 dozen
42	Cork Small	1 dozen
43	Condensor	2 No.
44	Compass	1 dozen
45	Disection Box/Surgry Box	01 dozen
46	Dish China	1 dozen
47	Flask Visco 100ml	1 dozen
48	Flask Visco 50ml	1 dozen
49	Flask Conocal 500ml	1 dozen
50	Funnel Separating	1 dozen
51	Funnel Bulb Type 250	1 dozen
52	Funnel Dropping 100ml	1 dozen
53	Flask Elenmyer 150ml	1 dozen

54	Flask Conical 100ml	1 dozen
55	Flask Boiling 1000rb	1 dozen
56	Flask Boiling 300	1 dozen
57	Flask Boiling 250	1 dozen
58	Flask Boiling 500	1 dozen
59	Flask Boiling 500fb	1 dozen
60	Flask Boiling 1000fb	1 dozen
61	Flask Filtering 2000	1 dozen
62	Flask Conical GD	1 dozen
63	Flask Filtering 250/300	1 dozen
64	Flask Filtering 100ml	1 dozen
65	Flask Iodine 300	1 dozen
66	Filter Pump Glass	1 dozen
67	Iron File	1 dozen
68	Hydro Baume Meter	1 dozen
69	Micro Burit 10ml	1 dozen
70	Wash Bottle	1 dozen
71	Pippet	1 dozen
72	Soxhlat App	01
73	Spirit Lamp	1 dozen
74	Spatula	1 dozen
75	Test Tube Micro	100
76	Tube rod	1 dozen
77	Thermometer	1 dozen
78	Thimble	1 dozen
79	Test Tube Holder Stand	1 dozen
80	Flask conical 250	1 dozen
81	Flask Measuring 100	1 dozen
82	Flask Measuring 250	1 dozen

83	Flask Measuring 500	1 dozen
84	Flask Masuring 1000	1 dozen
85	Burit with stand	1 dozen
86	Desicator China	05
87	Bottle Regent 100ml	06
88	Bottle Regent 500ml	06
89	Botte Regent 250ml	06
90	Bottle Weighing 30/50	1 dozen
91	Bottle Weighing 30/50	1 dozen
92	Crcible China	1 dozen
93	Beaker 400ml	1 dozen
94	Beaker 150ml	1 dozen
95	Mesh	1 dozen
96	Busen Burner	1 dozen
97	Electric burett 10, 20 ml (one each)	2

Minimum Qualification of Teacher/ Instructor

- **M.Sc. in Chemical Engg.**

OR

- **B.Sc. in Chemical Engg. with 2-Years' relevant experience in teaching/ industry**

OR

- **B-Tech / B.Sc. Tech. Chemical with 4-Years' relevant experience in teaching/ industry**

OR

- **DAE in Leather Technology with 6-Years' relevant experience in teaching/ industry**

Curriculum Revision Committee (CRC)

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