CURRICULUM FOR THREE YEAR
(SIX SEMESTER)
DIPLOMA COURSE IN

LEATHER TECHNOLOGY (TANNING)

Effective from Session

Semester System

UNDER DEVELOPMENT

Prepared By

Curriculum Development Cell

INSTITUTE OF RESEARCH DEVELOPMENT
& TRAINING, U.P., KANPUR

APPROVED BY

BOARD OF TECHNICAL EDUCATION
U.P. LUCKNOW,
CORRECTED AS SYLLABUS COMMITTEE OF:
B.T.E. MEETING HELD ON 04.05.2017:

Corrected and Approved By B.T.E. on Dated 04.05.2017

STUDY AND EVALUATION SCHEME FOR
THREE YEAR (SIX SEMESTER) DIPLOMA COURSE IN LEATHER TECHNOLOGY (Tanning)
(Effective From Session 200 -0)

I Semester

Curriculum						S U B J E C T	Scheme of Examination									Grand Total
Periods Per Week							Theory				Practical					
Lec.	Tutorial	Draw		Lab	Work Shop	Total		Examination Dur.	Marks	Sess. Marks	Total Marks	Examination Dur.	Marks	Sess. Marks	Total Marks	
4	-	-		-	-	4	1.1 Foundational Communicaton	2.5	50	20	70	-	--	--	--	70
3	1	-		-	-	4	1.2 Applied Mathematics-I(A)	2.5	50	20	70	-	-	-	-	70
3	1	-		-	-	4	1.3 Applied Physics-I	2.5	50	20	70	-	--	--	--	70
6	-	-		4	-	10	1.4 Applied Chemistry	2.5	50	20	70	3	40	20	60	130
-	-	10		--	10	20	1.5 Drawing & Workshop Practice	--	--	--	--	4	100	50	150	150
16	2	10		4	10	42	<---------TOTAL---------->	--	200	80	280		140	70	210	490
							Games/NCC/Social and Cultural Activities + Discipline (15 + 10)									25
															TOTAL	515

II Semester

3	1	-		-	-	4	2.1 Applied Mathematics-I(B)	2.5	50	20	70	-	-	-	-	70
3	1	-		4	-	8	2.2 Applied Physics-II	2.5	50	20	70	3	40	20	60	130
6	2	-		--	--	8	2.3 General Engineering-I	2.5	50	20	70	--	--	--	--	70
5	1	-		8	--	14	2.4 Organic Chemistry	2.5	50	20	70	3	60	30	90	160
4	1	-		6	--	11	2.5 Theory of Leather Manufacture-I	2.5	50	20	70	4	70	30	100	170
21	6	-		18	-	45	<---------TOTAL---------->	--	250	100	350		170	80	250	600
							Games/NCC/Social and Cultural Activities + Discipline (15 + 10)									25
															TOTAL	625

NOTE:- (1) Each period will be of 50 minutes duration.
(2) Each session will be of 16 weeks.
(3) Effective teaching will be at least 14 weeks.
(4) Remaining periods will be utilised for revision etc.

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STUDY AND EVALUATION SCHEME FOR
THREE YEAR (SIX SEMESTER) DIPLOMA COURSE IN LEATHER TECHNOLOGY (Tanning)
(Effective From Session)
III SEMESTER

Curriculum								Scheme of Examination								
Periods Per Week							S U B J E C T	Theory				Practical				Grand Total
Lec.	Tutorial	Draw	Lab	Work Shop	Total			Examination Dur.	Sess. Marks	Total Marks		Examination Dur.	Sess. Marks	Total Marks		
6	1	-	4	--	11	3.1	Elementary Microscopy & Microbiology	2.5	50	20	70	3	40	20	60	130
6	1	-	--	--	7	3.2	Theory of Leather Manufacture - II	2.5	50	20	70	--	--	--	--	70
8	-	-	6	--	14	3.3	Theory of Leather Manufacture - III	2.5	50	20	70	3	70	30	100	170
6	-	-	4	-	10	3.4	General Engineering-II	2.5	50	20	70	3	40	20	60	130
26	2	-	14	-	42	<---------TOTAL---------->		--	200	80	280		150	70	220	500
							Games/NCC/Social and Cultural Activities + Discipline (15 + 10)									25
														TOTAL		525

IV SEMESTER

4	-	-	-	-	4	4.1	FunctionalCommunicaton	2.5	50	20	70	-	--	--	--	70
7	-	-	7	--	14	4.2	Process of Leather Manufacture - I	2.5	50	20	70	12	80	30	110	180
5	-	-	6	--	11	4.3	Process of Leather Manufacture - II	2.5	50	20	70	12	70	30	100	170
3	-	-	3	-	6	4.4	Leather Trade Engg.	2.5	50	20	70	3	40	20	60	130
2	-	-	5	--	7	4.5	Introduction To Computer	--	--	--	--	3	60	30	90	90
3	-	-	2		5	4.6	Energy Conservation	2.5	50	20	70	3	20	10	30	100
24	-	-	23	--	47				250	100	350		270	120	390	740
							Games/NCC/Social and Cultural Activity/Community Development Work + Discipline (15 + 10)									25
														AGGREGATE		765

NOTE:- (1) Each period will be of 50 minutes duration.
(2) Each session will be of 16 weeks.
(3) Effective teaching will be at least 14 weeks.
(4) Remaining periods will be utilised for revision etc.
(5) 4 weeks structured and supervised, branch specific, task oriented industrial/field exposure to be organised after IV Semester. Student will submit a report. There will be 60 marks for this ecposure.
These marks will be awarded by project examiner in the VI Semester.
(Examination marks : 40, Sess. marks : 20).
(6) Field visit and extension lectures are to be organised and managed at least twice in a month at institute level.

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STUDY AND EVALUATION SCHEME FOR
THREE YEAR (SIX SEMESTER) DIPLOMA COURSE IN LEATHER TECHNOLOGY (Tanning)
(Effective From Session)
V Semester

Curriculum								Scheme of Examination								
Periods Per Week							S U B J E C T	Theory			Practical				Grand Total	
Lec.	Tutorial	Draw	Lab	Work Shop	Total			Examination Dur.	Sess. Marks	Total Marks	Examination Dur.	Sess. Marks	Total Marks			
-	-	-	4	-	4	5.1	IntegrativeCommunicaton	2.5	--	--	--	3	40	20	60	60
6	2	-	-	--	8	5.2	Industrial Management and Entrepreneurship Development	2.5	50	20	70	--	--	--	--	70
6	-	-	-	7	13	5.3	Process of Leather Manufacture - III	2.5	50	20	70	12	100	50	150	220
6	-	-	-	7	13	5.4	Elements of Footwear & Leather Goods Manufacture	2.5	50	20	70	4	100	50	150	220
7	1	-	-	--	8	5.5	Analytical Chemistry of Leather Manufacture	2.5	50	20	70	--	--	--	--	70
25	3	-	4	14	46				200	80	280		200	100	300	580
Games/NCC/Social and Cultural Activity/Community Development Work + Discipline (15 + 10)																25
															AGGREGATE	605

VI Semester

4	-	-	-	-	4	6.1	Environmental Education* Disaster Management	2.5	50	--	--	-	--	--	--	--
6	2	-	-	--	8	6.2	Financial,Cost & Management Accounting	2.5	50	20	70	--	--	--	--	70
6	2	-	-	--	8	6.3	Tannery Waste Management	2.5	50	20	70	--	--	--	--	70
-	-	-	8	--	8	6.4	Standardisation & Analysis of Leather/ Leather Manufactures	---	--	--	--	12	100	50	150	150
6	4	-	-	--	10	6.5	International Business Management & TQM	2.5	50	20	70	--	--	--	--	70
-	4	-	-	--	4	6.6	Project									
							(i) Project Work	---	--	--	--	3	70	40	110 }	
							(ii) Industrial Training	---	--	--	--		40	20	60 }	170
22	12	-	8	-	42				150	60	210		210	110	320	530
Games/NCC/Social and Cultural Activity/Community Development Work + Discipline (15 + 10)																25
															AGGREGATE	555
															30% Carry Over of I & II Semester	342
															70% Carry Over of III & IV Semester	903
															100% Carry Over ofV & VI Semester	1160
																2405

NOTE:- (1) Each period will be of 50 minutes duration.
(2) Each session will be of 16 weeks.
(3) Effective teaching will be at least 14 weeks.
(4) Remaining periods will be utilised for revision etc.
(5) Field visit and extension lectures are to be organised and managed well in advance at institute level as per need.
(6) (*) It is compulsory to appear & to pass in examination, But marks will not be included for division and percentage of obtained marks.

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I. MAIN FEATURES OF THE CURRICULUM

1.	Title of the Course	:	Diploma in Leather Technology (Tanning)
2.	Duration of the Course	:	Three Years (Six Semester)
3.	Type of the Course	:	Full Time Institutional
4.	Pattern of the Course	:	Semester System
5.	Intake	:	60
6.	Entry Qualification	:	Passed High School with 35% Marks
7.	Admission Criteria	:	State Joint Entrance Examination

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LIST OF EXPERTS

List of experts who contributed in the Semester System of curriculum for Three Years (Six Semester) Diploma Course in Leather Technology at I. R. D. T., U. P., Kanpur dated 22-4-2015

1.	Shri Bharat Singh	H.O.D. Govt.Leather Institute, Agra
2.	Shri D. N. Swami	Lecturer (Shoe Design) Govt. Leather Institute, Kanpur
3.	Shri Rajjan lal Pal	Lecturer G. G. P., Lucknow
4.	Shri N. K. Singh	Instructor Govt. Leather Institute, Kanpur
4.	Shri Pankaj Yadav	Professor I.R.D.T.,U.P., Kanpur

List of experts who contributed in the Review/Revison curriculum for Three Years (Six Semester) Diploma Course in Leather Technology at I. R. D. T., U. P., Kanpur dated 24-10-2016

1.	Shri Anurag Sachan	Deputy Manager, Lanxes Pvt. Ltd.,Kanpur
2.	Shri Narendra Kumar	Technical Officer,CLRI,Jajmau,Kanpur
3.	Shri Ashok Yadav	B.T.E., Lucknow
4.	Shri Bharat Singh	H.O.D., Govt.Leather Institute, Agra
5.	Shri Jitendra Kumar	H.O.D., G.L.I., Kanpur
6.	Shri D. N. Swami	Lecturer (Shoe Design) Govt. Leather Institute, Kanpur
7.	Shri Satyendra Singh	Lecturer, G.L.I., Kanpur
8.	Shri M. K. Singh	Instructor Govt. Leather Institute, Kanpur
9.	Dr. Kshama Mishra	Assistant Professor, I.R.D.T.,U.P., Kanpur

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LIST OF EXPERTS

A Curriculum Workshop for Development of Curriculum on the Subject " Energy Conservation" was held on 22nd January, 2018 at NITTTR, Chandigarh. The following participated in the workshop:-

S. No.	Name, Designation and Official address
From Field/Industries/Institutions of Higher Learning	
1.	Shri Jotinder Singh, Engineer-in-Chief(Retd.) Punjab State Power Corpn. Ltd.(PSPCL), Punjab
2.	Shri Punit Sharma, Asstt.General Manager, Electrical & Energy Management, Godrej Appliances Ltd. Mohali, Punjab
3.	Ms. Anu Singla, Associate Professor, Chitkara University, Rajpura, Punjab
4.	Shri Girish Kumar, UP New and Renewable Energy Development Authroity (UPNEDA), Lucknow, U.P.
5.	Sh. Lal Ji Patel, TBO/ CDC Officer, IRDT Kanpur, U.P.
6.	Shri Ravinder Kumar, Research Assistant, IRDT, Kanpur, U.P.
From NITTTR, Chandigarh	
7.	Dr. AB Gupta, Professor & Head, Curriculum Development Centre, **Coordinator**

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III. NEED ANALYSIS :

Various types of leather articles are in use in every day life. There is continuous demand for such articles in the world market. Our country is third richest country in cattle stock. Therefore raw material in the form of leather is available in sufficient quantity.

Processing of leather for different purposes is an specialised job. Procurement of raw leather is a technical job which requires knowledge of Microscopy & Microbiology, Organic chemistry, Standardisation and quality control techniques, testing etc.

The student is supposed to have basic knowledge of different methods of leather processing. Knowledge of computers will be additional advantage to handle statistical information. There are bright prospects for external revenue generation through leather export.

Keeping in view the above factors, curriculum for three year diploma course in Leather Technology has been revised to suit the need of the industry. Environmental pollution and its control and Entrepreneurship development has also been included in the curriculum.

It is hoped that this new curriculum woll prove useful for the students. The demand for middle level technical man power can be fulfiled in the industries through diploma passouts of Leather Technology.

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IV. PROFILE DEVELOPMENT :

A tool in the form of questionnaire for getting information about job potential, job opportunities, man power requirements and job activities of Diploma holder in Footwear and Leather Goods Technology was designed and sent to various organisations, industries and higher technological Institutions and Polytechnics. The response was not very much encouraging. So efforts were made to get feed back through mutual interaction with the experts of above organisations, industries, higher technological institutes and polytechnics. The feed back received was discussed and analysed in a workshop and a draft curriculum was prepared adopting the following procedure.

1. Listing job potential and job activities.

2. Analysing activities into acknowledge and skill.

3. Determining course objectives.

4. Planning horizontal and vertical organisation of the subjects.

5. Developing study and evaluation scheme.

6. Development of detailed course content and coverage time keeping in view the knowledge and skill requirement.

7. Determination of resource input in the form of human resource, space, equipment etc.

The draft curriculum so prepared was sent for comments of experts in various higher technological institutions and senior personnel in industries. The suggestions thus recieved and those through personal contacts were incarporated where found suitable. Finally revised curriculum was put before an exspert Committee approved by the "Government of Utter Pradesh" for its final approval. The Committees suggestions though very nominal too were respectfully incarporated to give it its final shape.

It is hoped that revised curriculum of Diploma in Footwear and Leather Goods Technology will be useful in producing middle level manpower for world of work.

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V. JOB POTENTIAL / JOB OPPORTUNITIES

The following are the job opportunities for diploma holders in leather technology.

1. As a leather technologist to manufacture various types of heavy and light leathers, sports goods leathers, garment leather etc.

2. As supervisor/production manager in the tanneries/leather and allied industries in the following sections:

   Liming Department, Tanning Department, Dyeing Department, Curing Department, Finishing Department, Testing and Quality control.

3. As research assistant for developing tanning processes for manufacture of various types of leathers.

4. As technical officer/sales officer in chemicals and auxiliary manufacturing companies.

5. As supervisor in quality control and purchases (Finished leather)

6. As an analyst in tanneries.

7. As supervisor or manager in raw hide curing, preservation and flaying centre.

8. As a field officer for procurement of new materials in shoe industry/Tannery

9. As a marketing officer in tanneries and allied industries.

10. As a laboratory assistant in leather test laboratories.

11. As assistant/ Deputy Director leather in Govt. departments.

12. As a design/planning supervisor in leather goods manufacturing and allied industries.

13. As a maintenance supervisor in leather industry.

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VI. JOB ACTIVITIES OF DIPLOMA HOLDERS IN LEATHER TECHNOLOGY

1. Activities connected with leather Manufacturing

   1.1 Examines hides and skins for various defects.

   1.2 Analyses various chemicals such as water, commonsalt, lime, sulphides, acids, dyes, vegetable and synthetic used in leather industry.

   1.3 Tests tanned and finished leathers at every stage for conformity to prescribed standards and quality.

   1.4 Determine correct and economical methods of tanning of hides and skins for various leathers.

   1.5 Assessment and assortment of raw hides and skins for processing into different kinds of leathers.

   1.6 Supervises curing beam house, tanning and finishing processes.

   1.7 Selection and grading of finished leathers.

   1.8 Measurement, weighment and yield of leather at various stages of manufactures.

   1.9 Packing of finished leathers.

2. Activities connected with leather Manufacturing

   2.1 Selects and installs new equipment and machinery

   2.2 Maintains and under takes minor repairs of the machinery installed in a tannery.

   2.3 Assists in the selection of site, layout and construction of tanneries.

   2.4 Demonstrates correct procedures for operating various machinery.

   2.5 Handles and uses various instruments.

3. Management Activities

   3.1 Plans and schedules production

   3.2 Allocates duties to various workers.

   3.3 Imparts training to workers engaged in the unit.

   3.4 Supervises the work of various sections in the tanneries.

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3.5 Estimates the unit cost of leather produced under his charge.

3.6 Supervises the receiving , packing and forwarding of goods.

3.7 Controls inventory of chemicals and raw materials and makes out a schedule of such materials to be kept in stock for continuous production.

3.8 Accounting and maintaining records.

3.9 Assists in ensuring working conditions in tanneries in accordance with labour and factory laws.

3.10 Supervises labour welfare schemes.

3.11 Marketing of leather.

3.12 Assists in conducting techno-economic surveys and preparing project reports for starting tanneries.

4. Activities connected with research and development

4.1 Assists in research and development in the fields of:

Curing and preservation;

Leather manufacture;

Auxillaries;

Utilization of bye-products

Treatment of effluents;

Utilizing local tanning resources;

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VII. ANALYSIS OF ACTIVITIES INTO KNOWLEDGE AND SKILL

ACTIVITY	KNOWLEDGE	SKILLS
1.1 Examines, hides and skins for various defects	Histology of hides and skins	Flaying practice
	Anatomical structure	Curing and preservation practicals
	Different kinds of hides and skins	
	Different breeds of ovines and bovines and their characteristic grains.	Study of defects in hides and skins in the raw hide market
	Post mortem and ante-mortem defects on hides and skins and their effects on finished leather.	Microscopic and bacteriological examination of (At an elementary level)
	Remedial measures to overcome defects	
	Seasonal and re-gional variations	
	Raw hide and skin prices, weights, areas and yield	
	Proper trimming and utilization.	
	Strength proper-ties of skin fibres	
	Proper flaying of hides and skins	
	Purifaction and bacteria	
	Storage, handling and transportation of raw hides and skins	
	Assorting and grading of raw hides and skins	

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ACTIVITY		KNOWLEDGE	SKILLS
1.2	Analyses various chemicals such as water, common salt, lime, sulphides, acids, dyes, oils and fats, tanning materials-mineral vegetable and synthetic used in leather industry	Sources of availability of various chemicals. Impurities present Minimum acceptable standards of Composition and properties of various chemicals Chemical reactions. Methods of Chemical analysis.	Experiments in the Laboratory concerned with qualitative and quantitative methods of chemical analysis involving these chemicals
1.3	Tests tanned and finished leather at every stage for conforming to prescribed standards of quality.	- Different methods of tanning and finishing - Analysis of vegetable tanned leather, sampling, preparation of the sample, analysis in full Determination of adulteration, acidity of vegetable tanned leathers - Analysis of chrome salts and chrome tanned leather. Determination of percentage basicity, distribution of acid in chromium complexes, chromium in chrome leather - Preparation of various types of chrome liquors and their analysis and tanning test, with them - Analysis of aluminium and zirconium tanning agents, systems and formaldehyde	Analysis of all chemical used in leather manufacture except dyes Analysis of vegetable and mineral tanning agents Analysis of vegetable, chrome other mineral and oil tanned leathers Physical testing of leathers

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ACTIVITY	KNOWLEDGE	SKILLS
	- Dyes and dye stuffs preparation and systematic tests comparitive dyeing tests with various types of leathers.	
	- Types of oil fats and waxes Analysis of oils and fats. Iodine value saporification values theory of saturation and maturation Analysis of oil tanned leathers.	
	- Tests for sulphonated oils, analysis of soaps and fat liquors	
	- Analytical study and control of tanning process	
	- Water analysis temporary and permanent hardness, methods of softening study of suitability of water for tanning purposes.	
	- Analysis of curing materials. Analysis of soaps liquors and soaking materials, analysis of lime in full, analysis of sodium sulphide, defects of lime and sulphide and other unhairing agents in liming - Analysis of limed pelt Analysis of used lime liquor, Bata liquor, Deliming liquors and the chemicals used in bating and deliming - Analyses of pickle liquor used and unused.	

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ACTIVITY		KNOWLEDGE	SKILLS
		- Analysis of vegetable tanning materials, methods of sampling; grinding and extraction, qualitative and quantitative analysis of vegetable tanning materials - Sampling and analysis of extracts, liquids or solids; comparative tannery tests with different blends of hydrolisable and condensed tannins - Pigments, binders (Synthetic and natural); Nitrocellulose lacquers, lacquer emulsions, polyurethanes, plasticizers, solvents thinners, PVC lacquers etc. - Physical testing of leathers: Sampling and conditioning for tensile strength, tear and bursting strength, abrasion reistance, stretchiness, crack index apparent and real density, air and water vapour permeability water proofness, resilience and flexibility, wet and dry rub fastness, water absorption etc.	
1.4	Determine correct and economical method of tanning of hides and skins for various leathers.	-Principles and methods of manufacture of different types of heavy, light and sportsgoods leather such as sole, harness, bolting, saddlery, leather for carriage and automobiles packing band leather, buffers, pickers, washers, hydraulic leathers, shoe upper leathers, lining leathers, gloving and clothing leathers, chamois leather, upholstery book	-Practical exercise to manufacture improtant types of heavy, light and sportsgoods leather their working on various machinery.

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		binding and morocco leathers.	
ACTIVITY		KNOWLEDGE	SKILLS
		Glazed kid leather, buff, calf, upper, softy upper suede and sambhur leather, ammunition boot upper and sarunken grain leather, E.I. tanned sheep, goat, cow and buff leather, Reptile leather, game skins leather, semichrome and fullchrome football leather, hockey and cricket ball leather, batting/wicket keeping glove leather, shuttle cock leather, grip leather etc.	
		Dressing of EII leathers /bag tanned leathers/wet blues.crust leather into finished leathers working of various tanning maching and their production machines, Alignment etc. Performance exercise. characteristics maintena-nce and replacement factors foundations for machine and erection.	
		-Probable defects and repairs. Power load requirements of machinery. Schematic drawinds and flow charts (ISI symbols and conventions).	-Blue print reading, Free Hand skectching charts.
2.3	Assists in the selections of site, layout and constr-uction of tanneries	-Factors to be considered in site selection, water supply, distributin and disposal system, sanitary fittings factory layout Power and steam piping, Biolers, fire protection safety measures.	-Reading of Typical layouts and re-drawing them.
2.4	Demonstrates correct procedures for operating vari-ous machinery		-Same as 2.1 & 2.2 + dismantling and assemb-ling tanning machine + renewal of belts length

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			and sizes of belts, checking of slackness of belts, their remedie, checking of pulleys and
ACTIVITY		KNOWLEDGE	SKILLS
			setting them right; Tightening loose shafts, couplings bearings and other alignments, speed and strockes of machine.
2.5	Handles and uses various instruments	-Hydrometers, pressure meters, vaccum gauges, Hydrometers, Ammeters, Voltmeters, pH meter, Calorimeter, thermostats, Ovens, Muffle furnaces, Balances, Glassware viscometer; microscope; sterilizer distillation and gasplants etc.	-Practical in using these instruments.
3.1	Plans and schedules production	-Stock of raw materials. Availability of workers, various production, capacities of machines and men; Bar charts and networking techniques.	
3.2	Allocates duties to workers	-Individual and group skills Elements of industrial psychology; Time and motion study.	
3.3	Imparts training to workers engaged in the unit	-Processes and machinery, training needs, methods of training and assessment. Qualities of leadership.	- Group discussion skills. - Demonstration skills - Visit to industries
3.4	Supervises the work of various sections in the tanneries	-Coordination, Economic and technical decision making. Selection of alternatives, Principles of supervision human ralation	
3.5	Estimating the unit cost of leather produced under his charge	-Use of money credit, depre-ciation, earning and returns. Breakeven point, costing and book-keeping, competitions (Elements of economics with special reference to leather industry) Exercises in estimating the cost of production of some important types of leather.	
3.6	Supervises the	-Book-keeping; Receiving and	

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	receiving, packing and forwarding of goods	despathching procedures. -Import-Export regulations; F.O.B., C.I.F. values and invoices methods of packing; handling and transprotation.

ACTIVITY		KNOWLEDGE	SKILLS
3.7	Controls inventory of chemicals and raw materials and makes out a suitable schedule such materials to be kept in stock for continuous productions.	-Principle of materials management; stores mangement and reordering level	
3.8	Accounting and maintaining records.	-Commerical accounting maintenance of job cards; stock registers	
3.9	Assists in ensuring working conditions in tanneries in accordance with labour and factory laws	-Factory rules workers welfare schemes, Trade unions, Minimum wages act, ESI, Gratuity, Retirement benefits,workmen compensation Act, Workers coop. stores schools, canteens etc.	
3.10	Supervises labour welfare schemes		
3.11	Marketing of leather	-Communication and public relations; Advertising quality control; competitions ; Internal price Export trade, sales promotion; Marketing intelligence.	
3.12	Assists in conducting techno-echonomic surveys and preparing project reports for starting tanneries	-Sampling; Methods of Collecting data; Elementary Statistics, capital structure, capital structure; Ioans from financial institution and bakns; Govt. policy and concessions, Entrepreneurship and technocart schemes, production; profitability and balance sheet; leather economics; practical exercises in preparing project report.	
4.1	Assists in R&D in fields of curing	-As in all the activities Above	

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	and preservation, leather manufacture auxiliaries, utilization of bye products, treatment of effluents utilizing local tanning resorces	Project work

VIII. COURSE OBJECTIVES:

After completion of the course the student should be able to

1. Understand the physical, chemical and biological properties of raw hides and skins, finished leather and materials that go into leather manufacture.

2. Select and grade raw hides and skins for manufacture of different types of finished leather;

3. Select the most appropriate tanning method for various types of leathers;

4. Estimate the unit cost of manufacture of leather;

5. Plan, schedules, organises, direct, controls and co-ordinate operations and men involved in the manufacture of leather;

6. Test tanned and finished leathers at various stages to prescribed standards of quality;

7. Selects, instals, maintains and undertake minor repairs of machinery in a tannery;

8. Assists in selection of site, layout and construction of tannery.

9. Assists in conducting tecnho-economic surveys and preparing project reports for starting tanneries.

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IX. DERIVING SUBJECTS OF STUDY FROM COURSE OBJECTIVES:

COURSE OBJECTIVES	SUBJECTS
1. Understand the physical, chemical and biological properties of raw hides and skins and finished leather and materials that go into leather manufacture.	Mathematical, Physical, Inorganic and Organic chemistry, Microbiology, Theory of leather manufacture, Theory & practice of deying and finishing.
2. Select and grade raw hides and skins for manufacture of different types of finished leather.	Microscopy and Mocrobiology Theory of leather manufacture Process of leather manufacture.
3. Select the most apporopriate tanning method for various types of leathers.	Theory of leatner manufacture Process of leather manufacrure Theory and Practice of deying and finishing General engineering Leather Trades Engineering Footwear and Leather goods manufacture.
4. Estimates the unit cost of manufactured leathers.	Theory and Practice of Leather manufacture, Leather Machinery Estimating and Costing.
5. Plans, Schedules organises, directs, controls and coordinates operations and men involeve in the manufactre of leather.	Leather Trades Engineering Industrial Management Production Management
6. Test tanned and finished leathers at various stages to prescribed standards of quality.	Analytical chemistry of leather manufacture and testing.
7. Selects, instals, maintains and undertakes minor repairs of machinery in a tannery.	General Engineering, Workshop practice, Drawing and Blueprint reading, Maintenance of mechinery, Leather Trades Engineering.

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8. Assist in selection of site, layout and construction of tannery.	Leather Trades Engineering Theory & Process of Leather Manufacture
9. Assist in conducting techno-economic surveys and preparing project reports for starting tanneries.	All the above subjects - Elementary economics and statistics - Engilish language course (For report writing as well as for oral communication)

SUBJECTS AND CURRICULUM AREAS

SUBJECT	CURRUCULUM AREA
Communication Technique	Language & Communication
Mathematics-I Physics Chemistry (Inorganic, Physical and Organic) Microscophy and Microbiology	Basic Sciences
General Engineering (Mech., Elect.) Workshop Drawing	Basic Engineering
Theory of Leather Manufacture Process of Leather Manufacture (Heavy, Light, Industrial, Sportgoods) Theory and Pracctice of deying and finishing Elements of Footwere Manufacture Leather Goods Manufacture Leather Trade Engineering Maintenance of Machinery Analytical Chemistry of Leather Manufacture Analysis of materials and products of leather manufacture Project work	Leather Technology
Industrial Management and entrepreneurship development	Management and Entrepreneurship
Introduction to Computers	Computer awareness

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I Semester

1.1 FOUNDATIONAL COMMUNICATION
SECTION "A" (ENGLISH)

L	T	P
4	-	-

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Units	Coverage Time L	T	P
Section A English				
1.	PARTS OF SPEECH	12	-	-
2.	VOCABULARY BUILDING	05	-	-
3.	Grammar	15	-	-
4.	DEVELOPMENT OF EXPRESSION (Composition)	12	-	-
Section B Hindi				
5.	Topic 5	2	-	-
6.	Topic 6	5	-	-
7.	Topic 7	5	-	-
		56	-	-

DETAILED CONTENTS

1. **PARTS OF SPEECH :**

   a. Noun
   b. The pronoun : Kinds and Usage
   c. The adjective : Kinds and Degree
   d. Determiner : Articles

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e. The verb : Kinds
f. The Adverb : Kinds, Degree and Usage
g. Prepositions
h. Conjunctions
i. The Interjections
j. Subject: Verb Agreement (Concord)

2. **VOCABULARY BUILDING :**

a. Antonyms and Synonyms
b. Homophones
c. One word substitutions
d. Idioms and Phrases
e. Abbreviations

3. **Grammar**

a. Sentence & its types
a. Tenses
b. Punctuations
c. Active and Passive voice
d. Transformation of Sentences
e Synthesis of Sentences
f. Direct and Indirect Narrations

4. **DEVELOPMENT OF EXPRESSION (Composition) :**

a. Paragraph Writing
b. Essay Writing
c. Proposal Writing
d. Letter Writing (Formal,Informal,Business,official etc.)
f. Report Writing
g. Note Making
h. News Making
i. Application Writing
j. Minute Writing
k. Invitation Letter Writing

SECTION "B" (Hindi)

5– संज्ञा, सर्वनाम, विशेषण, किया विशेषण, वर्ण समास, संधि, अलंकार, रस, उपसर्ग प्रत्यय।

6– पत्र लेखन, निविदा संविदा, दर आमंत्रण (कोटेशन) अपील, स्वतन्त्र अभिव्यक्ति, प्रतिवेदन लेखन, प्रेस विज्ञप्ति।

7– वाक्य/वाक्यांश के लिए शब्द, पर्यायवाची या समानार्थी शब्द, विलोम शब्द, अनेकार्थी शब्द, शब्दयुग्म या समुच्चारित शब्द समूह, वाक्य शुद्धि (शुद्ध अशुद्ध वाक्य), मुहावरे एवं लोकोक्तियॉ।

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1.2 APPLIED MATHEMATICS I(A)

[Common to All Engineering Courses]

L	T	P
3	2/2	-

Rationale:

The study of mathematics is an important requirement for the understanding and development of any branch of engineering. The purpose of teaching mathematics to diploma engineering students is to impart them basic knowledge of mathematics which is needed for full understanding and study of engineering subjects.

S.N.	Units	Coverage Time L	T	P
1.	Algebra- I	8	3	-
2.	Algebra- II	8	3	-
3.	Trignometry	6	2	-
4.	Differential Calculus-I	10	3	-
5.	Differential Calculus-II	10	3	-
		42	14	-

DETAILED CONTENTS:

1. ALGEBRA-I : (10 Marks)

1.1 Series : AP and GP; Sum, nth term, Mean

1.2 Binomial theorem for positive, negative and fractional index (without proof). Application of Binomial theorem.

1.3 Determinants : Elementary properties of determinant of order 2 and 3, Multiplication system of algebraic equation, Consistency of equation, Crammer's rule

2. ALGEBRA-II:(10 Marks)

2.1 Vector algebra : Dot and Cross product, Scaler and vector triple product.

2.2 Complex number.

Complex numbers, Representation, Modulus and amplitud Demoivre theorem, its application in solving algebraic equations, Mod. function and its properties..

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3. TRIGONOMETRY :(8 Marks)

3.1 Relation between sides and angles of a triangle : Statement of various formulae showing relation ship between sides and angle of a triangle.

3.2 Inverse circular functions : Simple case only

4. DIFFERENTIAL CALCULUS - I : (12 Marks)

4.1 Functions, limits, continuity, - functions and their graphs, range and domain, elementary methods of finding limits (right and left), elementary test for continuity and differentiability.

4.2 Methods of finding derivative, - Function of a function, Logaritimic differentiation, Differentiation of implicit functions.

5. DIFFERENTIAL CALCULUS -II :(10 Marks)

5.1 Higher order derivatives, Leibnitz theorem.

5.2 Special functions (Exponential, Logarithmic, Inverse circular and function), Definition, Graphs, range and Domain and Derivations of each of these functions.

5.3 Application - Finding Tangants, Normal, Points of Maxima/Minima, Increasing/Decreasing functions, Rate, Measure, velocity, Acceleration, Errors and approximation.

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1.3 APPLIED PHYSICS-I

[Common to All Engineering Courses]

L	T	P
3	2/2	-

Rationale:

Engineering physics is a foundation Course. Its purpose is to develop proper understanding of physical phenomenon and scientific temper in the students. While teaching the subject,teachers should make maximum use of demonstrations to make the subject interesting to the students.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	L	T	P
1.	Units & Dimensions	3	1	-
2.	Errors in Measurement	3	1	-
3.	Circular Motion	4	1	-
4.	Motion of Planets	4	1	-
5.	Dynamics of rigid body (Rotational Motion)	5	1	-
6.	Fluid Mechanics and Friction	4	1	-
7.	Friction	4	1	-
8.	Harmonic Motion	5	2	-
9.	Heat & Thermodynamics	6	4	-
10.	Acoustics	4	1	-
		42	14	-

DETAILED CONTENTS:

1. Units and Dimensions (4 Marks)

S.I. Units & Dimensions of physical quantities, Dimensional formula and dimensional equation. Principle of homogenity of dimensions and applications of homogenity principle to:

i) Checking the correctness of physical equations,

ii) Deriving relations among various physical quantities,

iii) Conversion of numerical values of physical quantities from one system of units into another. Limitations of dimensional analysis.

2. ERRORS AND MEASUREMENT (4 Marks)

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Errors in measuremnts, accuracy and precision, random and systematic errors, estimation of probable errors in the results of measurement(Combination of erros in addition, substraction, multipication and powers). Significant figures, and order of accuracy in resprect to instruments,

3. Circular Motion (5 Marks)

Central forces. Uniform Circular motion (Horizental and Vertical cases),angular velocity,angular acceleration and centripetal acceleration.Relationship between linear and angular velocity and acceleration. Centripetal and centrifugal forces. Practical applications of centripetal forces. Principle of centrifuge.

4. MOTION OF PLANETS AND SATELLITES :(5 Marks)

Gravitational force, Acceleration due to gravity and its variation w.r. to height and depth from earth, Kapler's Law, Escope and orbital velocity, Time period of satellite, Geo-stationary, Polar satellites (Concept Only)

5. Dynamics of Rigid Body (Rotational Motion) (6 Marks)

Rigid body,Rotational motion, Moment of inertia,Theorems(Perpendicular and Parallel axis) of moment of inertia (Statement). Expression of M.I. of regular bodies (Lamina, Sphere, Disc, Cylindercal),Concept of Radius of gyration, angular momentum, Conservation of angular momentum, Torque, Rotational kinetic energy. Rolling of sphere on the slant plane . Concept of Fly wheel.

6. Fluid Mechanics :(5 Marks)

Surface tension, Capillary action and determination of surface tension from capilary rise method, Equation of continuity (A1V1=A2V2), Bernoulli's theorem, and its application stream line and Turbulent flow, Reynold's number.

7. Friction :(4 Marks)

Introduction, Physical significance of friction, Advantage and disadvantage of friction and its role in every day life. Coefficients of static and dynamic friction and their measurements. viscosity, coeff. of viscosity, & its determination by stoke's method.

8. Harmonic Motion (6 Marks)

Periodic Motion , characterstics of simple harmonic motion;

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equation of S.H.M. and determination of velocity and acceleration. Graphical representation. Spring-mass system. Simple pendulum. Derivation of its periodic time. Energy conservation in S.H.M.. Concept of phase, phase difference, Definition of free, forced, undamped and damped vibrations, Resonance and its sharpness, Q-factor.

9. Heat & Thermodynamics: (6 Marks)

Modes of heat transfer (Conduction, Convection and Radiation), coefficient of thermal conductivity Isothermal and adiabatic process. Zeroth First, Second Law of Thermodynamics and Carnot cycle, Heat Engine (Concept Only).

10. Acoustics (5 Marks)
Definition of pitch, loudness, quality and intensity of sound waves. Echo, reverberation and reverberation time. Sabine's formula without Derivation. Control of reverberation time (problems on reverberation time). Accoustics of building defects and remedy.

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1.4 APPLIED CHEMISTRY

[Common to All Engineering Courses]

L	T	P
6	-	4

Rationale:

Engineering Chemistry has profound and deep relationship with the industrial and environmental technology. This curriculum intends to impart technical knowledge alongwith productive practice to the students of the diploma engineering. The teachers are expected to guide the students in the classroom and the laboratories according to the curriculum by demonstrations and by showing relevant materials and equipments to inculcate interests in learning among students.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	L	T	P
1.	Atomic Structure	4	-	-
2	Chemical Bonding	6	-	-
3.	Classification of Elements	4	-	-
4.	Electro Chemistry-I	7	-	-
5.	Electro Chemistry-II	8	-	-
6.	Chemical Kinetics	4	-	-
7.	Catalysis	4	-	-
8.	Solid State	4	-	-
9.	Fuels	4	-	-
10.	Water Treatment	6	-	-
11.	Colloidal State	4	-	-
12.	Lubricants	4	-	-
13.	Hydrocarbons	7	-	-
14.	Organic Reactions & Mechanism	8	-	-
15	Polymers	4	-	-
16	Synethetic Materials	6	-	-
		84	-	56

DETAILED CONTENTS:

1. ATOMIC STRUCTURE :(3 MARKS)

Basic concept of atomic structure, Matter wave concept, Quantum number, Haisenberg's Uncertainty Principle, Shaples of orbitals.

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2. CHEMICAL BONDING :(4 MARKS)

Covalent bond, Ionic & Co-ordinate, Hydrogen bonding, Valence bond theory, Hybridisation, VSEPR theory, Molecular orbital theory.

3. CLASSIFICATION OF ELEMENTS :(3 MARKS)

Modern classification of elements (s,p,d and f blcok elements), Periodic properties : Ionisation potential electro negativity, Electron affinity.

4. ELECTRO CHEMISTRY-I:(3 MARKS)

Arrhenius Theory of electrolytic dissociation, Transport number, Electrolytic conductance, Ostwald dilution law. Concept of Acid and bases : Bronsted, Arrhenius and Lewis theory. Concept of pH and numericals. Buffer solutions, Indicators, Solubility product, Common ion effect with their application,

5. ELECTRO CHEMISTRY-II:(3 MARKS)

Redox reactions, Electrode potential(Nernst Equation), Electro-chemical cell (Galvanic and Electrolytic). EMF of a cell and free energy change. Standard electrode potential, Electro chemical series and its application. Chemical and Electrochemical theory of corrosion, Galvenic Series. Prevention of corrosion by various method.

6. CHEMICAL KINETICS :(3 MARKS)

Law of mass action, order and molecularity of rection. Activation energy, rate constants, Ist order reactions and 2nd order reactions.

7. CATALYSIS :(2 MARKS)

Definition Characteristics of catalytic reactions, Catalytic promotors and poison , Autocatalysis and Negative catalysis, Theory of catalysis, Application.

8. SOLID STATE :(2 MARKS)

Types of solids (Amorphous and Crystalline), Classification (Molecular, Ionic, Covalent, Metallic), Band theory of solids (Conductors, Semiconductors and Insulators), types of Crystals, FCC, BCC, Crystal imperfection.

9. FUELS :(3 MARKS)

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Definition, its classification, high & low Calorific value.Determination of calorific value of solid and liquid fuels by Bomb calorimeter.

Liquid fuel - Petroleum and its refining, distillate of petroleum (Kerosene oil, Disel and Petrol), Benzol and Power alchol. Knocking, Anti-knocking agents, Octane number and Cetane number.

Cracking and its type, Gasoling from hydrogenation of coal (Bergius process and Fischer tropsch's process)

Gaseous Fuel - Coal gas, Oil gas, Water gas, Producer gas, Bio gas, LPG and CNG.

Numerical Problems based on topics

10. WATER TREATMENT :(3 MARKS)

Hardness of water, Its limits and determination of hardness of water by EDTA method. Softening methods (Only Sods lime, Zeolote and Ion exchange resin process). Disadvantage of hard water in different industries, scale and sludge formation, Corrosion, Caustic embritlement, primming and foarming in biolers.

Disinfecting of Water By Chloramine-T, Ozone and Chlorine. Advantage and disadvantage of chlorinational, Industrial waste and sewage, Municipality waste water treatment, Definition of BOD and COD. Numerical Problems based on topics.

11. COLLOIDAL STATE OF MATTER :(3 MARKS)

Concept of collidal and its types, Different system of colloids, Dispersed phase and dispersion medium.
Methods of preparation of colloidal solutions, Dialysis and electrodialysis. Properties of colloidal solution with special reference to absorption, Brownian Movement, tyndal effect, Electro phoresis and coagulation. relative stability of hydrophillic and hydrophobie colloids. Protection and protective colloids. Emulsion, Types, preparation,properties and uses. Application of colloids chemistry in different industries.

12. LUBRICANTS :(3 MARKS)

Definition, classification, Necessasity and various kinds of lubricants. Function and mechanism of action of lubricants and examples. Properties of lubricants, Importance of additive compunds in lubricants, Synthetic lubricants and

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cutting fluids. Industrial application, its function in bearing.

13. HYDROCARBONS:(4 MARKS)

A. Classification and IUPAC nomeuclature of organic compounds hamologous series (Functional Group)

B. Preparation, properties and uses of Ethane, Ethene, Ethyne (Acetylene), Benzene and Toluene.

14. ORGANIC REACTIONS & MECHANISM:(4 MARKS)

1. Fundamental auspects -

   A. Electrophiles and nucleophiles, Reaction Intermediates, Free radical, Carbocation, Carbanion
   B. Inductive effect, Mesomeric effect, Electromeric effect.

2.A. Mechanism of addition reaction (Markonicove's Rule, Cyanohydrin and Peroxide effect),

B. Mechanism of Substitution reactions; (Nucleophillic) hydrolysis of alkyle halide, electrophillic substitution halogenation, Sulphonation, Niration and friedel-Craft reaction.

C. Mechanism of Elimination reaction - Dehydration of primary alcohol, Dehyrohalogenation of primary alkyl halide.

15. POLYMERS :(3 MARKS)

1. Polymers and their classification. Average degree of polymerisation, Average molecular weight, Free radical polymerisation (Mechanisms)

2. Thermosetting and Thermoplastic resen -

   A. Addition polymers and their industrial application- Polystyrene, PVA, PVC, PAN, PMMA, Buna-S, Buna-N, Teflon.

   B. Condensation polymer and their industrial application : Nylon 6, Nylon 6,6, Bakelite, Melamine formaldehyde, Urea formaldehyde, Terylene or Decron, Polyurethanes.

3. General concept of Bio polymers, Biodegradable polymers and inorganic polymers(Silicon)

16. SYNETHETIC MATERIALS :(4 MARKS)

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A. Introduction - Fats and Oils
B. Saponification of fats and oils , Manufacturing of soap.
C. Synthetic detergents, types of detergents and its manufacturing.
3. EXPLOSIVES: TNT, RDX, Dynamite.
4. Paint and Varnish

LIST OF PRACTICALS

1. To analyse inorganic mixture for two acid and basic radicals from following radicals

A. Basic Radicals :

NH4+, Pb++, Cu++, Bi+++, Cd++, As+++, Sb+++,

Sn++, Al+++, Fe+++, Cr+++, Mn++, Zn++, Co++

Ni++, Ba++, Sr++, Ca++, Mg++

B. Acid Radicals :

CO3--, S--, SO3--, CH3COO-, NO2-,

No3- , Cl-, Br_ , I- , So4--

2. To determine the percentage of available Chlorine in the supplied sample of Bleaching powder.

3. To determine the total hardness of water sample in terms of CaCo3 by EDTA titration method using Eriochroma black-T indicator.

4. To determine the strength of given HCl solution by titration against NaOH solution using Phenolphthalium as indicator.

5. To determine the Chloride content in supplied water sample by using Mohr's methods.

6. Determination of temporary hard ness of water sample by O-Hener's method.

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1.5 DRAWING & WORKSHOP PRACTICE PRACTICALS
(Common with Leather Technology, Footwear (CASD))

L	D	P
-	10	10

Rationale:

Drawing is called the language of engineering. The pass out can hold independent responsibility of any nature if he is equipped with sufficient knowledge of engineering drawing. Workshop practice introduces a sense of self confidence in the students for shopflore supervision of work. Practice in various machine operations and processes are given to make the student fit for shopflore working and supervision. A well skilled middle level man power can have effective control over skilled workers.

DRAWING

Sr. No.	Units	Coverage Time L	T	P
1.	Free hand sketching	-	-	18
2.	Principles of projection	-	-	17
3.	Missing surfaces	-	-	18
4.	Sketching of pictorial views	-	-	17
5.	Three views of given objects	-	-	18
6.	Shapes of inclined surface	-	-	17
7.	Plan, Clevation, side views and Isometric views	-	-	18
8.	Dimensioning technique	-	-	18
		-	-	140

WORKSHOP

Rationale:

Workshop practice introduces a sense of self confidence in the students for shopflore supervision of work. Practice in various machine operations and processes are given to make the student fit for shopflore working and supervision. A well skilled middle level man power can have effective control over skilled workers.

Sr. No.	Units	Coverage Time L	T	P
1.	Filing practice	-	-	09
2.	Use of marking & measuring tools	-	-	09
3.	Hack sawing practice	-	-	09
4.	Brazing practice	-	-	09

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5.	Soldering practice	-	-	08
6.	Heat treatment of tools	-	-	08
7.	Grinding practice	-	-	08
8.	Plane turning	-	-	12
9.	Practice on turning lathe	-	-	12
10.	Practice on band saw & circular saw	-	-	08
11.	Wooden utility articles for leather industry	-	-	08
		-	-	100

DETAILED CONTENTS:

DRAWING

1. Freehand sketching.
Basic principles, freehand sketching of components used in leather machinery and leather goods.

2. Principles of projection:
Recognition of objects from given pictorial view identification of surfaces from different objects and pictorial view.
Exercise on missing surfaces.
Sketching practice of pictorial views from objects.
Principles of orthographic projections
Three views of a given object.
Some shapes of inclined surfaces.
Invisible liner, centre lines, extension lines and dimensioned lines.
Simple exercises in drawing plans, elevations and side views of components used in footwear and leather goods machinery.

3. Dimensioning technique.
Principles and methods of dimensioning.
Exercise on dimensioning a given drawing.

4. ISI standards, symbols and conventions.

Workshop Practice :

1. Description of work bench, holding device, files and hand tools.Specification of files,precautions while filing a Job.

Job No. 1; Filing practice (Production of flat surfaces)
Checking by straight edge.

2. Marking of jobs, use of marking and measuring tools,

Job No. 2; Filing a dimensioned rectangle of square piece

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to an accuracy of + 0.25 mm.

3. Simple operation of hacksawing, description of various types of blades, their uses audhow to fit the blade.

   Job No. 3: Hacksawing practice.

4. Description of drills, selection of drills, tapping types, tapes drilling, reaming tapping and dieing operations.

   Job No. 4: Practice of drilling and dieing operations.

5. Brazing practice : Preparation of brazing joints.

   Job No. 5 : Brazing of two mild steel plates.

6. Job No. 6 : Soldering and welding : Preparation of soldering joints.
   joints- Preparation of welding joints,

7. Job No. 7: Heat treatment of tools.

8. Job No. 8: Grinding of blades, shears and knives used in leather machineries.

9. Job No. 9: Preparation of a steel turning job on a centre lathe.

10. Demonstration of wood working machines:

    (i) Demonstration on wood turning lathe.
    (ii) Demonstration on circular saw.
    (iii) Demonstration on bend saw.
    (iv) Grinding of saws on circular saw grinder.

11. Job No. 10: Simple exercises involving making of wooden components for use in leather industries.

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II Semester

2.1 APPLIED MATHEMATICS I (B)

[Common to All Engineering Courses]

L	T	P
3	2/2	-

Rationale:

The study of mathematics is an important requirement for the understanding and development of any branch of engineering. The purpose of teaching mathematics to diploma engineering students is to impart them basic knowledge of mathematics which is needed for full understanding and study of engineering subjects.

S.N.	Units	Coverage Time L	T	P
1.	Integral Calculus-I	12	4	-
2.	Integral Calculus-II	12	4	-
3.	Coordinate Geometry (2 Dimensional)	10	3	-
4.	Coordinate Geometry (3 Dimensional)	8	3	-
		42	14	-

DETAILED CONTENTS:

1. INTEGRAL CALCULUS - I : (14 Marks)

Methods of Indefinite Integration :-

1.1 Integration by substitution.

1.2 Integration by rational function.

1.3 Integration by partial fraction.

1.4 Integration by parts.

2. INTEGRAL CALCULUS -II :(14 Marks)

2.1 Meaning and properties of definite integrals, Evaluation of definite integrals. Integration of special function.

2.2 Application : Finding areas bounded by simple curves, Length of simple curves, Volume of solids of revolution, centre of mean of plane areas.

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2.3 Simposns 1/3rd and Simposns3/8th rule and Trapezoidal Rule : their application in simple cases.

3. CO-ORDINATE GEOMETRY (2 DIMENSION):(14 Marks)

3.1 CIRCLE :

Equation of circle in standard form. Centre - Radius form, Diameter form, Two intercept form.

3.2 Standard form and simple properties

Parabola x2=4ay, y2=4ax,

Ellipse $\frac{x2}{a2} + \frac{y2}{b2} = 1$

Hyperbola $\frac{x2}{a2} - \frac{y2}{b2} = 1$

4. CO-ORDINATE GEOMETRY (3 DIMENSION):(8 Marks)

4.1 Straight lines and planes in space -

Distance between two points in space, direction cosine and direction ratios, Finding equation of a straight line and Plane (Different Forms),

4.2 Sphere x2 + y2 + z2 + 2gx + 2fy + 2wz=d (Radius, Centre and General Equation)

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2.2 APPLIED PHYSICS-II

[Common to All Engineering Courses]

L	T	P
3	2/2	4

Rationale:

Engineering physics is a foundation Course. Its purpose is to develop proper understanding of physical phenomenon and scientific temper in the students. While teaching the subject,teachers should make maximum use of demonstrations to make the subject interesting to the students.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	L	T	P
1.	Optics	4	1	-
2.	Introduction To Fiber Optics	4	1	-
3.	Laser & its Application	4	1	-
4.	Electrostatics	4	1	-
5.	D.C. Circuits	4	1	-
6.	Magnetic Materials & Their Properties	4	1	-
7.	Semi Conductor Physics	4	1	-
8.	Introduction Diode & Transistors	4	2	-
9.	Introduction To Digital Electronics	4	2	-
10.	Non-conventional energy sources	6	3	-
		42	14	56

1. Optics (4 Marks)

Nature of light, Laws of Reflection and Refraction, Snell's Law, Interference (Constructive and Deotructive), Diffraction and Polarization (Concept Only), Law of Mallus and Polaroids.

2. Introduction To Fibre Optics :(5 Marks)

Critical angle, Total internal reflection, Principle of fibre optics, Optical fibre, Pulse dispersion in step-index fibres, Graded index fibre, Single mode fibre, Optical sensor.

3. Lasers and its Applications (4 Marks)

Absorbtion and Emission of energy by atom, Spontaneous and Stimulated Emission, Poluation inversion, Main component of

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laser and types of laser- Ruby Laser, He-Ne laser and their applications. Introduction to MASER.

4. Electrostatics :(4 Marks)

Coutomb's Law, Electric field, Electric potential, Potential energy, Capacator, Energy of a charged capacitor, Effect of dielectric on capacators.

5. D.C. Circuits (5 Marks)

Ohm's Law, Kirchoff's Law and their simple application, Principle of Wheat Stone bridge and application of this principle in measurement of resistance (Meter bridge and Post Office Box); Carey Foster's bridge, potentiometer.

6. Magnetic Materials and Their Properties: (5 Marks)

Dia, Para and Ferro-magnetism, Ferrites, Magnatic Hysteresis Curve and its utility. Basic idea of super conductivity, Meissner's effect.

7. Semiconductor Physics (4 Marks)

Concept of Energy bands in soldis, classification of solids into conductors, insulators and semiconductors on the basis of energy band structure. Intrinsic and extrinsic semi conductors, Electrons and holes as charge carriers in semiconductors, P-type and N-type semiconductors.

8. Junction Diode and Transister : (6 Marks)

Majority and Minority charge carriers,P-N junction formation, barrier voltage, Forward and reverse biasing of a junction diode, P-N junction device characteristics, Formation of transistor, transistor-action, Base, emitter and collector currents and their relationship LED's.

9. Introduction To Digital Electronics : (6 Marks)

Concept of binary numbers, Interconversion from binary to decimal and decimal to binary. Concepts of Gates (AND, NOT, OR).

10. Non-conventional energy sources: (7 Marks)

(a) Wind energy : Introduction, scope and significance, measurement of wind velocty by anemometer, general principle of wind mill.

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(b) Solar energy: Solar radiation and potentiality of solar radiation in India, uses of solar energy: Solar Cooker, solar water heater, solar photovoltaic cells, solar energy collector.

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PHYSICS LAB

Note: Any 4 experiments are to be performed.

1. Determination of coefficient of friction on a horizontal plane.

2. Determination of 'g' by plotting a graph T2 verses l and using the formula g=4n2/Slope of the graph line

3. Determine the force connstant of combinationof springs incase of 1. Series 2. Parallel.

4. To verify the series and parallel combination of Resistances with the help of meter bridge.

5. To determine the velocity of sound with the help of resonance tube.

6. Determination of viscosity coefficient of a lubricant by Stoke's law.

7. Determination of E1/E2 of cells by potentio meter.

8. Determination of specific resistance by Carry Foster bridge.

9. Determination of resitivity by P.O.Box.

10. Verification of Kirchoff's Law.

11. To draw Characteristics of p-n Junction diode.

12. To measure instantaneous and average wind velocity by indicating cup type anemometer/hand held anemometer.

NOTE :

Students should be asked to plot a graph in experiments (where possible) and graph should be used for calculation of results. Results should be given in significant figures only.

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2.3 GENERAL ENGINEERING -I

(Common with Leather Technology (CASD))

L	T	P
6	2	-

Rationale:

The purpose of introducing this paper in the first year of three years diploma course in Leather Technology is to expose the student with the fundamental knowledge about some main engineering materials used in the leather industry, Transmission of power by belt's and gears, machine components like Cams, Gears, Coupling and bearing. Basic workshop processes like brazing, soldering, welding, fitting and machine operations like turning, shaping, grinding and drilling and working of wood working machine will further enrich the knowledge of student for practical application in the world of work.

Sr. No.	Units	Coverage Time L	T	P
1.	Engineering Materials	09	03	-
2.	Drives In Machineries			
A.	Cams	09	03	-
B.	Transmission	09	03	-
C.	Gear Drives	09	03	-
D.	Couplings	06	02	-
E.	Bearings	09	03	-
3.	IC Engines	04	02	-
4.	Basic Workshop Technology	06	02	-
5.	Civil Engineering Materials	06	02	-
6.	Foundation	12	04	-
7.	Air conditionaing System	05	01	-
		84	28	-

DETAILED CONTENTS:

1. ENGINEERING MATERIALS:-

An introduction to mechanical properties of materials. Types of wood and their uses in leather machinery. Ferrous and nonferrous metals; CI types and properties; carbon steel and alloy steel, stainless steel; Non-ferrous metals brass,

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bronze, copper, aluminium and magnisium alloys.
Tool materials cutting tools, blades, shears, and knives - Heat treatment tools and sharpening and grinding of tools.
An introduction to different mechanisms in machines.

2. DRIVES IN MACHINERIES:

(a) Cams;

Cams as means of producing given type of motion: types of cams and their applications in machines.

(b) Transmission of Power ;

Power transmission by chain, belt and gear drives. Specific applications, safety provisions, sliping of belts. Different types of pulleys and their application.

(ii) Gear drives.

Types - Feature of spur gears, helical gears, bevel gears and worm gears, Hydraulic pumps and hydraulic drive mechanisms.

(c) Couplings:

Flange coupling - Universal coupling - Fluid couplings.

(d) Bearings:

Bush bearings, ball and roller bearings - Lubrication of bearings -- types.

(e) Pneumatic Systems

3. I.C. ENGINES :

Classification and working of I.C. engines

4. BASIC WORK SHOP TECHNOLOGY:

Brazing, soldering and welding : Fitting and machine shop operations such as shaping, milling, lathework, drilling, reaming and grinding machine tools used for above work limits, Fits and tolerances - Fabrication of components for repair and maintenance,
Principles of working of wood working machines.

5. CIVIL ENGINEERING MATERIALS:

General idea of raw materials, manufacturing process,

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properties and uses of Bricks, lime, cement and Timber.

6. FOUNDATION

(i) Bearing capacity of soil and its importance, need of foundation for electrical machines.

(ii) Foundations for heavy, light and vibrating machines.

(iii) Concrete proportion, mixing w/c ratio, workability RCC and its use.

7. AIR-CONDITIONING SYSTEM :

Brief concept of Refrigeration and Air-conditioning systems.

2.4 ORGANIC CHEMISTRY

L	T	P
5	1	8

Rationale:

Basic knowledge of organic chemistry is very much useful for diploma holders in leather technology. The student gets fundamental knowledge about purification of organic compounds, distillation and sublimation estimation of nitrogen, hologen and sulpher, unsaturated hydrocarbons and alkylhalides. Preparation and properties of Chloroform, Idoform, Petroleum, and Petroleum Products, Alcohols, Glycols, Glycerol, Ether, Aldehydes, Ketones, Acids, Ester, Amines, Amino Acid, Coal, Aromatic Compounds also enrich knowledge of the student. Knowledge of lubrication and plastics will be useful for industry life.

Sr. No.	Units	Coverage Time L	T	P
1.	Introduction,Classification and Nomenclature of organic compounds	06	02	-
2.	Purification of organic compounds	05	02	-

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3.	Qualitative and Quantitative Elemental analysis	03	02	-
4.	Empirical,Molecular and Structural Formula	04	03	-
5.	Strucutre of organic compounds	04	03	-
6.	Saturated and unsaturated Hydrocarbons	03	01	-
7.	Alcohols	03	01	-
8.	Ether	02	01	-
9.	Aldehyde and Ketones	03	01	-
10.	Acids	04	01	-
11.	Esters	03	01	-
12	Amines	03	01	-
13.	Carbohydrates	03	01	-
14.	Amino acids, Proteins and Peptides	04	01	-
15.	Fats, Oils and Waxes	04	01	-
16.	Aromatic Compounds	05	02	-
17.	Enzyme Chemistry	02	01	-
18.	Petroleum and Petrochemicals	05	02	-
19.	Introduction	04	01	-
		70	28	112

DETAILED CONTENTS:

1. INTRODUCTION,CLASSIFICATION AND NOMENCLATURE OF ORGANIC COMPOUNDS:

   Introduction, definition and origin, importance of organic compounds. Sources of organic compounds, Classification of organic compounds, Classes of organic compounds, Homologous series. Nomenclature of organic compounds, rules for IUPAC nomenclature.

2. PURIFICATION OF ORGANIC COMPOUNDS :

   Criteria of purity, methods of purification - crystallisation sublimation, distillation, solvent extraction, Different aspects of chromotography.

3. QUALITATIVE AND QUANTITATIVE ELEMENTAL ABALYSIS :

   Detection of elements (N, S and Malogens), estimation of hydrogen, Nitrogen, Halogen and sulpher.

4. EMPIRICAL, MOLECULAR AND STRUCTURAL FORMULA :

   Determination of Empirical formula, Determination of Molecular formula, Determination of structural formula.
   Note :- Numericals based on above topic

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5. STRUCTURE OF ORGANIC COMPOUNDS :

Atomic structure, Nature of chemical bounding, arrangement of electrons in orbitals, shapes of s and p orbitals, orbital theory of chemical bounding, factors affecting a covalent bond, inductive effect, mesomeric effect, conjugation, mesomerism, resonance, hydrogen bounding.

6. SATURATED AND UNSATURATED HYDROCARBONS :

General, nomenclature, isomerism, occurence, general methods of formation, general physical characteristics, general chemical characterisitcs, preparation and properties of methane and ethane, ethylene and acelytene.

7. ALCOHOLS :

A monohydric alcohols, Dihydric and trihydric alchol, nomenclature, isomerism. General methods of formation, General physical characteristics, General chemical characteristics, Distinction between primary, secondary and tertiary alcohols. Preparation of ethyle alcohol by fermentation of molasses. Preparation, properties and uses of ethyl alcohol, glycol and glycerol.

8. ETHER :

General nomenclature and isomerism, Preparation, Properties and uses of diethyle ether.

9. ALDEHYDE AND KETONES :

General, nomenclature and isomerism, general physical and chemical characteristics, Preparation, properties and uses of formaldehyde, acetaldehyde and acetone.

10. ACIDS :

Monocarboxylic and dicarboxylic acids, nomenclature and isomerism, General chemical and physical characteristics, Preparation, properties and uses of acetic acid, Lactic acid, Citric acid, tartaric acid, oxalic acid, malonic acid, succinic acids, Substituted acids - acetyl chloride, acetic anhydride, higher fatty acids, members from C12 to C18 (Saturated and unsaturated) sources, properties and uses (Saponification and acid value).

11. ESTERS :

Esters and Esterification, ethyle acetate - preparation, properties and uses.

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12. AMINES :

Primary, secondary and tertiary amines, Preparation, properties and uses of methyle and ethyle amines.

13. CARBOHYDRATES :

Introduction, classification, monosaccaride carbohydrate glucose, fructose - Preparation, properties and uses. Disaccaride carbohydrate - Sucrose or can sugar - preparation, properties and uses. Polysaccaride - starch - preparation, properties and uses.

14. AMINO ACIDS, PROTEINS AND PEPTIDES :

Methods and synthesis of a-amino acids (glycine), properties and uses of glycine, Composition of protein, Structure of protein, classification of proteins, physical and chemical characteristics of protein, uses of protein.

15. FATS, OILS AND WAXES :

Introduction to fats and oils, occurence and extraction, analysis of oils and fats, chemical composition and uses of oils, fats and waxes.

16. AROMATIC COMPOUNDS :

A. Introduction, sources of aromatic compounds. Structural presentation of benzeme and other benzenoid compounds, classification and nomenclature, benzene and its homologous, Difference between Aliphatic and aromatic compounds- Aromaticity, orientation and aromatic substitution, Preparation of benzene from coaltar and its uses, substitution in benzene reing and in side chain.

B. Some useful reactions - friedel crafts reaction, Kolbe synthesis, Reimer tiemann reaction, Benzoin condensation, cannizaro reaction, perkin reaction.

17. ENZYME CHEMISTRY :

Knowledge of enzymens, simple application of different biological
reactions.

18. PETROLEUM AND PETROCHEMICALS :

Occurence, composition of petroleum, fractional

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distillation, Different petroleum products and their uses, Petrochemicals, Properties of chloroform and iodoform.

19. Introduction to Bio-technology and its application.

PRACTICALS

1. Estimation of ammount of the Copper-volumetrically.

2. Estimation of Calcium in solution using EDTA solution.

3. Estimation of chlorides by using standard solution of silver nitrate and potassium chromate indicator.

4. Estimation of So4 & BaSo4 (Gravimetrically).

5. Estimation of calcium as calcium oxalate (gravimetrically).

6. Estimation of lead as lead chromate (gravimetrically).

7. Detection of CI, Br, I, S and N present in organic compounds.

8. Detection of functional groups like aldehyde, ketone, carbohydrate, amino, carboxylic groups

9. Identification of enzymes.

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2.5 THEORY OF LEATHER MANUFACTURE-I

L	T	P
4	1	6

Rationale:

The objective of this paper is to equip the student with the fundamental knowledge of history of leather manufacture, anatomical structure and composition of hides and skins, protiens, curing and preservation, pretanning operations, chrome tanning and syntans etc which will prove very useful in real industrical atmosphere.

Sr. No.	Units	Coverage Time L	T	P
1.	Introduction	4	01	-
2.	Protiens	4	01	-
3.	Raw Hides	9	02	-
4.	Water Quality	3	01	-
5.	Curing and Preservation	5	01	-
6.	Pretanning Operations	10	02	-
7.	Types of Tannages	5	02	-
8.	Types of Leather	10	02	-
9.	Cleaning Process	10	02	-
		56	14	84

DETAILED CONTENTS:

1. INTRODUCTION :

History of leather manufacture and its uses.

2. PROTIENS:

Nature and types of protiens, physical and chemical composition, Properties of hide protens.

3. RAW HIDES :

i. Raw stock : Mainly used raw hides and skins, General structural conditions for raw hides, Skin defects

ii. Anatomical structure of hides and skins.

iii. Chemical composition and constituents of hides and skins.

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4. WATER QUALITY :

Classification according to sources, Possible defects due to substances contained water.

5. CURING AND PRESERVATION:

Methods and chemistry of curing of hides and skins. Merits and demerits of each method. Code of practice for curing and preservation of cattle hides as per I.S. 7656(1995).

6. PRETANNING OPERATIONS:

Principles and objectives involved in

(a) Soaking
(b) Liming
(c) Deliming
(d) Bating
(e) Pickling
(f) Depickling
(g) Bleaching
(h) Degreasing.

7. TYPES OF TANNAGES :

Introduction of vegetable tannage, mineral tannage aldehyde and Crome Tanning, oil tannage, etc.

8. TYPES OF LEATHER:

Chrom tanned leather, vegetable tanned leather, Aluminium tanned leather, Zerconium, tanned leather, Oil tanned leather, Iron tanned lether, Sulphur tanned leather. According to the nature of finishes/products, Aniline leather, semi aniline tanned leather, Portant leather, Corrected arain leather, Nuckbuck leather, Suede lether, Nappa leather, Upper Leather, Uphalestry leather, Belting leather, Saddlery leather, Harness, Briddle lether.

9. CLEANING PROCESSES:

Hair shaving process, Sulphide free unharing process, Cleaner process in Beam House/Tan Yard Practices, Role of enzymes of pretanning operation.

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PRACTICALS

1. Microscopic examination of hides and skins as per Indian/ Inter-National Standard

2. Quantitative chemical analysis of Sodium Chloride, Sodium Sulphide, Lime, Ammonium Chloride, Ammonium Sulphate, Boric Acid, Formic Acid, Hydrochloric Acid, Sulphuric Acid, Ascetic acid and Oxalic acid.

3. Analysis of Chrome Tanning materials and Wet Blue Leathers.

4. Tannery Practice :-

   Practice in all Beam House and Chrome Tanning Operations.

5. Glossary of terms relating to Hides and Skins as per Indian/Inter-National Standard.

6. Grading of raw Hides and Skins as per Indian/Inter-National Standard. Identification of defects of raw hides

7. Knowledge of pH and indicators.

8. List of standard tannery chemical suppliers.

   NOTE :

   All the above noted operations should be prectically demonstrated to the students in the tanneries, so that students should be able command practical leather making knowledge. Every week students should be taken to lether processing units as a part of structured-cum-industrial visit. Well designed and detailed programme of such visits should be chalked out in advance for result orientiation and skill improvement during their course of study

   Each visit of the students to tanneires should be guided be the subject teacher and technical observations, etc. may be observed and verified by the subject teacher

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III Semester

3.1-ELEMENTRY MICROSCOPY AND MICROBIOLOGY

L	T	P
6	1	4

Rationale:

The scientific study of hides and skins requires microscopic observations. Hence diploma students in leather techonolgy can only effectively analyse the raw materials if they are equipped with practical working knowledge of microscopes, bacteriology and moulds etc. Life cycle of small micro organisms bacteria provides scientific handling and treatment of leather and leather goods.

Sr. No.	Units	Coverage Time L	T	P
1.	Microscopy	15	04	-
2.	Anatomical structure of hair and skin	8	02	-
3.	Role of Micro organism in different Processes	8	02	-
4.	Bacteriology			-
i.	Fundamentals	8	02	-
ii.	Action of Bacteria on hides and skins	8	02	-
5.	Moulds	12	04	-
		84	14	50

DETAILED CONTENTS:

1. Microscopy:

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(i) Different types of microscopes-mechanical and optical parts in microscope.

(ii) Slide preparation for microscopic study:

Preparation of materials, fixing, embodding, section cutting, staining and mounting.

(iii) Application of microscopy:

2. Anatomical structure of hair and wool, grain patterns of hides and skins-Fibre structure of leather-microscopic assessment of leather, application of microscopy to note the changes that may take place in processing i.e. curing, soaking, liming, deliming, bating, pickling, tanning and finishing.

3. Role of micro-organism in different processes.
4. BACTERIOLOGY:

(i) Fundamentals of Bacteriology:

Microscopic forms of life, recognition under microscope their culture, preparation of various culture media-sterilisation morphological characteristics of bacteria, staining of bacteria and classification-Biochemical properties of bacteria-bacteria count.

(ii) Action of Bacteria on hides and skins:

Damage caused by bacterial infestation, hair slip, liberation of ammonia-Halophilic bacteria, problem of mod heat and its cure-Bacterial analysis of various tannery substrates in the prevention of growth by use of preservatives as bacteriostatic and bacteriocida agents, determination of productive activity of bacteria.

5. MOULDS:

Moulds and their difference from bacteria-damages that can be produced by moulds to leather, tan liquor, pickled skins and mould prevention. Mould growth to finished vegetable tanned leather/bed blue chrome. Study of preservative in leather science, Action of fungs on leather, Different types of fungs.

PRACTICALS

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1. Setting up of microscope.
2. Examination of hides, skins and leather under microscope.
3. Preparation of slides and assessment of leathers.
4. Preparation of culture, staining and identification.
5. Observation of insects, ticks, meng and mite, etc.

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3.2-THEORY OF LEATHER MANUFACUTRE-II

L	T	P
6	1	-

Rationale:

Various methods are used for tanning of leather like Vegetable tanning, Oil tanning, Aldehyde tanning, Alum tanning and Zirconium tanning. A thorough study of various tanning techniques and tannages decide the suitability of particular process and selection of tannages for the under consideration.

Sr. No.	Units	Coverage L	Coverage T	Time P
1.	Chrome Tanning	10	02	-
2.	Vegetable tanning	10	01	-
3.	Oil tanning	10	01	-
4.	Aldehyde tanning	10	02	-
5.	Alum tanning	10	02	-
6.	Zirconium tanning	10	02	-
7.	Miscellaneous tannages	10	02	-
8.	Combination tannages	10	02	-
9.	Reactive tannage	2	-	-
10.	Tannage with polymers	2	-	-
		84	14	

DETAILED CONTENTS:

1. CHROME TANNING:

Werners coordination theory of chrome compounds, Chemistry of chromium complexes, Preparation of chrome liquors, Self basifying chrome powder-Hydrolysis, Olation, Oxolation, Polymerization, Theory of Valancey.

Factors influencing chrome tanning like pH, concentration time, temperature and neutral salts. Basification and Basicity principles and chemistry of various chrome tanning methods, mechanism of chrome tanning. Mechanism of chrome tranning, Basic knowledge and cheome recovery and its use. Toxilogical aspect and Hazards of chrome tanning, Defects Caused by chrome tanning. Standards for wet-blue.

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2. VEGETABLE TANNING:

Classification, identification, physical and chemical properties-Study of vegetable tanning materials. Preparation of tanning liquors by leaching and preparation of extract, Types of extracts, sulphitation of tan liquors. Factors invloved in vegetable tanning,mechanism of vegetable tanning. Crushers and grinders for bark and nuts, etc. Bleaching, Filling, Fixation of vegetable tanned leather, Controls of vegetable tannage, Defects o vegetable tannage.

3. OIL TANNING:

Types of oils based, their properties, mechanism of oil tanning. Chamois tannage, tannage with Sulpha Chlorides, Tannage with fatty alcohols sulphites.

4. ALDEHYDE TANNING:

Reactions of formeldehyde with protiens, mechanism of aldehyde tanning. Use of glutaraldehyde and dialdehyde in leather manufacture. Hazardous behaviour of Formaldehyde, Glutaraldehyde with leather during processing.

5. ALUM TANNING :

Chemistry of aluminium salts (chlorides and sulphates) hydrolysis, olation, oxolation and basification efect of masking salts machanism of aluminium tanning. Aluminium Slicate Tanning.

6. ZIRCONIUM TANNING :

Zirconium sulphates and chlorides hydrolysis, basification and mechanism of zirconium tanning. Use of zirconium salts in tanning.

7. MISCELLANEOUS TANNAGES :

Application of iron and silicon salts in tanning processes, Sulpher tannages.

8. COMBINATION TANNAGES |

Application of the vegetable oil and synthetic tannins in various combinations in the production of semi chrome and chrome retanned and alum, chrome and alum retan, sulphur, oil-vegetable tannage, chrome zirconium tannage, oil aldehyde tannage their machanisms (in brief), Sources of effluent of different tannages.

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9. Reactive Tannages : Reactive Tannage, Resin Tanning agent.
10. Tanange with Polymer : Polymer tanning agent, Polyphosphates

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3.3 THEORY OF LEATHER MANUFACTURE-III

L	T	P
8	-	6

Rationale:

Several processing steps are envolved in obtaining finished leather for manufacturing of leather goods from wet blue leather. This envolves selection of wet blue leather, neutralisation, dying, fat liquoring, stuffing, stripping and bleaching and water proofing. The knowledge of post tanning operations like sammying, setting and drying, sawdusting, buffing, snuffing is also essential for diploma students in leather technology. Awareness about pigments and binders will provide an aided advantage to the students.

Sr. No.	Units	Coverage L	Time T	P
1.	Selection,Wet Back,Rechanging	10	-	-
2.	Neutralisations	10	-	-
3.	Dying	10	-	-
4.	Retanning	08	-	-
5.	Fat Liquoring	10	-	-
6.	Stuffing,Stripping & Bleaching	10	-	-
7.	Stripping and Bleaching	08	-	-
8.	Water Repellant Agents	08	-	-
9.	Machine Operations	14	-	-
10	Finishes	24	-	-
	a. Pigments			
	b. Binders			
	c. Compact finishes			
		112	-	84

DETAILED CONTENTS:

1. Selection of Wet blue leather, Sammying, Splitting and shaving operation, Wet back rechroming.

2. NEUTRALISATION (Deacidification):

   Principle of neutralisation and the reactions, Different chemicals used in neutralisation and their application in order to preference. Controls of Neutralisation.

3. DYEING:

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Various types of dyes including natural dues, light, fastness, penetration, washing and colour matching of dyes and their elementary chemistry and behaviour towards leathers. Different types of dyeing auxiliary (leveling, fixing agents and mordents, etc.). Principle and methods of dyeing and uses for different end products with different recipes. Restricted/Banned Aryle Amine base dyes, Toxilogical Hazardous aspects of dyes.

4. RETANNING :

Various types of retanning agents including their properties and uses. Types of retanning.

Classification, general methods of preparation, reactions with skin protiens, use in leather manufacture. Types and use of various Resin tanning agents. Syntans used in trade, Phenol free syntans.

5. FAT LIQUORING:

Oils,fats, waxes and their sourses, emulsion and their types; Different types of fat and liquors including synthetic gat liquers and new development and their uses.Preparation of fat liquors and their properties and formulation in the manufacture of different types of leathers. Factors effecting choice of fat liquor, mechanism of fat liquoring. Propreity fat liquers and their uses. Water repellant and water proof fat liquors. Controls, errors and possible defects of fat liquoring.

5. STUFFING:

Various types of fats, oil and waxes used their properties, recipes and uses. Application of stuffing.

6. STRIPPING AND BLEACHING:

Principle involved in stripping and bleaching of leathers, effect of bleaching and stripping chemicals in their order of perference, Methods of bleaching.

7. WATER REPELLANT AGENTS:

Different water repellant agents including properiety products and their application.

8. FINISHING:

MACHINE OPERATIONS:

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(A) Sammying, setting drying, Vaccume and Toggle:

Object of sammying and setting. Drying process and method of drying with reference to vegetable tanned leather, chrome tanned leather and softy leathers. Vaccum drying-Elementary mechanism and application.

(B) Sawdusting Or Conditioning:

Method and object of conditioning-Nailing and toggling. Object of nailing and toggling, staking.

(C) Buffing And Snuffing:

Object of buffing and snuffing. Use of emery paper for different purpose.

FINISHES, TYPES OF FINISHES:

(A) Basic products for finishing

(B) Composition And Classification:

General structure and composition of different types of finishes and finishing agents. Classification of finishes. Eco-friendly finishes

(C) Materials:

(i) PIGMENTS:

Classification of pigments, their porperties and uses in leather finishing. Preparation of pigments and applications including colour matching (In organic and Organic colour lakes).

(ii) BINDERS

Type of binders (casein, shellac, mucillage and gums) properties and use.

Plasticizers, lusters, names of various materials used and method of their application. Resin binder or polymer binders-Types and classification of different binders available in the market and its proprieity effect. Waxes and PU finishes.

Filling and impregnation agents and methods.

Nitro cellulose lequer properties and use.

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N.C. Lacquer emulsion, classification formulation, dilutable with water or organic solvent with reference to fastness to wet rubbing. Elementary knowledge of PVC lacquer, polyvinyl acetateco-polymer lacquer and polyurethane their applications.

Solvents and diluents.

iii. Compact finishing materials.

(C) Techniques:

Seasons, their formulation and mentod of applications.

1. Brushing
2. Padding
3. Roller coating
4. Spraying and Polishing
5. Glazing, Burnishing and Brushing
6. Hot Plating.
7. Measuring.
8. Packaging
9. Sources of effluents of post tanning operation.

PRACTICALS

1. Exercises involving dying and finishing operations.
2. Guide lines for identification of finished leather for export as per Indian/International Standard.

3.4 GENERAL ENGINEERING II

(Common with Leather Technology, Footwear(CASD))

L	T	P
6	-	4

Rationale:

Electrical energy is presently most convinient, neat and clean source of energy. The students when engaged in the industry will require to handle different types of electrical equipment and machines. A fundamental knowledge of terms associated with electricity, tariff system and working of motor's generators, measuring instruments and electric heating will be very useful in day to day working.

Sr. No.	Units	Coverage Time L	T	P

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1.	Advantages of electricity	6	-	-
2.	Basic qualities of electricity	15	-	-
3.	Electrical tariffs	15	-	-
4.	Motor's and Transformer	15	-	-
5.	Measuring Instruments	15	-	-
6.	Electrical Heating	12	-	-
7.	Electrical Safety	06	-	-
		84	-	56

DETAILED CONTENTS:

1. Application and advantages of electricity :
   Various applications of electricity, advantages of electrical energy over other forms of energy.

2. Basic qualities of electricity :
   Idea of voltage, current, power, energy - their units; conversion of mechanical units into corresponding electrical units and vice versa : difference between A.C. and D.C., frequency time period, maximum and RMS value, concept of phase and phase difference, power factor, practical importance of power factor.

3. Electrical Tariff System :

   Different type of tariffs, effect of low power factor, on tariffs, economics of power factor improvement.

4. Electrical Motors :

   Single phase and three phase motors, equipment for starting and protection of motors, rating of motors. Working Principle of transformer and brief concept of constructional details.

5. Electrical Measuring Instruments :

   Working principles and use of the following electrical measuring instruments : Ammeter, Voltmeter, Wattmeter, Energymeter, Multimeter.

6. Electrical Heating :

   Advantages of Electric heating : Various methods of heating : Simple description of electric oven.

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7. Electrical Safety Measures :

Importance of earthing, safety provisions in Indian Electricity Rules, Treatment of electric shock.

PRACTICALS:

1. Starting of a three phase inducction motor :
   (i) Direct on lines
   (ii) Through star-delta starter

2. (a) Practical instructions of safety precautions while handling electrical apparatus and live circuits.

   (b) Demonstration of treatment against electric shock.

3. Connection of lamp, ceiling fan, socket outlets, Flurosent tube, etc.

4. Reversing the direction of rotation of a:

   (i) Single phase induction motor
   (ii) Three phase induction motor

5. Measurement of voltage, current, power and power factor of a single phase A.C. circuit.

6. Measurement of resistance of the following by ammeter voltmeter method by a multimeter :

   (i) Winding resistance of an electrical motor
   (ii) Resistance of a high value rheostat

7. Trouble shooting on a three phase motor.
   Note : The students should be able to detect must common faults like loose connections, blown fuse, single phasing, incorrect direction of rotation etc. which may occur in a three phase motor.

8. Study of a transformer and determination of its turn ratio by measurement of primary and secondary voltage.

9. Preparing the layout plan of electrical supply system of an institute starting from the indoor substation by actual observation.

10. Starting and reversing the direction of rotation of a single phase induction motor.

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IV SEMESTER

4.1 Functional Communication

L	T	P
4	–	–

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Units	Coverage Time L	T	P
Section A English				
1.	On Communication	04	–	–
2.	Exploring Space	04	–	–
3.	Sir C.V. Raman	04	–	–
4.	Professional Development	04	–	–
5.	Buying a Second Hand Bicycle	04	–	–
6.	Leadership and Supervision	04	–	–
7.	First Aid	03	–	–
8.	The Romanance of Reading	03	–	–
9.	No Escape from Computers	03	–	–
10.	Bureau of Indian Standards	03	–	–
Section B Hindi				
1.	Topic 1	02	–	–
2.	Topic 2	02	–	–
3.	Topic 3	02	–	–
4.	Topic 4	02	–	–
5.	Topic 5	02	–	–
6.	Topic 6	02	–	–
7.	Topic 7	02	–	–
8.	Topic 8	01	–	–
9.	Topic 9	02	–	–
10.	Topic 10	02	–	–
11.	Topic 11	01	–	–
		56	-	-

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Section “A” (English)

Text Lessons

Unit I. On Communication
Unit.II Exploring Space
Unit.III Sir C.V. Raman
Unit.IV Professional Development of Technicians

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Unit.V	Buying a Second Hand Bicycle
Unit.VI	Leadership and Supervision
Unit.VII	First Aid
Unit.VIII	The Romanance of Reading
Unit.IX	No Escape from Computers
Unit.X	Bureau of Indian Standards

Section "B" Hindi

1– स्वरोजगार
2– भारतीय वैज्ञानिकों एवं तकनीकियों का भारत के विकास में योगदान
3– ग्राम्य विकास
4– परिवार नियोजन
5– सामाजिक संस्थायें
6– नियोजन और जन कल्याण
7– भारत में प्रौद्यौगिकी के विकास का इतिहास
8– हरित कांन्ति
9– पर्यावरण एवं मानव प्रदूषण
10–श्रमिक कल्याण
11–भारत में श्रमिक आन्दोलन

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4.2 PROCESS OF LEATHER MANUFACTURE-I

L	T	P
7	-	7

Rationale:

Before manufacture of footwear and leather goods processing of leather is required. Processing technique for heavy and industrial leathers envolve many steps. The students must be conversant with the processing techniques of different types of leathers used in the industry. This is very much useful for maintananing export quality of leathers in the international market.

Sr. No.	Units	Coverage Time L	T	P
1.	Industrial Leathers			
a.	Selection of hides & skins	10	-	-
b.	Manufactur of textile leather	14	-	-
c.	Manufacture of roller leather	10	-	-
d.	Pickers and packing	10	-	-
e.	Combing	10	-	-
f.	Gill box leather	10	-	-
g.	Indian standards	10	-	-
h.	Hydraulic & mechanical leather	10	-	-
i.	Oil seal & Diaphragm leather	12	-	-
		96	-	96

DETAILED CONTENTS:

1. INDUSTRIAL LEATHERS:

Selection of Hides and Skins, Manufacture of textile leather, Roller leathers, Pickers and Picking band leathers, Buffer and Check strap leathers , Combing , Condenser tape, Gillbox leathers and their uses with Indian standards,Hydraulic and mechanical leathers, Cup and Pump, Hydraulic ram, Oil seal Leather, Diaphragm Leather, Gas meter leather with their uses and Indian Standards. Leather for musical instruments.

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PRACTICAL

Manufacture of some important industrial leathers.

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4.3 PROCESS OF LEATHER MANUFACTURE-II

L	T	P
5	-	6

Rationale:

Before manufacture of footwear and leather goods processing of leather is required. Processing technique for heavy and industrial leathers envolves many steps. The students must be conversant with the processing techniques of different types of leathers used in the industry. This is very much useful for the maintaining export quality of leathers in the international market.

Sr. No.	Units	Coverage Time L	T	P
1.	Heavy Leathers			
a.	Selection of hides	8	-	-
b.	Manufactur of sole leather	8	-	-
c.	Safety Shoe Leather	8	-	-
d.	Manufacture of harness	8	-	-
e.	Manufacture of belting leather	8	-	-
2.	Sports goods leathers			
a.	Lace & Strap leather	15	-	-
b.	Industrial glove leather	15	-	-
		70	-	84

DETAILED CONTENTS:

1. HEAVY LEATHERS

Selection of hides and skin , Manufacture of vegetable and chrome sole leather and water Replent leather and Non water replent leather; manufacture of harness and saddlery leather, Belting leather etc..

2. SPORTS GOODS LEATHER:

Leathers for inflated balls (Football, Basketball, Volleyball, Handball, Rugby ball etc.) hockey and cricket ball leather, grip leather, batting and wicket keeping glove leather, golf glove leather and industrial glove leather. Lace and strap leather for legguards, Bag Tanning.

PRACTICALS

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Manufacture of some important sports & heavy leathers.

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4.4 LEATHER TRADE ENGINEERING

L	T	P
3	-	3

Rationale:

Different types of machinery and machine componets are used in leather industry. Awareness of slection of site and equipments used in tannery is very much useful for diploma student in leather technology. The leather trade engineering is directly utilised in industrial atmosphere. The students are supposed to possess knowledge about selection of site, water and power, transmission of power, drums, paddles , pits and tannery machinery.

Sr. No.	Units	Coverage Time L	T	P
1.	Selection of site and layout	6	-	-
2.	Water & Power	6	-	-
3.	Drums, Paddles and Pits	6	-	-
4.	Tannery Machinery	6	-	-
5.	Finishing Machines	6	-	-
6.	Conservation of energy and water	6	-	-
7.	Plant Maintenance	6	-	-
		42	-	42

DETAILED CONTENTS:

1. SELECTION OF SITE AND LAYOUT :

Location of tannery, factors influencing the selection of the site, geographical background, soil and water, power, transport facilities, facilities for disposal of effluents, port facilities for export and import of tannery goods.

Location of Tannery: Ground and size of the tannery, layout of different sections with various pots, drums and other machinery, a general idea of the construction of building for free air, light and ventilators, window, doors, roof natural and artificial lighting arrangements.

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2. WATER AND POWER:

Sources of water supply and its storing, distribution of water by pipe lines, valves etc. Production of steam for power,steam boilers,different types ofboilers,their main components and functions, advantages and disadvantages of machine power and electrical power.

3. DRUMS, PADDLES AND PITS:

Size and description of drums, paddles along with their weight and cost, their rection and construction. Drives for drums and paddles,routine maintenance and repair arrangement of different pits, construction details of pits size and cost of pits, preparation of estimate for the construction of the pits, building,total cost of tannery yards with and without machinery.

4. TANNERY MACHINERY

General construction, descriptive idea of various tanning machinery like flashing, Hair trimming, Vaccume, Toggle, Samming, Wet mollisha scudding, setting,
shaving splitting, buffing, stacking etc. Mode of working, fuel and speed, power required, types of driver for each machine, total power in kw, general maintenance and repair; repair, size weigth and cost of each machine and its availability.

5. FINISHING MACHINES:

Principle of working of various finishing machines Buffring, Spray, Embossing, Milling, Rollor, Cotter, Hydraulic Press Contiles Press with free hand drawing, weight, cost and capacities power required,total power for finishing yard, maintenance and repair of machinery, safety precautions to be observed in case of each machine.

6. Conservation of energy and water.

7. PLANT MAINTENANCE :

1. Functions of maintenance department.

2. Maintenance Procedure-Preventive maintenance, Routine maintenance and breakdown maintenance of leather machineries and accessories.

3. Lubrication and Oiling procedure in rotine maintenance and development of lubrication charts.

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4. Fabrication and repair of components for breakdown maintenance.

5. Estimating the repair and maintenance cost.

6. Safety - Definition, Importance, Causes of Accidents, Accident Prevention rules, General safety devices.

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PRACTICALS

1. Study of various working parts of the tanning machines, their make, function etc. Checking alignment and rectifying defects therein,

2. Removal of parts for general maintenance and routine service repair, renewal and reassembly.

3. Replacement of worn out knives of splitting machine and their renewal.

4. Adjustment of grinding wheels and other attachments of splitting, shaving and fleshing machines.

5. Removal and refixing of the glazing glass, rollers and seaks in the stacking machines shafts in buffing machine and old grinder in the shaving machine;

6. General check up of all the electrical equipment motors, starters, switches, fuses etc.

7. Replacement of belts, fastening, checking slacknes of belts. their remedies, checking of pullies, tightening loose shafts, bearing and other alignments.

8. Study of spray guns and drying chambers.

9. Demonstration of correct methods of operating machines first aid training.

10. Blue print reading of tannery layout and installation drawing.

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4.5 INTRODUCTION TO COMPUTER

[Common with Civil Engg., Civil (Spl. With Rural), Mechanical Engg.,(Specialisation in Production, Automobile, Refrigeration and Air conditioning), Electronics Engg.,Instumentation and Control Engg., Dairy Engg., Leather Technology, Footwear and Leather Goods Tech., Cermics, Chemical Engg.(Four year Sandwitch), Chemical Tech. (Rubber & Plastic), Chemical Tech. (Fertilizer)]

L	T	P
2	-	5

Rationale:

Computers are being used for design and information processing in all branches of engineering. An exposure to fundamentals of computer programming is very essential for all diploma holders. this subject has been included to introduce students in the use and application of computers in engineering.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Units	Coverage Time L	T	P
1.	Introduction to Computer	4	-	-
2.	Introduction To Operating System (MS DOS/Windows)	3	-	-
3.	Word Processing	4	-	-
4.	Worksheet	4	-	-
5.	Presentation	4	-	-
6.	Data Base Operation	3	-	-
7.	Introduction to Internet	2	-	-
8.	Introduction to advance tools	4	-	-
		28	-	70

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DETAILED CONTENTS

1. Introduction to Computer:

A. Block Diagram of Computer.
B. Types Of Computer
C. Types of Input and Output devices
D. Memories Devices (Its Types and Basic).

2. INTRODUCTION TO OPERATING SYSTEMS (MS-DOS/MS-WINDOWS:)

What is operating system, its significance, Commands of DOS, Features/Application of window.

3. WORD PROCESSING:

File : Open, Close, Save, Save as, Search, Send to, Print Preview, Print and Page Setup
Edit : Cut, Copy,Paste, Office Clipboard, Select All, Find, replace, Goto, etc.
View : Normal/Web Layout/Print Layout; Tool Bars; Header/Footer; Zoom, etc.
Insert: Break, Page Number, Date & Time, Symbol, Comment, Reference, etc.
Format: Font, Paragraph, Bullets & Numbering, Borders & Shading, Column, Change case, Back ground, etc.
Tools : Spelling & Grammer, Language, Word Count, Letters & Mailing, Options, Customize, etc.
Table : Draw, Insert, Delete, Select, Auto Format, AutoFit, Convert, Sort, Formula, etc.
Mail Merge

4. WORKSHEET:

Introduction, Use of Tools/Icons for preparing simple Mini Project.

5. PRESENTATION :

Introduction, Use of Tools/Icons for preparing simple presentation on Power Point.

6. DATABASE OPERATION :

Create database using MS Access, Create Table and Creating Reports.

7. Introduction to Internet:

What is Network, How to send & receive messages, Use of

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Search Engines, Surfing different web sites. Creating Mail ID, Use of Briefcase, Sending./replying emails.

8. INTRODUCTION TO ADVANCE TOOLS :

I. Steps requires to solving problems.
A. Flow Chart
B. Algroithm
C. Programming

II. Use of advance Tools such as Skype, Teamviewer, Installation of Modem, use of WiFi, Etc.

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INTRODUCTION TO COMPUTER LAB

List Of Practicals

1. Practice on utility commands in DOS.

2. Composing, Correcting, Formatting and Article (Letter/Essay/ Report) on Word Processing tool Word and taking its print out.

3. Creating, editing, modifying tables in Database tool.

4. Creating labels, report, generation of simple forms in Database tool.

5. Creating simple spread sheet, using in built functions in Worksheet tool..

6. Creating simple presentation.

7. Creating mail ID, Checking mail box, sending/replying e-mails.

8. Surfing web sites, using search engines.

Note : In the final year, related students have to use the concept of MS Word/MS Excel/MS Access/ MS Power Point in their respective branch's project work such as creating project report through MS Word/Creation of statistical data in MS Excel/Creation of database in MS Excel/ Demonstration of project through Power Point Presentation.

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4.6 ENERGY CONSERVATION

L	T	P
3	-	2

RATIONALE

The requirement of energy has increased manifolds in last two decades due to rapid urbanization and growth in industrial/service sector. It has become challenging task to meet ever increasing energy demands with limited conventional fuels and natural resources. Due to fast depletion of fossil fuels and a tremendous gap between supply and demand of energy, it is essential to adopt energy conservation techniques in almost every field like industries, commercial and residential sectors etc. Energy conservation has attained priority as it is regarded as additional energy resource. Energy saved is energy produced. This course covers the concepts of energy management and its conservation. It gives the insight to energy conservation opportunities in general industry and details out energy audit methodology and energy audit instruments.

DETAILED CONTENTS

1. **Basics of Energy**

   1.1 Classification of energy- primary and secondary energy, commercial and non-commercial energy, non-renewable and renewable energy with special reference to solar energy, Capacity factor of solar and wind power generators.
   1.2 Global fuel reserve
   1.3 Energy scenario in India and state of U.P. Sector-wise energy consumption (domestic, industrial, agricultural and other sectors)
   1.4 Impact of energy usage on climate

2. **Energy Conservation and EC Act 2001**

   2.1 Introduction to energy management, energy conservation, energy efficiency and its need
   2.2 Salient features of Energy Conservation Act 2001 & The Energy Conservation (Amendment) Act, 2010 and its importance. Prominent organizations at centre and state level responsible for its implementation.
   2.3 Standards and Labeling
      2.3.1 Concept of star rating and its importance
      2.3.2 Types of product available for star rating

3. **Electrical Supply System and Motors**

   3.1 Types of electrical supply system
   3.2 Single line diagram
   3.3 Losses in electrical power distribution system
   3.4 Understanding Electricity Bill
      3.4.1 Transformers Tariff structure
      3.4.2 Components of power (kW, kVA and kVAR) and power factor, improvement of power factor

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3.4.3 Concept of sanctioned load, maximum demand, contract demand and monthly minimum charges (MMC)

3.5 Transformers

3.5.1 Introduction

3.5.2 Losses in transformer

3.5.3 Transformer Loading

3.5.4 Tips for energy savings in transformers

3.6 Electric Motors

3.6.1 Types of motors

3.6.2 Losses in induction motors

3.6.3 Features and characteristics of energy efficient motors

3.6.4 Estimation of motor loading

3.6.5 Variation in efficiency and power factor with loading

3.6.6 Tips for energy savings in motors

4. Energy Efficiency in Electrical Utilities

4.1 Pumps

4.1.1 Introduction to pump and its applications

4.1.2 Efficient pumping system operation

4.1.3 Energy efficiency in agriculture pumps

4.1.4 Tips for energy saving in pumps

4.2 Compressed Air System

4.2.1 Types of air compressor and its applications

4.2.2 Leakage test

4.2.3 Energy saving opportunities in compressors.

4.3 Energy Conservation in HVAC and Refrigeration System

4.3.1 Introduction

4.3.2 Concept of Energy Efficiency Ratio (EER)

4.3.3 Energy saving opportunities in Heating, Ventilation and Air Conditioning (HVAC) and Refrigeration Systems.

5 Lighting and DG Systems

5.1 Lighting Systems

5.1.1 Basic definitions- Lux, lumen and efficacy

5.1.2 Types of different lamps and their features

5.1.3 Energy efficient practices in lighting

5.2 DG Systems

5.2.1 Introduction

5.2.2 Energy efficiency opportunities in DG systems

5.2.3 Loading estimation

6 **Energy Efficiency in Thermal Utilities**

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6.1 Thermal Basics

6.1.1 Types of fuels

6.1.2 Thermal energy

6.1.3 Energy content in fuels

6.1.4 Energy Units and its conversions in terms of Metric Tonne of Oil Equivalent (MTOE)

6.2 Energy Conservation in boilers and furnaces

6.2.1 Introduction and types of boilers

6.2.2 Energy performance assessment of boilers

6.2.3 Concept of stoichiometric air and excess air for combustion

6.2.4 Energy conservation in boilers and furnaces

6.2.5 Do's and Don'ts for efficient use of boilers and furnaces

6.3 Cooling Towers

6.3.1 Basic concept of cooling towers

6.3.2 Tips for energy savings in cooling towers

6.4 Efficient Steam Utilization

7 Energy Conservation Building Code (ECBC)

7.1 ECBC and its salient features

7.2 Tips for energy savings in buildings

7.2.1 New Buildings

7.2.2 Existing Buildings

8 Waste Heat Recovery and Co-Generation

8.1 Concept, classification and benefits of waste heat recovery

8.2 Concept and types of co-generation system

9 General Energy Saving Tips

Energy saving tips in:

9.1 Lighting

9.2 Room Air Conditioner

9.3 Refrigerator

9.4 Water Heater

9.5 Computer

9.6 Fan, Heater, Blower and Washing Machine

9.7 Colour Television

9.8 Water Pump

9.9 Cooking

9.10 Transport

10 Energy Audit

10.1 Types and methodology

10.2 Energy audit instruments

10.3 Energy auditing reporting format

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PRACTICAL EXERCISES

1. To conduct load survey and power consumption calculations of small building.
2. To check efficacy of different lamps by measuring power consumption and lumens using lux meter.
3. To measure energy efficiency ratio (EER) of an air conditioner.
4. To measure effect of valve throttling and variable frequency drive (VFD) on energy consumption by centrifugal pump.
5. To measure and calculate energy saving by arresting air leakages in compressor.
6. To measure the effect of blower speed on energy consumed by it.

V SEMESTER

5.1 INTEGRATIVE COMMUNICATION

L	T	P
-	-	4

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Units	Coverage Time L	T	P
1.	Introduction to Personality Development	-	-	02
2.	Factors Influencing / Shaping Personality	-	-	02
3.	Self Awareness – 1	-	-	03
4.	Self Awareness – 2	-	-	02
5.	Self Awareness – 3	-	-	02
6.	Change Your Mind Set	-	-	02
7.	Interpersonal Relationship and Communication	-	-	03
8.	Non-Verbal communication Communication Skills	-	-	02
9 .	Communication Skills ACTIVITIES	-	-	06
10.	Body Language skills	-	-	03
11.	Leadership Traits & Skills	-	-	03
12.	Attitude	-	-	03
13.	Analyzing & Solving a Problem skills	-	-	02
14.	Time Management skills	-	-	03
15.	Stress Management Skills	-	-	02
16.	Interview Skills	-	-	04
17.	Conflict Motives	-	-	02
18.	Negotiation / Influencing Skills	-	-	02
19.	Sociability	-	-	03
20.	Importance of Group	-	-	03
21.	Values / Code of Ethics	-	-	02

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PERSONALITY DEVELOPMENT

1 Introduction to Personality Development

AIM, Skills, Types of Skills, LIFE SKILLS VS OTHER SKILLS, Concept of Life Skills. Ten core Life Skills identified by WHO

2. **Factors Influencing / Shaping Personality :**

Introduction, Physical and Social Factors Influencing / Shaping Personality (Hereditary, Self-Development, Environment, Education, Life-situations) Psychological AND Philosophical Factors Influencing / Shaping Personality (Past Experiences, Dreams and Ambitions, Self-Image, Values)

3. **Self Awareness – 1**

DIMENSIONS OF SELF AWARENESS (Self Realization, Self Knowledge or Self Exploration, Self Confidence, Self Talk, Self Motivation, Self Esteem, Self Image, Self Control, Self Purpose, Individuality and Uniqueness, Personality, Values, Attitude, Character), SELF REALIZATION AND SELF EXPLORATION THROUGH SWOT ANALYSIS AND JOHARI WINDOW,

4. **Self Awareness – 2**

SYMPATHY VS EMPATHY AND ALTRUISM,
Importance ofEmpathizing with Others,

5. **Self Awareness – 3**

Self-Awareness through Activity, Body Image (What is Body Image, What Decides our Body Image, What is Poor Body Image, What are the Harmful Effects of Poor Body Image), Tackling Poor Body Image(Enhance Self-Esteem, Build Up Critical Thinking, Build up Positive Qualities, Understand Cultural Variation, Dispel Myths, Utilize Life Skills)

6. **Change Your Mind Set**

What is Mindset, HOW TO CHANGE YOUR MINDSET (Get the Best Information Only, Make the best people your Role Model, Examine Your Current Beliefs, Shape Your Mindset with Vision and Goals, Find Your Voice, Protect Your Mindset, Let Go of Comparisons, Put An End To Perfectionism, Look At The Evidence, Redefine What Failure Means, Stop Worrying About What “People” Think)

INTERPERSONAL SKILLS

7. **Interpersonal Relationship and Communication**

INTERPERSONAL RELATIONSHIP , Forms of Interpersonal

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Relationship, Must Have in an Interpersonal Relationship, Interpersonal Relationship between a Man and a Woman (Passion, Intimacy, Commitment), Relationship Between Friends, ROLE OF COMMUNICATION IN INTERPERSONAL RELATIONSHIP (Take Care Of Your Tone And Pitch, Choice of Words is Important in Relationships, Interact Regularly, Be Polite, Try To Understand The Other Person's Point Of View As Well, Individuals Can Also Communicate Through Emails,

8. **NON-VERBAL COMMUNICATION Communication Skills**

Non-Verbal Communication,
We Communicate with Our Eyes, Communication with Facial Expression, A Good Gesture, Appearance, Posture and Gait, Proximity and Touch), IMPORTANCE OF LISTENING,
Characteristics of Good and Effective Listener(Is Attentive, Do
Not Assume, Listen for Feelings and Facts, Concentrate on the Other Speakers Kindly and Generously, Opportunities)

9. **Communication Skills ACTIVITIES –**

Activities in Making Collages, Making Advertisements, PPT Preparation &
Presentation, Speaking -Seminars, Group Discussions, Debates, Extempore Speeches, Listening to an audio clip and telling its
gist, Answering a telephone call, Making enquiries, General tips-
Pronunciation, Tone, Pitch, Pace, Volume, relevance, brief, simple Reading Newspaper, Magazines (Current Affairs, Economic magazines, Technical magazines), How to read a report, article, Writing- Resume Writing, Writing joining report,
Notice writing, Report making, Proposal writing, Advertisement,
Notice for tender, Minutes writing, E-Mail writing,
Listening News, Listening to audio clips.(Lecture, poetry, speech, songs),

10. Body Language skills

Introduction, What is Body Language , Body Language Parts,
Personal Space Distances (Intimate Distance, Personal Distance,
Social Distance, Public Distance), IMPORTANT BODY LANGUAGE SIGNS AND THEIR MEANING

UNDERSTANDING OTHERS

11. **Leadership Traits & Skills :**

Introduction, Important Leadership Traits (Alertness, Bearing,
Courage, Decisiveness, Dependability, Endurance, Enthusiasm,
Initiative, Integrity, Judgment, Justice, Knowledge, Loyalty, Sense

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of Humour), Other Useful traits (Truthfulness, Esprit-de-corps,
Unselfishness, Humility and sympathy, Tact without loss of moral
courage, Patience and a sense of urgency as appropriate, Selfconfidence,
Maturity, Mental including emotional stability)

12. **Attitude**

Types of Attitude, Components of Attitudes (Cognitive Component, Affective Component, Behavioral Component), Types of Attitudes (Positive Attitude, Negative Attitude, Neutral Attitude, Rebellious Attitude, Rational and Irrational Attitudes, Individual and Social Attitudes), Kinds of Attitude, ASSERTIVENESS, How to Develop Assertiveness (Experiment and Try New Things, Extend Your Social Circle, Learn to Make Decisions for Yourself, Indulge in Knowledge, Admire Yourself & Others), Negotiation (Be Sensitive to The Needs Others, Be Willing To Compromise, Develop Your Problem-Solving Skills, Learn to Welcome Conflict, Practice Patience, Increase Your Tolerance For Stress, Improve Your Listening Skills, Learn To Identify Bottom-Line Issues Quickly, Be Assertive, Not Aggressive)

PROBLEM SOLVING

13. **Analyzing & Solving a Problem skills**

Critical Thinking, Creative Thinking, Decision Making, Goal Setting & Planning, Problem Solving

14. **Time Management skills**

Need of Time Management, TIME WASTERS (Telephone, Visitors , Paper work, Lack of Planning & Fire Fighting , Socializing , Indecision , TV , Procrastination), PRINCIPLES OF TIME MANAGEMENT - Develop a Personal Sense of Time (Time Log , value of other people's time), Identify Long-Term Goals , Concentrate on High Return Activities , Weekly & Daily Planning (The Mechanics of Weekly Planning , Daily Planning), Make the Best Use of Your Best Time , Organize Office Work (Controlling Interruptions , Organizing Paper Work), Manage Meetings, Delegate Effectively, Make Use of Committed Time, Manage Your Health,

15. **Stress Management Skills**

INTRODUCTION, Understanding Stress and its Impact, Expected

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Responses (Physical, Emotional, Behavioral), stress signals(thoughts, feelings, behaviors and physical), STRESS MANAGEMENT TECHNIQUES (Take Deep Breath, Talk It Out, Take A Break, Create a Quite Place in Your Mind, Pay Attention to Physical Comfort, Move, Take Care of Your Body, Laugh, Mange Your Time, Know Your Limits, Do You Have To Be Right Always, Have A Good Cry, Look for the Good Things Around You, Talk Less, Listen More), UNDERSTANDING EMOTIONS AND FEELINGS-through Activity

16. **Interview Skills (2 sessions from Industry Expert is Compulsory)**

Curriculum Vitae (When Should a CV be Used, What Information Should a CV Include, personal profile, Covering Letter, What Makes a Good CV, How Long Should a CV Be, Tips on Presentation), Different Types of CV (Chronological, Skills-Based), BEFORE THE INTERVIEW , CONDUCTING YOURSELF DURING THE INTERVIEW , FOLLOWING THROUGH AFTER THE INTERVIEW , Interview Questions To Think About , MOCK INTERVIEW – Activity (MOCK INTERVIEW EVALUATION - NON-VERBAL BEHAVIORS, VERBAL BEHAVIORS, General Etiquettes to face the Board , Telephonic interview

17. **Conflict Motives –Resolution**

Motives of Conflict(Competition for Limited Resources, The Generation Gap and Personality Clashes, Aggressive Personalities, Culturally Diverse Teams, Competing Work and Family Demands, Gender Based Harassment), Merits and Demerits of Conflict , Levels of Conflict (Interpersonal Conflict, Role Conflict, Inter-group Conflict, Multi-Party Conflict, International Conflict), Methods of Conflict Resolution (The Win-Lose Approach, The Lose-Lose Strategy, The Win-Win Approach), Techniques for Resolving Conflicts (Confrontation and Problem Solving Leading to Win-Win, Disarm the Opposition, Cognitive Restructuring, Appeal to Third Party, The Grievance Procedure)

18. **Negotiation** / **Influencing Skills**

Why Influencing, What Is Influencing, TYPES OF INFLUENCING SKILLS (Probing And Listening, Building Rapport, Sign Posting, Pacing, Selling, Assertiveness), LAWS AND PRINCIPLES OF INFLUENCE, The Six Laws of Influence (The Law of Scarcity, The Law of Reciprocity, The Law of Authority, The Law of Liking, The Law of Social Proof, The Law of Commitment and Consistency), Influencing Principles (Making a Start, Buy Yourself

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Thinking Time, Dealing With Disagreement, Difficult And Sensitive Situations)

19. **Sociability : Etiquettes And Mannerism & Social Skills**

Need for Etiquette , Types of Etiquettes (Social Etiquette, Bathroom Etiquette, Corporate Etiquette, Wedding Etiquette, Meeting Etiquette, Telephone Etiquette, Eating Etiquette, Business Etiquette, E-Mail Etiquettes,), MANNERISMS, HOW TO IMPROVE YOUR SOCIAL SKILLS (Be Yourself, Be Responsible, Be Open & Approachable, Be Attentive, Be Polite, Be Aware, Be Cautious)

20. **Importance of Group / Cross Cultural Teams / Team Work skills**

Introduction, Types and Characteristics of Groups (Definition of a Group, Classification / Types of Groups, Friendship Group, Task Group, Formal Groups, Informal Group, Effective Group), Importance of a Group, Characteristics of a Mature Group, TYPES AND CHARACTERISTICS OF A TEAM (Definition of a Team, Types of Teams, Functional Teams, Problem Solving Teams, Cross - Functional Teams, Self - Managed Teams), Importance of a Team, Characteristics of a Team

21. **VALUES / CODE OF ETHICS**

Meaning, A FEW IMPORTANT VALUES (Honesty, Integrity, Purity, Discipline, Selflessness, Loyalty, Fairness, Equality, Trust, Support, Respect, etc)

Note : One Orientation module for the faculty is must. Involvement of Industry Experts is necessary for Interview Skills

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5.2 INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT

L	T	P
6	**2**	**-**

RATIONALE

The knowledge of this subject is required for all engineers/technicians who wish to choose industry/field as their career. This course is designed to develop understanding of various functions of management, role of workers and engineers and providing knowledge about industrial and tax laws.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Units	Coverage Time L	T	P
1.	Principles of Management	8	-	-
2.	Human Resource Development	10	-	-
3.	Wages and Incentives	4	-	-
4.	Human and Industrial Relations	6	-	-
5.	Professional Ethics	2	-	-
6.	Sales and Marketing management	10	-	-
7.	Labour Legislation Act	10	-	-
8.	Material Management	8	-	-
9.	Financial Management	8	-	-
10.	Entrepreneurship Development	8	-	-
11.	Fundamental of Economics	5	-	-
12.	Accidents and Safety	5	-	-
		84	-	-

DETAILED CONTENTS

1. **Principles of Management**
   - 1.1 Management, Different Functions: Planning, Organising, Leading, Controlling.
   - 1.2 Organizational Structure, Types, Functions of different departments.
   - 1.3 Motivation: Factors, characteristics, methods of improving motivation, incentives, pay, promotion, rewards, job satisfaction, job enrichment.
   - 1.4 Need for leadership, Functions of a leader, Factors for accomplishing effective leadership, Manager as a leader, promoting team work.
2. **Human Resource Development**

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2.1 Introduction, objectives and functions of human resource development (HRD) department.
2.2 Recruitment, methods of selection, training strategies and career development.
2.3 Responsibilities of human resource management – policies and functions, selection – Mode of selection – Procedure – training of workers, Job evaluation and Merit rating.

3. **Wages and Incentives**

3.1 Definition and factors affecting wages, methods of wage payment.
3.2 Wage incentive – type of incentive, difference in wage, incentive and bonus; incentives of supervisor.
3.3 Job evaluation and merit rating.

4. **Human and Industrial Relations**

4.1 Industrial relations and disputes.
4.2 Relations with subordinates, peers and superiors.
4.3 Characteristics of group behaviour and trade unionism.
4.4 Mob psychology.
4.5 Grievance, Handling of grievances.
4.6 Agitations, strikes, Lockouts, Picketing and Gherao.
4.7 Labour welfare schemes.
4.8 Workers' participation in management.

5. **Professional Ethics**

5.1 Concept of professional ethics.
5.2 Need for code of professional ethics.
5.3 Professional bodies and their role.

6. **Sales and Marketing management**

6.1 Functions and duties of sales department.
6.2 Sales forecasting, sales promotion, advertisement and after sale services.
6.3 Concept of marketing.
6.4 Problems of marketing.
6.5 Pricing policy, break even analysis.
6.6 Distribution channels and methods of marketing.

7. **Labour Legislation Act (as amended on date)**

7.1 Factory Act 1948.
7.2 Workmen's Compensation Act 1923.
7.3 Apprentices Act 1961.
7.4 PF Act, ESI Act.
7.5 Industrial Dispute Act 1947.
7.6 Employers State Insurance Act 1948.
7.7 Payment of Wages Act, 1936.
7.8 Intellectual Property Rights Act

8. **Material Management**

8.1 Inventory control models.
8.2 ABC Analysis, Safety stock, Economic ordering quantity.
8.3 Stores equipment, Stores records, purchasing procedures, Bin card, Cardex.
8.4 Material handling techniques.

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9. **Financial Management**
   - 9.1 Importance of ledger and cash book.
   - 9.2 Profit and loss Account, Balance sheet.
   - 9.3 Interpretation of Statements, Project financing, Project appraisal, return on investments.

10. **Entrepreneurship Development**
   - 10.1 Concept of entrepreneur and need of entrepreneurship in the context of prevailing employment conditions.
   - 10.2 Distinction between an entrepreneur and a manager.
   - 10.3 Project identification and selection.
   - 10.4 Project formulation.
   - 10.5 Project appraisal.
   - 10.6 Facilities and incentives to an entrepreneur.

11. **Fundamental of Economics**
   - 11.1 Micro economics.
   - 11.2 Macro economics.

12. **Accidents and Safety**
   - 12.1 Classification of accidents based on nature of injuries, event and place.
   - 12.2 Causes and effects of accidents.
   - 12.3 Accident-prone workers.
   - 12.4 Action to be taken in case of accidents with machines, electric shock, fires and erection and construction accidents.
   - 12.5 Safety consciousness and publicity.
   - 12.6 Safety procedures.
   - 12.7 Safety measures – Do’s and Don’ts and god housing keeping.

5.3 PROCESS OF LEATHER MANUFACTURE-III

L	T	P
6	-	8

Rationale:

Leather for specific purpose like book Binding, Box, Morrocco leather, Corrected grain leather, glazed kid leather, Suede upper leather, Leather for gloves and Garments, Num bulk leather and Chamois leather require different type of treatment. A student is supposed to possess knowledge and skill of treatment for these specific leathers. The knowledge will be further reenforced if he is familiar with fancy leathers.

Sr. No.	Units	Coverage Time

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		L	T	P
1.	Selection of Hide & skins,Processing Effect	9	-	-
2.	E.I & Vegetable Tanned Leathers	9	-	-
3.	Leather for Special Purposes	15	-	-
4.	Garment,Gloves and Hat Leather	9	-	-
5.	Fancy & Fine Leather	9	-	-
6.	Leathers with Hair	9	-	-
7.	Orthopaedic Leather	9	-	-
8.	Chrome & Chrome Free	9	-	-
9.	Raw Skin Products	6	-	-
		84	-	112

DETAILED CONTENTS:

1. Selection of hides and skins, Processing Effect.

2. Manufacture of E.I. and vegetable tanned leathers from sheep, Goat skins and cow hides.

3. Book binding and Morocco leather. Manufacture of box and willow shoe upper, shoe inside leather, Shoe under side leather leathers, corrected grain leathers, glazed kid leather, suede upper leathers, Leather for sports equipment, Furniture and Upholstery, Nu-Buck leathers upholstery leather. Manufacture of chamois leather. Manufacturing of lining leather. Manufacture of oil pull-up. Brush-off, Burnish and shrunken grain leather.

4. Gloving and grain garment leathers, suede garment leathers.

5. Manufacture of fancy and fine leathers, leathers from splits, patent leathers, Leather for softy and work protection,
6. Leathers with hair,
7. Orthopaedic Leather.
8. Chrome & Chrome Free Tanned Leather
9. Raw Skin products.

PRACTICALS

Manufacture of some improtant leathers.

5.4-ELEMENTS OF FOOTWEAR AND LEATHER GOODS MANUFACTURE

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L	T	P
6	-	8

Rationale:

Some times the diploma holders in leather technology have to bear dual responsibility of holding positions as leather and leather goods manufacturing technician. To deal with such circumstances knowledge of leather goods and footwear manufacture is very much essential. Direct on the job training is necessery to devolop skill component along with knowledge components

Sr. No.	Units	Coverage Time L	T	P
1.	Anatomy of Human Foot	8	-	-
2.	Footwear Designing, Styling and Pattern Cutting	8	-	-
3.	Machines and Tools	8	-	-
4.	Layout, Casting and Marketing	8	-	-
5.	Importance of Leather Goods	10	-	-
6.	Materials for Leather Goods	10	-	-
7.	Leather Based Sports Goods	10	-	-
8.	Quality Assurance	12	-	-
		84	-	112

DETAILED CONTENTS:

1. FOOTWEAR:

Brief knowledge of foot anatomy, foot care and foot comfort and their relation to footwear.

Different types of footwear designing, styling and pattern cutting characteristics of various materials used for upper, lining and bottom parts. Modern methods of construction and machinery, Standardisation of footwear grinderies, hand tools and quality control. Elementary knowledge of layout, costing and marketing.

2. LEATHER GOODS:

Leather goods industry, its impact and importance in modern life. Classification of leather goods such as travelling goods, hand bags and other pretty articles.

Characteristics of materials and their selection. Modern methods of fabrication and machinery. Standardisation of

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materials, fitting, hand, tools, quality assurance and Planning and Production control. Designing, styling and pattern cutting, layout costing and marketing (only elementary). Study of manufacture of leather based sports goods (elementary).

3. Grading of leathers, common defects in leather, sorting.

PRACTICALS

1. FOOTWEAR:

   (i) Exercies in disinging and pattern cutting, visual examination of materials and grinderies.

   (ii) Fabrication of simple types of footwear such as chappal, sandal, derby shoe.

2. LEATHER GOODS:

   Exercise in desigining and pattern cutting. Visual examination of fittings. Fabrication of simple types of leather goods, Manufacture of leather based sports goods.

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5.5-ANALYTICAL CHEMISTRY OF LEATHER MANUFACTURE

L	T	P
8	2	-

Rationale:

Some chemicals are required for the analysis of water, curing and pretanning process. The knowledge of PF measurement, degree of tannage and mineral oxide content is helpful in quality control of tanned leather. Physical testing helps in analysing qualities of leather. The knowledge about some common instruments which are necessary in rotine working is necessary to create self confidence in the students.

Sr. No.	Units	Coverage Time L	T	P
1.	Water Analysis	12	3	-
2.	Curing & Pretanning Chemicals	12	3	-
3.	Tanning Materials	12	3	-
4.	PH Measurement	12	3	-
5.	Indicators	12	3	-
6.	Tanned Leather Characteristics	12	3	-
7.	Testing of tanned Leathers	12	3	-
8.	Testing Instruments	15	4	-
9.	Conservation of Chemical & Water	08	3	-
		112	28	-

DETAILED CONTENTS:

Principle and methods (in brief) employed for the analysis of water, curing and pretanning chemicals including spent liquors, vagetable tanning materials and extracts, chrome liquors and extracts, aluminium and zirconium tanning salts, PH measurements indicators and their uses in testing. Vegetable, mineral and combination tanned leathers for characteristics like degree of tannage, mineral oxide contents etc.

Physical testing of various types of leathers for tensile strength, elongation, dynamic water absorption, abrasion resistance rub fastness, shrinkage etc.

Use of instruments such as spectrophotometer, colorimeter, ion exchange resins etc. in testing of tanning chemicals.

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Conservation of chemicals and water in the tannery.

Different practice and quality control of different mehtods of pretanning process as applied to light and heavy leather process control in pretanning and post tanning operation.

VI Semester

6.1 ENVIRONMENTAL EDUCATION & DISASTER MANAGEMENT

L	T	P
4	-	-

RATIONALE:

A diplima student must have the knowledge of different types of pollution caused due to industrialisation and construction activities, so as he may help in balancing of eco-system and control pollution by providing controlling measures. They should be also aware of the environmental laws for effectively controlling the pollution of environment. The topics are to be taught in light of legislation Para-3.

TOPIC WISE DISTRIBUTION OF PERIODS:

SL. NO.	TOPIC	L	T	P
1.	Introduction	6		
2.	Pollution	4		
2.1	Water Pollution	8		
2.2	Air Pollution	8		
2.3	Noise Pollution	4		
2.4	Radio Active Pollution	6		
2.5	Solid Waste Management	6		
3.	Legislations	4		
4.	Environmental Impact Assessment	4		
5.	Disaster Management	6		
	TOTAL	56	-	-

DETAILED CONTENTS

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1. INTRODUCTION :

- Basics of ecology, Ecosystem, Biodiversity Human activities and its effect on ecology and eco system, different development i.e. irrigration, urbanization, road development and other engineering activities and their effects on ecology and eco system, Mining and deforestation and their effects.

- Lowering of water level , Urbanization.

- Biodegradation and Biodegradibility, composting, bio remediation, Microbes .Use of biopesticidies and biofungicides.

- Global warning concerns, Ozone layer depletion, Green house effect, Acid rain,etc.

2. POLLUTION :

Sources of pollution, natural and man made, their effects on living environments and related legislation.

2.1 WATER POLLUTION :

- Factors contributing water pollution and their effect.

- Domestic waste water and industrial waste water. Heavy metals, microbes and leaching metal.

- Physical, Chemical and Biological Characteristics of waste water.

- Indian Standards for qulity of drinking water.

- Indian Standards for quality of treated waste water.

- Treatment methods of effluent (domestic waste water and industrial/ mining waste water), its reuse/safe disposal.

2.2 AIR POLLUTION :

Definition of Air pollution, types of air pollutants i.e. SPM, NOX, SOX, GO, CO2, NH3, F, CL, causes and its effects on the environment.

- Monitoring and control of air pollutants, Control measures techniques. Introductory Idea of control equipment in industries i.e.

A. Settling chambers

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B. Cyclones
C. Scrubbers (Dry and Wet)
D. Multi Clones
E. Electro Static Precipitations
F. Bog Fillers.

- Ambient air qulaity measurement and their standards.

- Process and domestic emission control

- Vehicular Pollution and Its control with special emphasis of Euro-I, Euro-II, Euro-III and Euro IV.

2.3 NOISE POLLUTION :

Sources of noise pollution, its effect and control.

2.4 RADISACTIVE POLLUTION :

Sources and its effect on human, animal, plant and material, means to control and preventive measures.

2.5 SOLID WASTE MANAGEMENT :

Municipal solid waste, Biomedical waste, Industrial and Hazardous waste, Plastic waste and its management.

3. LEGISLATION :

Preliminary knowledge of the following Acts and rules made thereunder-

- The Water (Prevention and Control of Pollution) Act - 1974.

- The Air (Prevention and Control of Pollution) Act - 1981.

- The Environmental Protection (Prevention and Control of Pollution) Act -1986. Rules notified under EP Act - 1986 Viz.

  # The Manufacture, Storage and Import of Hazardous Chemical (Amendment) Rules, 2000

  # The Hazardous Wastes (Management and Handling) Amendment Rules, 2003.

  # Bio-Medical Waste (Management and Handling) (Amendment) Rules, 2003.

  # The Noise Pollution (Regulation and Control)

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(Amendment) Rules, 2002.

Municipal Solid Wastes (Management and Handling) Rules, 2000.

The Recycled Plastics Manufacture and Usage (Amendment) rules, 2003.

4. ENVIRONMENTAL IMPACT ASSESSMENT (EIA) :

- Basic concepts, objective and methodology of EIA.

- Objectives and requirement of Environmental Management System (ISO-14000) (An Introduction).

5. DISASTER MANAGEMENT :

Definition of disaster - Natural and Manmade, Type of disaster management, How disaster forms, Destructive power, Causes and Hazards, Case study of Tsunami Disaster, National policy- Its objective and main features, National Environment Policy, Need for central intervention, State Disaster Authority- Duties and powers, Case studies of various Disaster in the country, Meaning and benifit of vulnerability reduction, Factor promoting vulnerability reduction and mitigation, Emergency support function plan.

Main feature and function of National Disaster Management Frame Work, Disaster mitigation and prevention, Legal Policy Frame Work, Early warning system, Human Resource Development and Function, Information dissemination and communication.

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6.2 FINANCIAL, COST & MANAGEMENT ACCOUNTING

L	T	P
6	2	-

Rationale:

Knowledge of raw hides and skins their availabity, marketing, storing, packing and dispatch is necessary for foreign trade of raw hides and skins. Terms associated with consumption, distribution, demand and supply, budget and revenue in relation to Indian economy are useful to the students. Knowledge of book keeping and accountancy, meterial management and marketing techniques is an aided advantage to the diploma student in leather technology.

Sr. No.	Units	Coverage Time L	T	P
A.	FINANCIAL ACCOUNTING			
1.	Book Keeping & Accountancy	6	2	-
2.	Concepts & Conventions of Accounting	6	2	-
3.	Journal, Ledger & Trail Balance	6	2	-
4.	Cash Book & Other Books	6	2	-
5.	Final Accounts with Adjustment	6	2	-
6.	Banking Transactions	6	2	-
B.	COST & MANAGEMENT ACCOUNTING			
1.	Introduction & Need of Cost Management Accounting	6	2	-
2.	Elements of Cost & Production Expenses	6	2	-
3.	Material & Materials Control	6	2	-
4.	Indrect Expenses and thrir Allocation	6	2	-
5.	Unit or Outpur Costing System	6	2	-
6.	Budget & Budgetory Control	6	2	-
7.	Standard Costing and Various Analysis	6	2	-
8.	Marginal Costing and Break Even Analysis	6	2	-
		84	28	-

DETAILED CONTENTS:

A. FINANCIAL ACCOUNTING

1. BOOK KEEPING & ACCOUNTANCY :

Meaning, characteristics, difference, advantages of book keeping and accountancy, Meaning, characteristics and advantages of double entry system.

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2. CONCEPTS AND CONVENTIONS OF ACCOUNTANCY :

Concepts of accounting, conventions of accouting.

3. JOURNAL, LEDGER AND TRIAL BALANCE :

Journal, rules for journaling, Ledger, Need of ledger, Rules of posting, Trial balance, Methods of preparing trial balance, Disclosed and undisclosed errors in trial balance, suspense A/c.

4. CASH BOOK AND OTHER BOOKS :

Meaning, Advantages and classification of cash book, Contra entry, Petty cash book. Purchase book, Purchase return book, Sales book, Sales return book, Bills receivable book, Bills payable book.

5. FINAL ACCOUNTS WITH ADJUSTMENTS :

Trading A/c, Manufacturing A/c, Profits and loss A/c, Balance sheet with all adjustments.

6. BANKING TRANSACTIONS :

Meaning and functions of bank, Bank account opening methods, Chaque, Kinds of cheque, Crossing and Indorsement of chaque, Dishonoured cheque.

B. COST & MANAGEMENT ACCOUNTING

1. INTRODUCTION AND NEED OF COST AND MANAGEMENT ACCOUNTING:

Introduction, meaning, need, functions of cost of management accounting, Emergence of management accounting, Difference between management and financial accounting, Different methods of cost finding.

2. ELEMENTS OF COST AND PRODUCTION EXPENSES :

Production expenses and their classification, Direct and indirect expenses, Direct and indirect material, Direct and indirect labour, Classification of indirect expenses, Components of total cost.

3. MATERIALS AND MATERIAL CONTROL :

Inportance of materials, Objects of material control, Kinds of materials, Management and organisation of stores, Purchasing, Storing and issuing of materials, receipt of

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materials, Issue of materials, returns and transfer of materials, Methods of pricing the materials, LIFO and FIFO methods, Inventory systems, Inventory control, Stock levels, Economic order quantity, ABC techniques of inventory control, Bin card.

4. INDIRECT EXPENSES AND THEIR ALLOCATION :

Indirect expenses and their kinds, Classificaiton of overheads, Difference between oncost and overheads.

5. BUDGETS AND BUDGETARY CONTROL :

Meaning of unit costing system, Preparation of statement of cost, Cost sheet and tender statement.

6. BUDGETS AND BUDGETARY CONTROL :

Budget and budgetary control, Essential of effective budgeting, type of budgets, Preparation of production budget, Material budget, Sales budget, Sales and distribution overhead budget, Master budget, Flexible budget, Computation of semi-variable expenses.

7. STANDARD COSTING AND VARIANCE ANALYSIS :

Standard cost, Standard costing, Essentials for success of standard costing system, Objects, Advantages and disadvantages, Difference between standard costing and budgetary control, Variance analysis, Calculation of material variances, Labour variances and overhead variances.

8. MARGINAL COSTING AND BREAK-EVEN ANALYSIS :

Marginal costing and marginal cost, Advantages, Limitations, Cost volume-profit analysis, Dreak-even analysis, Contribution, Profit volume ratio, Break-even point, Margin of safety, Variable cost.

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6.3 TANNERY WASTE MANAGEMENT

L	T	P
6	2	-

Rationale:

The control of environmental pollution is very essential to establish healthy working atmosphere in tanneries. The student should have knowledge of tannery wastes theatment and disposal to check atmospheric pollution. Tannery wastes can also be utilised for manufacturing of certain products.

Sr. No.	Units	Coverage Time L	T	P
1.	Sources, Composition, Types & Characteristics	10	3	-
2.	Environmental Problems caused by Pollutants	14	5	-
3.	Recovery & Reuse of Chrome	14	5	-
4.	Treatment Meathods, Awareness of Clean Technology	12	5	-
5.	Sludge Treatment & Disposal	10	3	-
6.	Solid Wastes	14	4	-
7.	Utilization of Solid waste	8	2	-
8.	Visit	2	1	-
		84	28	-

DETAILED CONTENTS:

1 Sources, Composition, Types and Characteristics of tannery wastes.

2 Environmental problems caused by various pollutants. Methods of disposal, B.I.S./C.P.C.B./S.P.C.B standards for disposal.

3 Recovery and reuse of chrome from waste chrome liquor.

4. Different treatment methods-Primary, Secondary and Tertiary.

5. Sludge treatment and disposal, Model treatment plants. Awareness of clean technology. Flow sheet diagram from NEERI/CLRI.

6. Various solid wastes their composition and characteristics.

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Environmental problems in handling tannery solid wastes.

Utilization and disposal of tannery solid wastes.

7. Utilization of Solid Waste by making tannery by product Glue and Gelatin, Leather Boards,Dog chew leather.
8. Visit - Effluent Treatment Plant (ETP), Common Effluent Treatment Plant (CETP).

NOTE:Special Gust Lectrres of experts may be arranged at suitable times.

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6.4-STANDARDISATION & ANALYSIS OF LEATHER & LEATHER MANUFACTURE

L	T	P
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Rationale:

The purpose of introducing Standadisation and Analysis of Leather is to equip the diploma student with the necessary knowledge and skill component for manitaining and testing the quality of leather produced in the tanneries. Certain standard norms are required for maintaining export quality of the leather as per B.I.S.. A diploma holder must be aware of norms and standards required for quality maintenance in production.

Sr. No.	Units	Coverage Time L	T	P
1.	Analysis of Chemicals	-	-	20
2.	Chemical Analysis/Chemical Testing of Leathers	-	-	46
3.	Physical Testing of leathers	-	-	46
		-	-	112

DETAILED CONTENTS:

1. Analysis of different types of chemicals used in the manufacture of leather such as water and sodium bichromate, chrome powder and extracts, basicity of chrome liquors, oil and fats in fat Liquors.

2. CHEMICAL TESTING :

   (a) Analysis of chrome leather and other mineral tanned leather for chrome content and other mineral contents, total ash , oil and fats, PH of water solubles differential numbers, hide substance, moisture etc. analysis of spent liquors.

   (b) Analysis of vegetable tanning material, extracts and spent liquors for tannins and non tannins etc.

   (c) Analysis of vegetable tanning leathers. Fixed tannins, oils and fats, hide substance, total ash, water soluble, soluble and insoluble ash and degree of tannage.

   (d) Analysis of combination tanned leather for their

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constituents.

(e) Indian Standard of Leathers

3. PHYSICAL TESTING:

Measurement of thickness, water absorption, apparent density, tensile strength, elongation at break and specified load, stitch tear resistance, abrasion, shrinkage, air and water vapour, permeability wet rub fastness cracks in leather, shower proofing flexural endurance, grain crack index, Rubber testing (Physical) (i) Sole Adhesion, Full shoe flex test, Ross flexing, Hardness test, Finish adhesion test .

NOTE

Sampling for physical and chemical analysis of leathers should be in accordance with Beauro of India Standards.

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6.5 INTERNATIONAL BUSINESS MANAGEMENT & TQM

(Common with Diploma In Saddlery Technology & Export Management)

L	T	P
6	4	-

1. INTERNATIONAL BUSINESS :An Overview:

   Introduction,Modes of international business, External influences on international business, Evoluation of strategy in the Internationalization Processes

2. FOREIGN DIRECT INVESTMENT :

   Introduction, The Meaning of foreign direct investment, The relationship of trade and factor mobility, Motivations for handling international business through direct investment, Market expansion- Investment versus trade, Resource-Acquisition investment, Diversification- Oriented investments, Political motives, Buy-versus build decision, Advantages of foreign direct investment, The strategy of direct investment in the internationalization process, direct investment patterns.

3. FOREIGN EXCHANGE :

   Introduction, Terms and definitions, How the foreign exchange market works, Convertibility, Exchange restriction, The use of foreign exchange, Market in internationalization process.

4. THE DETERMINATION OF EXCHANGE RATES :

   Introduction, The international monetary system, Exchange rate arrangements, The determination of exchange rate, Forecasting exchange rate-movements, Business implications of exchange rate changes.

5. MARKETING :

   Introduction, Market size analysis, Product policy, Marketing in internationalization process, Pricing, Promotion, Branding, Distribution.

6. EXPORT AND IMPORT STRATEGIES :

   Introduction, Export strategy, Export intermediaries, Foreign freight forwarders, Export financing, Counter trade, The import strategy.

7. GLOBAL OPERATION MANAGEMENTS AND SOURCING STRATEGIES:

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Introduction, Global manufacturing, Strategies in the Internationalization process, Quality, Global sourcing, Purchasing and supplier relations, Inventory systems, Product design.

8. HUMAN RESOURCE MANAGEMENT :

Introduction, Management qualification and characterisitics, Internal managerial transfers, Management recruitment and selection, International development of managers, Human resource management in the internationalization process

9. TOTAL QUALITY AND QUALITY MANAGEMENT :

What is quality, Total quality approach, Key element of total quality, Controbution of deming and juran, Why Total Quality efforts sometimes fail, The future of Quality Management.

10. QUALITY CULTURE :

Understanding what a quality culture is ? Activating Cultural Change, Laying the Groundwork for Quality Culture, Learning What a Quality Culture looks like, Countering Resistances to Cultural Change, Establishing a Quality Culture.

11 QUALITY TOOLS :

Total Quality defined , Pareto chart, Cause and effect diagram, Check sheet.

12. JUST IN TIME :

Just in time defined, rational for JIT, Development of JIT, Relationship of JIT to Total quality and World Class Manufacturing, Benefits of JIT, Requirements of JIT, Automation and JIT.

13. AN OVERVIEW OF ISO CERTIFICATION :

ISO- 9K Series (Quality), ISO-14K Series (Environment), ISO-18K Series (Occupational Health and Safety), Six Sigma and Its Impact on Business Operation.

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6.6 -PROJECT

The purpose of introducing project is to enable the students to apply the knowledge, skills and atitudes acquired during the entire course to the solution of specific problem. Some suggested problems are listed below.

1. Preparation of a project report for setting up a tannery.

2. Improvement in flaying, collection, curing and preservation of raw hides and skins available in the country side.

3. Problems associated with the development of rural tanning industry.

4. Evalution of locally available tanning materials.

5. Work study in tanneries and suggesting measurement for increasing productivity.

6. Problems connected with the development of leather auxillaries.

7. Problems in marketing of leather and leather goods.

8. Case study on implemenation of standardisation and its benefits in Leather industries.

9. Group discussion, seminors, debate and interection with industry.

Problems suggested by industry may also be considered for project work. The student will have to go through all the steps in problem solving such as defining the problem, analysis of the problem, collection of required information and materials, formulation of alternative solution to the problems, selecting the best solution and reduction in practice.

Student will be assessed on the basis of the project report and viva voce examination.

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DIPLOMA IN LEATHER TECHNOLOGY

XI. STAFF STRUCTURE

	Intake of the course	60
	Pattern of the course	3yrs (Six Semester)
1.	Principal	1
2.	H.O.D.	1
3.	Lecturer (Lether Technology)	3
4.	Lecturer (Lether Microbiology)	1 (Part Time)
5.	Lecturer Maths/Physics	1
6.	Lecturer Chemistry	1
7.	Lecturer Language	1 part time
8.	Lecturer In Mechanical Engg. cum Workshop Incharge	1
9.	Lecturer In Commerce/Accountancy	1
10.	Computer Programmer	1
11	Instructor In Electrical Engg.	1
12.	Foreman	1
13.	Instructor Lether Technology	3
14.	Instructor (Fitting Shop)	1--
15.	Instructor (Welding Shop)	1 |
16.	Instructor (Machine Shop)	1 |
17.	Instructor (Carpentry Shop)	1 | Common With
18.	Drawing Instructor	1 | Footwear Tech.
19.	Steno typist	1 |
20.	Accountant/Cashier	1 |
21.	Student/Library Clerk	1 |
22.	Store Keeper	1 |
23.	Class IV	6--
24.	Sweeper	Part time as per requirement.

The posts of Choukidar and Mali will be sanctioned according to the justification of institution. Services for existing staff in other disciplines of the institute may be utilised if possible.

Staff qualifications will be as given in the service rules.

Staff development for teaching industrial management and entrepreneurship development may be done by the institute.

The post of "Computer Programmer" in not needed in the institutions where diploma in "Electronics Engineering" is running.

Guest lectures may be organised at suitable time.

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XII. SPACE REQUIREMENT

		No	M2
	A. Total Land Area		
	B. Administrative Block		
1.	Prinicipal's room	1	30
2.	Steno room	1	6
3.	Confidential room	1	10
4.	Office room	1	80
5.	Library (common with other disciplines)	1	150
6.	Common room	1	80
7.	Class rooms	3	225
8.	Store	1	100
9.	Model room	1	90
	C. Laboratories/Workshops		
1.	Drawing Hall @ 8 sq.m. per student	1X2	120
2.	General Engineering-II Lab @ 5 Sq.m. per student.	1X2	75
3.	Workshop. @ 8 Sq.m. per student.	1X2	120
4.	Mocroscopy & Microbiology Lab. @ 5 Sq. m. per student.	1X2	75
5.	Testing Lab. (Standardisation & Analysis Lab) @ 5 Sq.M. per student	1X2	75
6.	Process of Leather Manufacture Shop (Experimental Tannery/Leather Trade Engg.) @ 8 Sq.m. per student.	1X2	120
7.	Footwear & Leather Goods Manufacture Shop. @ 5 Sq.m. per student.	1X2	75
8.	Computer room @ 4 Sq.m. per student.	1X2	60

Note: Labs of physics, chemistry and computer science will be common for all dicsiplines in the institute.

	D. Common Facilities			
1.	Dispensary		1	40
2.	Canteen & tuck shop		1	50
3.	Parking space/cycle stand		1	200% student
	with garrage			50% student
4.	N.C.C. block		1	70
5.	Guest room		1	30
	E. Residential Facilities			
1.	Hostel for students	1	for	40% student
2.	Staff quarters			
	Principal	1	Type	IV
	HOD/Warden	2	Type	IV
	Sr. Lect./Lect.	2	Type	IV
	Technical/Ministerial staff	2	Type	II
	Class IV	6	Type	I
3.	Play ground (common)	1		

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LIST OF EQUIPMENTS

Only those of the equipments given below which are essentially required for the conduction of practicals mentioned in the curriculum are to be procured by the institutions.

"Machine/Equipments/Instruments of old BTE list which are not included below are to be retained in the Lab/Shop for Demonstration purpose but not to be demanded fresh for purchase."

NOTE : Equipment for different shop and lab of latest verson should be purchased.

I. APPLIED PHYSICS LAB

S.No.	Name of Equipment	No.	@ Rs. Aprox.	Amt.in Rs. Aprox.
1.	Brass ball with hook dia 1.8 Cm to 2 Cm diameter	2	50	100
2.	Stop watch least count Least Count 0.1 Sec.(non-megnetic) 0.01 sec to 0.001 sec (Electronic Desirable)	4	750	3000
3.	Wall bracket with clamping arrangement 8" to 10" length	2	50	100
4.	Meter scale Least count 0.1cm,wooden 1meter	5	40	200
5.	Meter scale Least count 0.1cm,wooden 50 Cm	5	40	200
6.	Searl's conductivity apparatus with copper & steel rods 25 cm length 4 cm.diameter with all accessaries	2 set	1500	3000
7.	Constant Level Water Flow Container of one liter capacity vertical stand & rubber tubing	2	250	500
8.	Thermometer 0-110oC(Least count 0.1oC desirable)	4	100	400
9.	Potentiometer - 10 wires (1 meter length of each wire) with jockey, sunmoical top	4	750	3000
10.	Moving coil galvenometer 30-0-30 with moving mounting	5	300	1500
11.	Rheostat 50 ohm.,100 Ohm.,150 Ohm. capacity	16	300	4800
12.	Lead Accumulator 2V,6V (1 No.Each)	2	250	500
13.	Meterbridge 1 meter length, sunmica top copper strips fitted with scale	2	300	600
14.	Resistance Coil (Standard) 1 ohm. to 10 ohm.	10	50	500
15.	Moving coil ammeter 0-1 amp., 0-2 amp., 0-5 amp. with mounting	8	250	2000
16.	Moving coil voltmeter 0-1 V.,0-2V 0-5 V., 0-10 V. with mounting	8	250	2000

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S.No.	Name of Equipment	No.	@ Rs. Aprox.	Amt.in Rs. Aprox.
17.	Denial cell with complete accessories	2	250	500
18.	Leclaunche Cell with complete accessories	2	250	500
19.	Standard Cadmium Cell with complete accessories	2	250	500
20.	Battery Charger with complete accessories	1set	1800	1800
21.	Battery Eliminator Multi range	2set	750	1500
22.	Multimeter(Digital)	1set	800	800
23.	Carey Foster Bridge (With all accessories)	2set	4500	9000
24.	Resistance Box (2 No. Each) 0-1 Ohm, 0-100 Ohm.	4	850	3400
25.	Fractional Resistance Box 0-1 Ohm.	2	1200	2400
26.	Post office box Key type	2	1200	2400
27.	Post office box Dial type	2	1200	2400
28.	Resistance Wire(100 Gm.) (Constanton/Maganin)	1 lacchi	100	100
29.	Connecting Wire Copper(1/2 Kg.) (Cotton Insulated)	1 lacchi	700	700
30.	Screw gauge L.c 1/100 mm	5set	150	750
31.	Vernier Callipers L.c. 1/10 mm	5set	100	500
32.	Appratus for determining character-stics of P-N junction diode complete with all accessaries	2 set	1500	3000
33.	Resonance Column of steel One Meter length and 3-4 Cm diameter fitted with scale & water level arrangement	2	1600	3200
34.	App. for determining coefficient of friction on a horrizontal plane (Complete with all accessories)	2 set	700	1400
35.	Tuning Fork's Sets Set of different frequency (with rubber pad)	3set	350	1050
36.	Physical balance with weight box Complete with Fractional weight	2	800	1600
37.	Anemometer with counter cup type	1	1000	1000
38.	Spring Force Constant Apparatus with graduated mirror & pointer, weight set with hanger	2	1200	2400
39.	Viscosity Apparatus (Stock law) with steel balls and viscous liquid & timer	2set	1600	3200
40.	Thermometer of different range Mercury thermometer 0-50oC to 0-110oC	10set	100	1000
41.	Wall Thermometer Alcohal Filled 0-50oC	2set	20	40
42.	Sprit Level Technical Type	1set	60	60
43.	Drilling Machine Electric with different size bits	1set	800	800

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44.	LPG Gas Burner with Cylinder	1set	800	800
45.	Tool Kit with different tools Complete	1set	800	800
46.	Lab stools	30		

S.No.	Name of Equipment	No.	@ Rs. Aprox.	Amt.in Rs. Aprox.
47.	Lab tables	8		
48.	Plug Keys One Way	5	50	250
49.	Plug Keys Two Way	5	100	500
50	Helical Springs - Soft, 10 cm each	6	100	600

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II. APPLIED CHEMISTRY LAB

S.No.	Name of Equipment	No.	@ Rs. Aprox.	Amt.in Rs. Aprox.
1.	Test tube stand (Plastic/Tafflon)	30	20	600
2.	Funnel stand (Plastic/Tafflon)	30	20	600
3.	Burette stand Stainless Steel/Wooden/Iron	30	50	1500
4.	Pipette stand Stainless Steel/Wooden/Plastic	30	20	600
5.	Chemical balances with analytical weights 1gm -200gms	5	1500	7500
6.	Fractional weights set with rider 10 mg to 500 mg with rider	5sets	25	125
7.	Kipp's apparatus 1000 ml. Plastic/ Tafflon	2	500	1000
8.	Reagents bottles			
	250ml	120	20	2400
	500ml	25	25	625
	1000ml	5	30	150
9.	Wide mouth bottle 250 ml Glass	50	15	750
10.	Winchester bottle 2.5 litre Plastic/Tafflon	15	30	450
11.	Test tubes 1/4" x 6"			
	i. Corning or Borosil	200	9	1800
	ii. Glass	200	2	400
12.	Boiling tube 1" x 6"			
	i.Corning or Borosil	100	16	1600
	ii. Glass	100	5	500
13.	Pestle and morter Dia 10 cms 15 cms (Ceramics)	2	30	60
14.	Watch glass 5.0 cms,7.5 cms glass	15	5	75
15	Beakers (Glass/Brosil/Corning Plastic)			
	250 ml.	50	20	1000
	500 ml.	50	20	1000
16.	Weighing Tube 10 ml with lid (Plastic)	30	10	300
17.	Wash bottles (Plastic/Tafflon)	30	15	450
18.	Conical flask 250 ml. Glass (Brosil/Corning/Plastic) Transparnt	100	30	3000
19.	Flat bottom flask 500 ml.Glass	15	40	600
20.	Flat bottom flask 250 ml.Glass	15	25	375
21.	Burette 50 ml. (Plastic/Tafflon)	30	60	1800
22.	Pipette 25 ml. (Plastic/Tafflon)	30	20	600
23.	Measuring flask 250 ml. with stopper	30	50	1500
24.	Measring cylinder of various sizes (100 ml,250 ml,500 ml,1000 ml) 3 no. of each	12	30	360
25.	Bunsen's burner of brass	30	50	1500
26.	Gas plant petrol/LPG 10 to 20 burners automatic	1	5000	5000
27.	Spirit lamp (Brass)	30	30	900
28.	Tripod stand (Steel/Iron) Large/Medium	30	30	900
29.	Wire gauge 15 X 15 cm. with asbestos	30	15	450
30.	Test tube holder wodden	50	10	500

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S.No.	Name of Equipment	No.	@ Rs. Aprox.	Amt.in Rs. Aprox.
31.	Porcelain plates Ceramic	30	20	600
32.	Funnel 15 cm. Glass Borosil Corning/Plastic	60	16	960
33.	Spatula hard & nickel/steel	2 each	50	100
34.	Distilled water units (electrical)	1	10000	10000
35.	Distilled water units (solar)	1	5000	5000
36.	Open balance 1000 gms./10 mg.	1	600	600
37.	Brush for cleaning Hydro Fiber Acid & Alkali Resistant	100	10	1000
38.	Jars 20 Lit. for keeping destilled water	5	100	500
39.	Lab table 2 m. x 1.2 m. x 1 m. hight with central sink and cup boards (Teak wood) with drawers and two built in almirah on each side with reagent racks, better tile top	4	8000	32000
40.	Exhaust fans 18" (GEC make/Crompton)	4	2000	8000
41.	Side racks and selves for bench reagents made of teak wood for 24 bottels each set	4	2000	8000
42.	Digital balance electronic Electronics upto 2 decimal places	1	10000	10000
43.	Hot plates 7-1/2", 3" dia controled 2000 watts	1	1000	1000
44.	Hot air oven thermostatically controled with selves and rotary switches 350 x 350 x 25 high	1	8000	8000
45	pH Meter (Digital)	1	1000	1000
46	Glass Electrode	2	850	1700
47.	Reference Electro	2	850	1700
48.	Weight Box 1gm,2gmX2, 5gm,10 gm 20gmX2, 50gm, 100gm with for cep			
	Miscellaneous	LS		15000

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III. WORKSHOP EQUIPMENT

A. MACHINE SHOP

1.	Lathes 4.5 Ft.	1	--	35000
2.	Shaping M/C	1	--	20000
3.	Milling M/C	1	--	45000
4.	Universal Cutter & Tool Grinder	1	--	15000
5.	Cylinderical Grinder	1	--	15000
6.	Power hacksaw	2	15000	30000
7.	Marking Tables	1	--	20500
8.	Surface Plates	3	3000	9000
9.	Welding Set & Soldering Brazing Kits.	One Set		40000
10.	Tools & Instruments		L.S.	30000

B. FITTING SHOP

1.	Marking Table With Stand	5	1000	5000
2.	Double Wheel Grinder	2	4000	8000
3.	Bench Drilling M/C	2	4000	8000
4.	Power Hacksaw	2	15000	30000
5.	Different types of Tools		L.S.	15000

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S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
C.	CARPENTRY SHOP			
1.	Workbenches	8	2500	20000
2.	Wood Turning Lathe	2	20000	40000
3.	Circular Saw & Band Saw	One Set	15000	15000
4.	Portable Band & Circular Saw Grinder.	1	--	15000
5.	Standard Tool Kit	6 Set	3000	18000
6.	Assorted Tools Etc.		L.S.	10000
IV.	GENERAL ENGINEERING LAB			
1.	Three Phase Induction Motor	2	5000	10000
2.	Single Phase Induction Motor	2	1000	2000
3.	Single Phase Transformer	2	3000	6000
4.	A.C. Ammeters (0-5/10 A)	6	500	3000
	(0-1/2 A)	2	500	1000
	(10/20 A)	3	500	1500
5.	D.C. Ammeters (0-3/5 A)	2	500	1000
6.	A.C Voltmeters(0-300/600 V)	4	500	2000
	(150/300 V)	2	500	1000
7.	D.C. Ammeter (0-15/30 V)	2	500	1000
8.	Multimeter	2	2000	4000
9.	Wattmeter (Single Phase)	6	1500	9000
10.	Sinle Phase Energy Meter	2	500	1000
11.	Starter for 3 Phase Induction Motor 3 H.P.			
12.	DOL Starter	1	--	1000
13.	Star Delta Starter	1	--	150
14.	Rheostats	6	500	3000
V.	TESTING LABORATORY (Standardisation & Analysis Lab)			
A.	Chemical Testing:			
1.	Single Pan Balance	2	--	20000
2.	Proctor Extractor	1	--	2000
3.	Muffle Furnace	2	--	16000
4.	Water distillation plant	1	--	5000
5.	Platinum Crussible	2	3000	6000
6.	Gas Plant	1	--	2000
7.	Oven	2	1000	2000
8.	Soxlet Apparatus	2	10000	20000
9.	pH Meter	2	5000	10000
10.	Magnetic Stirrer	2	2000	4000
11.	Hot plate & Mantle Heater	2	1000	2000
12.	Refrigerator	1	6000	6000
13.	Fuming cup board	1	1000	1000
14.	Mantle Heater set	1	1000	1000
b.	Physical Testing Lab.			
1.	Shrinkage Tester	2	2500	5000
2.	Humidity & Temperature Control	1	--	10000
3.	Thickness Measuring Gauge (Bench Type)	2	2500	5000
4.	Hardness tester	1	--	10000
5.	Ross Flening M/C	1	--	27000

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S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
6.	Flexometer For Upper Leather	1	--	30000
7.	Colour Fastness Tester	1	--	15000
8.	Precision Lasto Meter	1	--	20000
9.	SATRA Type Sole Adhesion Tester	1	--	10000
10.	SATRA Tensile Tester	1	--	25000
11.	Shoe Hardness Tester for Rubber	1	-	5000
12.	Bally Cantrometer	1	--	60000
13.	Fibre Board Flexing M/C	1	--	45000
14.	Furniture & Fixture		L.S.	25000
15.	Water Absorption Machine Static (Kubelca Method)	6	--	70000
16.	Water Absorption Machine Dynamic (Heavy Leather)	1	--	80000
17.	Water vapour permeability tester	1	--	50000
18.	Flexometer	1	--	70000
19.	Abrasion Tester	1	--	90000
20.	Dynamic water Absorption tester	1	--	70000
21.	Tensile Testing machine (Computerised)	1	--	200000

VII. MICROSCOPY & MICROBIOLOGY LAB

1.	Refrigerator (160 ltrs)	1	--	15000
2.	Optical Microscope	6	500	6000
3.	Clintal Microscope	2	--	20000
4.	Microtome	1	--	1000
5.	Slide Cabinet	1	--	2500
6.	Stereo Microscope	1	--	10000
7.	Compound Microscope	5	10000	50000

VIII. PROCESS OF LEATHER MANUFACTURE SHOP
(Experimental Tannery/Leather Trade Engg.)

			Rs. In Lacs
1.	Wooden paddle	2	0.70(Total)
2.	Small experimental drum steel	2	2.00(Total)
3.	Spray booth with compressor & exhaust fan & guns etc.	1	0.50
4.	Tubewell with pump & motor	1	0.60
5.	Wooden houses	8	0.10(Total)
6.	Fleshing and scudling Knives	6	0.20(Total)
7.	Fleshing and scudling beams	6	0.90
8.	Misc tools		0.30(Total)
9.	Mini Auto spray with 4-6 guns	1	15.00
10.	Auto toggling Humidily fixers	1	7.00
11.	Shaving M/c	1	12.00
12.	Dayana vac. drying M/C	1	18.00
13.	Molissa staker	1	10.00
14.	Finiflex	1	12.00
15.	Dusting off M/C	1	0.60
16.	Wooden Sample Drum	1	1.50
	Operated : 3 Phase Induction Motor 440 Volt Supply		
	Power :1.5 HP		
	Capacity : 5 Kg-50Kg Rawide		
	Size : 10 Fit Diameter		

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17.	Shaving Machine(Mechanical)	1	2.00
18.	Splitting Machine	1	5.00
19.	Sammying/Setting Machine	1	2.50
20.	Toggling Frame with Toggles	1	0.25
21.	Drying Chamber	1	3.00
22.	Slowcon Staking Machine/Molisa Staker	1	3.00
23.	Buffing Machine 1800 mm (Double Width)	1	2.00
24.	Glazing Machine	1	1.50
25.	Area Measuirng Machine	1	1.70
26.	Dhakia Setting Machine (For Sole Leather)	1	2.50
27.	Hydraulic Press (Ironing & Embossing) Operated :3 Phase Induction Motor 440 Volt Supply Power :1.5 HP At the Temp. up to 60oC embossing	1	10.00
28.	Weigh Bridge/Balance	1	0.10
29.	Baby Boiler	1	0.20
30.	Vacuum Drying Machine	1	5.00
31.	Compressor	1	1.85
32.	Polishing Machine	1	1.00
33.	Roller Coater (Small Size)	1	2.00
34.	Hand Setting Mahcine	1	0.50
35.	Seasoning Table-II	1	0.50
36.	Aquamix (Rotomix)	1	2.50
37.	Spray Gun Capacity 500 ml, Made of Stainless Steel		
38.	Thickness Measuring Gauge Capacity :1mm-35mm for thickness of raw hide Operated :Electronic Power :3 Phase Induction Motor: 1.5 HP		
39.	Electronic Balance Capacity:001 ml.gm to 1/2 mlg. Operated :Electrically, Non-Corrosive base		
40.	Experimental Drum Operated: 3 Phase Induction 440 Volt Supply Power: 1.5 HP Capacity: 250gm-1 Kg Rawhide Size: 03 Fit Diameter		
41.	Hand Flashing Knife Lenth: 1.5 Feet Length Width: 6 inches Use: For Flashing One Side (Sharp) and scudding one side(Blunt)		

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X. FOOTWEAR & LEATHER GOODS MANUFACTURE SHOP

(Fig.in Lakhs Rs.)

Sl.No.	Name of Equipment	Qty Regd.	Unit Cost
1.	Upper splitting M/C Feeding Speed : 4 Ele-Mec/Vario-Opz Installed Pawer : 2.7 KW Knife Dimensions : 0.7X50X3100mm Max. Splitting Thickness : 8mm Min. Splitting Thickness : 0.6/0.2mm Working width : 420mm	1	6.50
2.	Clicking press Maximum Cutting Power : 20-30 Ton Maximum Stroke : 100 mm Cutting Table : 900X450 mm Arm width : 380mm Motor : 1.5 HP Net Weight (With Oil) : 780Kg. Size : 900X1000X1370 mm	2	3.25
3.	Sewing Machine		
	(a) Flat bed sewing M/C Stickiness Per Minute : 200-3200 Max. Stitch Length : 7mm Life To Presser Foot (Hand/Knee) 5.5/10mm(Standart) Max. 13mm Needle System : DBX1#21(#19-#23) Thickneww of the sewn products: Heavy	10	0.15
	(b) Zig Zag sewing M/C Stitches Per minute : 2000-2600 S.P.M. Stitch Length :5mm Width of Zig Zag : 8mm-12mm Needle : DPX17 Needle bar strocke : 34-35mm Thickness of the sewn products :Light- Medium upto 10mm	1	0.50
	(c) Post bed sewing M/C single needle Stitches Per minute : 2200-2600 S.P.M. Maximum Stitch Length :6mm Lift of pressure foot : 11mm (by knee) Needle : DPX5 Needle bar strocke : 36mm Hook Type : Vertical Rotating Hook Link Take Up Lever	5	0.50
	(d) Post bed sewing M/C double needle	1	0.35
	(e) Cording M/C	1	0.50
	(f) Stroebel Stitching Machine	1	1.50
	(g) G Heavy Duty Sewing M/c	2	0.50

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4.	Mechanical clicking press for bottom components	1	0.50	
5.	Strap cutting M/C Cutting Width : 2-350 mm Cutting Thickness : 10mm Working Width : 350mm Dimensions : 1200X550X110mm Power : 550W, 220V	2	0.80	
6.	Glamping hand drive M/C	1	1.20	
7.	Binding M/C Stitches per minute 2500 S.P.M. Maximum Stitch Length : 5.5 mm Lift of pressure foot : 100 mm (by knee) Needle System : DP X 17 Niddle bar stroke : 34 mm Alternating Movement : 2-6 mm Feed Type : Unison Feed Diameter of cylinder Bed : 46mm	1	0.90	
8.	Pull over M/C	1	0.50	
9.	Heel lasting M/C	1	1.00	
10.	Pounding M/C Dimensions : 650X500X1300mm Power : 550W,220V Voltage : 440 V Production : 3000 pairs/8 hour	1	0.80	
11.	Roughing M/C	1	0.60	
12.	A. Edge trimming M/C (For Lining) Power : 0937 KW Net Weight : 64 Kg. Dimensions : 1100 X 530 X 1165 mm	1	1.50	
	B. Edge trimming M/c (For Sole) Suitable for Flush Trimming for Sole Made of PU,TPR, EVA and Rubber Power : 0.37 KW Net Weight : 64 KG Dimensions : 1100 X 530 X 1165 mm	1	1.00	
	C. Hell Attaching Machine (For Lining)	1	0.40	
13.	Heel trimming M/C	1	0.40	
14.	Ironing Machine	1	2.00	
15.	Working tables with stoob	60	1.00	(Total)
16.	Decorative punching M/C	1	0.15	
17.	Dies, toobs, moulds, lasts etc.	L.S.	1.00	(Total)
18.	Tools boxes for students	60	0.20	(Total)

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19.	Thickness measuring gauge	2	0.03
20.	Pattern Shear	2	1.50
21.	Pattern Binding M/c	1	0.03
22.	Pattern Vaccum Forming M/C	1	1.50

Sl.No.	Name of Equipment	Qty Regd.	Unit Cost
23.	Pneumatic fusing M/C for ironing Fusible interlining drum type 60 mm	1	1.20
24.	Taping & Seam Rubbing M/C complete with devices.	1	1.25
25.	Top Cap applicator thermoplastic two stations.	1	0.50
26.	Lining trimming M/C with storepening device	1	0.40
27.	Automatic Eyeletting & punching M/C	1	0.70
28.	Stitch marking M/C	1	0.20
29.	Back part moulding M/C	1	1.20
30.	Mocassion performing M/C	1	2.50
31.	Mocassion performing M/C with one beating head (electric)	1	5.00
32.	Vamp clapping M/C	1	1.50
33.	Insole trimming & attaching M/C	1	0.80
34.	Conditioning M/C	1	0.30
35.	Forepart Lasting M/C with Adhesive tapes	1	5.00
36.	Conditioning for back port	1	0.25
37.A.	Heal setting plant with 4 chambers and single vaccum	1	3.50
B.	Reactivating plant for sales	1	0.50
38.	Delasting (Slip Last) M/c	1	0.25
39.	Spray booth with sprayer etc. Dimensions : 900 X 850 X 1900 mm Power : 0.55 KW Net weight : 300 Kg Voltage : 380V/50 Hz	1	0.50
40.	DVP Two Station Machine	1	1.50

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	Dimension : 1400 X 1150 X 2042 MM Mould Frame Size (LXWXH) 420X200X30mm Press Last Power : 6.5 Mpa Clamping Stroke : 130 mm Press Mould Stroke : 80mm Lift of core formation : 15mm Rotation Angle of Shoe Last 180 Degree Motor Power : 2.2 KW Heat Power : 8.6 KW		
41.	Thickness Measuring Machine Capacity : 1mm-35mm For Thickness of raw hide Operated : Electronic Power : 3 Phase Induction Motor 1.5 HP	1	0.50
42.	Compressor For Pneumatic machine Motor : 2HP Tank Capacity : 115 Lit. Air Delivery : 340L/min. Pressure : 10 Bar	1	1.00
43.	Punching Machine Punching Width : 36 mm Feed : 0-60 mm Speed : 250-350/min. Motor : 200W Net Weight : 45 Kg. Dimension 365 X 370 X 360 mm OR Standard	1	0.60
44.	Simplex Matie 33 mts. conveyor with 1 Mech. tier	1	3.50
45.	Two colour hrizontal injection moulding M/C with moulds etc.	1	20.00
46.	D.M.S. M/C 4 bed with moulds etc.	1	8.00

INTRODUCTION TO COMPUTER (Common to all Trades)

COMPUTER CENTRE

S.No.	DESCRIPTION	QTY.	APPROX. COST (in Rs.)
1.	Core-2 Quad Processor, 4GB RAM 1 GB SATA HDD, 19" TFT Monitor/ Server of Latest Specification OS-Windows 2007/2008/Latest Version	02 Server	1,20,000=00
2.	General Desktop Computer-Intel i5 60 node or Higher(with latest Specification Pre loaded latest Anti Virus with Life time Subscription, Licence Media and Manual with UPS 660 VA with latest window OS Including licence OR Computer of latest Specification With latest window os including licence		36,00,000=00
3.	Software :((Latest Version)		
	i. MS OFFICE 2010/Latest Version	LS	LS
	ii COMPILER 'C', C++, JAVA-7	LS	LS
4.	Hardware	4,50,000.00 LS	
	i. Switch-32 Port	02	
	ii. Router	02	
	iii. Hub	04(8 Port)	
	iv. Ext. Modem	02	
	v. Wireless N/W Adaptor	02	
	vi. Series Access Point	02	
	vii.LAN Cable Meter	05	
	viii. LAN Cable Analyzer	05	
	ix. Crimping Tool and all other accessories related to Networking	15	
5.	Scanner- Flat Bed A4/Auto Lighter (Bit depth 48)	02	20,000
6.	132 Column 600 CPS or faster 9 Pin dot matrix printer with 500 million character head life	02	50,000
7.	Laser Jet-A4 All In one 20 page per min (2 Each)	04	50,000
8.	Desk Jet-A4 Photo Smart (2 Each)	04	40,000
9.	5 KVA on line UPS with minimum 30 minute battery backup along with sealed maintenance free batteries. Provision for connecting external batteries with network	04	8,00000

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	connectivity.(For 2 Labs)			
10.	Split Air Conditioner 1.5 tones capacity with ISI mark along with electronic voltage stabilizer with over voltage and time delay circuit	08	35,0000	
11.	Room preparation and furniture	LS		
12.	19" rack, 24-port switch. connector RJ-45 Cat-6 cabling for network	LS	10,0000	
13.	2 KVA Inverter Cum UPS	02	6,0000	
14.	Fire Extinguisher (2 Kg.)	04	15000	
15.	Fire Extinguisher (5 Kg.)	04	25000	
16.	Vacuum Cleaner	02	25000	
17.	LCD Projector 3000 Lumen with all Accessories	02	350000	
18.	Pen Drive 16 GB	10	10000	
19.	DVD Writer External	02	10000	
20.	HDD External 500 GB	02	15000	
21.	PAD (Latest Configuration)	02	15000	
22.	Broadband For Internet(Speed Min. 8mbps)	04	LS	
23.	USB Modem	02	8000	
24.	Generator 15 KVA Water Coolant	01	450000	

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LIST OF LABORATORY EQUIPMENT(Energy Conservation)

Sr. No	Particulars	Qty	Estimated Cost (Rs)
1.	Multimeter	1	17,000
2.	Power Analyzer	1	20,000
3.	Luxmeter	1	5,000
4.	Black Box (for checking lamp efficacy including stand and luxmeter)	1	25,000
5.	Centrifugal pump, 1 kW	1	15,000
6.	Variable Frequency drive	2	50,000
7.	Water Flow meter	1	10,000
8.	Pressure Gauge	1	2,000
9.	Experimental Set up for Valve Throttling vs VFD	1	50,000
10.	Compressor, 20 cfm, single-stage	1	50,000
11.	Air leakage meter	1	18,000
12.	Blower (2 HP)	1	8,000

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LEARNING RESOURCE MATERIALS

1.	LCD Projector with Screen	1	--	20000
2.	Handicam	1	--	30000
3.	Cutting, Binding & Stitching equipment.	1	--	30000
4.	Desk Top Computer with Internet Core i5/i7- 760, Processor, Genuine Windiw 7, Professional 18 inch HD, Flat Panel Monitor Optical Mouse, Key Board & all related media or latest version	1	--	40000
5.	Home Theater Support Disc type CD. CDR/CDRW DVDR/DVDRW, VCD Supported with USB Port Support-DIVX/JPEG/MP3	1	--	25000
6.	Commerical P A System 16 W-220W output, AC & 24V DC Operated, 5 Mic. & 2 Auxilary input, Speaker output 4 Ohm, 8 Ohm, 17 V & 100 V	1	--	20000
7.	Interactive Board	1	--	50000

ote :

1. This center will be only one at the institute level irrespective of all branches.

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ANNEXURE- I QUESTIONNAIRE

INSTITUTE OF RESEARCH,DEVELOPMENT AND TRAINING U.P.KANPUR -208024

SUBJECT: Questionnaire for ascertaining the job potential and activities of diploma holder in Leather Technology.

PURPOSE: To design and develop diploma curriculum in Leather Technology.

NOTE: 1.Please answer the questions to the points given in the questionnaire.

2.Any other point or suggestion not covered in this questionnaire may be written on a separate paper and enclosed with the questionnaire.

1.Name of the organisation:_____
_____

2.Name & Designation of the officer filling the questionnaire _____
_____

3.Name of the department/section/ shop _____
_____

4.Important functions of the department/section/shop _____
_____

5.Number of diploma holder employees under your charge in the area of Leather Technology. _____

6.Please give names of modern equipments/machines handled by a diploma holder in Leather technology.

1. 2. 3.

4. 5. 6.

7.What proficiencies are expected from a diploma holder in Leather Technology.

1. 2. 3.

4. 5. 6.

8.Mention the approximate percentage of the following desired in Diploma teaching.

1. Theoretical knowledge ----------%

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2. Practical knowledge ----------%
3. Skill Development ----------%

9.Do you think " on the job training" / Industrial training should form a part of curriculum. (Yes/ No)
if yes then
(a) Duration of training ----------
(b) Mode of training 1. Spread over different semesters

2. After completion of course

3. Any other mode

10.What mode of recruitment is followed by your organisation.

1. Academic merit
2. Written test
3. Group discussion
4. Interview
5. On the job test.

11. Mention the capabilities/ Qualities looked for while recruiting diploma holder in Leather Technology.
(a) Technical knowledge ----------
(b) Practical skill ----------
(c) Etiquettes and behaviour ----------
(d) Aptitude ----------
(e) Health habit and social background ----------
(f) Institution where trained ----------

12. Does your organisation have any system for the survey of Leather processing techniques of different countries/States. Yes/No

13. Does your organisation conducts field survey to know users views regarding. Yes/No
1. Use of differnet leather goods.
2. Effect of climatic conditions
3. Any other
If yes ; pleas give brief account of each.

14. Which type of assignment do you suggest for an entrepreneur in Leather Technology.

15. In which types of organisations can a diploma holder in Leather Technology work ?

1 2 3

4 5 6

16. Job procepects for the diploma holder in Leather Technology the next ten years in the state / country.

17. In your opinion what should be the subjects to be taught to a diploma student in Leather Technology.

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Theory Practical

18. Kindly mention particulars regarding topics/areas which should be given more emphasis in the curriculum .

Theory Practical

19. Kindly state whether your organisation can contribute towards improvement of curriculum in above field. Yes/ No
If yes : Pleas give names of experts in your organisation to whom contact.

20. Kindly give your valuable suggestions for being considered at the time of finilisation of curriculum.

21. What changes in technologies or to be incorporated in the development of curriculum on Leather Technology.

(Signature)

Kindly mail the above questionnaire duly filled to:-

Dr. Kshama Mishra
Assistant Professor
Institute of Research,Development & Training,U.P.
Govt. Polytechnic Campus
Kanpur-208024

(Please note that all information in this survey is confidential for the use of curriculum design only)

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ANNEXURE- II SUMMER TRAINING SCHEDULE

4 weeks structured, supervised, branch specific, task oriented industrial/field exposure to be organised during summer vacation after second year annual examination.

The student during the vacational training must undertake training in any one of the following.

1. Raw hide collection, storage, curing and preservation methods including various types of transportaion in common use.

2. Students are required to gather full details regarding different sections of a tannery including its layout, machines used with specification, source of supply of spare parts and maintenance schedule.

3. Beam house operations, process involved in making leather upto wet blue. Full details including processing etc. are to ne onserved during training period.

4. Tanning and finishing operations of a tannery including dyeing, measuring etc.

5. Effuent treatment methods adopted in a tannery including primary and secondary treatment, tannery waste mangement.

6. Chemical and physical testing of leather, marketing of leather and exoprt documentation practice.

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The students will work and focus their attention during the training on the following points which will be incorporated by them in their reports.

1. Name & Address of the unit

2. Date of
   i. Joining.
   ii. Leaving.

3. Nature of Industry

   i. Product.
   ii. Services.
   iii. Working Hrs.

4. Sections of the unit visited and activities there in.

5. Details of machines/Tools & instruments used in working in the section of the unit visited.

6. Work procedure in the section visited.

7. Specifications of the product of the section and materials used.

8. Work of repair and maintenance cell.

9. Details of the shops

10. Name of checking and Inspecting Instruments and their details.
    Quality controls measures taken.

11. Details of hadraulics/pneumatic/ thermal units or appliances used if any.

12. Discripton of any breakdown and its restoring.

13. Use of computer - if any.

14. Visit of units store, Manner of keeping store items, Their receiving & distribution.

15. Safety measures on work place & working conditions in general - comfortable, convenient & hygeinic.

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STUDENT ACTIVITIES ON ENERGY CONSERVATION/ENERGY EFFICIENCY

1. Presentations of Case Studies
2. Debate competitions
3. Poster competitions
4. Industrial visits
5. Visual Aids

COURSE OUTCOMES

After studying this course, a student will be able to co-relate and apply fundamental key concepts of energy conservation and energy management in industry, commercial and residential areas. A student will be able to:

- Define principles and objectives of energy management and energy audit.
- Understand Energy Conservation Act 2001 and its features.
- Understand various forms & elements of energy.
- Identify electrical and thermal utilities. Understand their basic principle of operation and assess performance of various equipments.
- Identify areas of energy conservation and adopt conservation methods in various systems.
- Evaluate the techno economic feasibility of the energy conservation technique adopted.

INSTRUCTIONAL STRATEGY

Teachers are expected to lay considerable stress on understanding the basic concepts in energy conservation, principles and their applications. For this purpose, teachers are expected to give simple problems in the class room so as to develop necessary knowledge for comprehending the basic concepts and principles. As far as possible, the teaching of the subject must be supplemented by demonstrations and practical work in the laboratory. Visits to industries must be carried out. Expert from industry must be invited to deliver talks on energy conservation to students and faculty.

REFERENCE BOOKS

1. Guide book on General Aspects of Energy Management and Energy Audit by Bureau of Energy Efficiency, Government of India. Edition 2015
2. Guide book on Energy Efficiency in Electrical Utilities, by Bureau of Energy Efficiency, Government of India. Edition 2015
3. Guide book on Energy Efficiency in Thermal Utilities, by Bureau of Energy Efficiency, Government of India. Edition 2015
4. Handbook on Energy Audit & Environmental Management by Y P Abbi&Shashank Jain published by TERI. Latest Edition
5. **Important Links:**
   (i) Bureau of Energy Efficiency (BEE), Ministry of Power, Government of India. www.beeindia.gov.in.
   (ii) Ministry of New and Renewable Energy (MNRE), Government of India. www.mnre.gov.in.
   (iii) Uttar Pradesh New and Renewable Energy Agency (UPNEDA), Government of Uttar Pradesh. www.upneda.org.in.
   (iv) **Central Pollution Control Board (CPCB),** Ministry of Environment, Forest and Climate Change, Government of India. www.cpcb.nic.in.
   (v) Energy Efficiency Sevices Limited (EESL). www.eeslindia.org.
   (vi) Electrical India, Magazine on power and electrical products industry. www.electricalindia.in.

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RECOMMENDED BOOKS

List of standard Text Books recommended for diploma level institutions of Uttar Pradesh

1. DISCIPLINE : APPLIED PHYSICS

Sl.No.	TEXT BOOK	AUTHOR	MEDIUM	EDITION YR	COST	FULL ADDRESS OF PUBLICATION
1.	ANUPRAYUKT BHAUTKI	GUPTA & GUPTA	HINDI	1995	75.00	ASIAN PUBLISHERS, 85-C NAI MANDI, MUZAFFAR NAGAR
2.	ENGINEERING BHAUTKI	Dr. BHARGAVA	HINDI	1995	60.00	DHANPAT RAI & SONS
3.	ANUPRAYUKT BHAUTKI	KUMAR & TYAGI	HINDI	1995	75.00	NAV BHARAT PRAKASHAN, BEGUM BRIDGE ROAD,MEERUT
4.	ANUPRAYUKT BHAUTKI	Dr. R.C.PANDEY	HINDI	1994	75.00	NAV BHARAT PRAKASHAN, BEGUM BRIDGE ROAD, MEERUT
5.	APPLIED PHYSICS-I (Vol - I)	Dr. H.H.LAL	ENGLISH	1993	45.00	TATA McGRAW HILL
6.	APPLIED PHYSICS-II(Vol - II)	Dr. H.H.LAL	ENGLISH	1993	54.00	TATA McGRAW HILL
7.	MODERN COLLEGE PHYSICS	WHITE	ENGLISH	1995	110.00	C. B. S.
8.	PHYSICS Vol - I & II	HOLLIDAY AND RESNIC	ENGLISH	1993	100.00	WILEY EASTERN

1. DISCIPLINE : APPLIED MATHEMATICS

Sl.No.	TEXT BOOK	AUTHOR	MEDIUM	EDITION YR	COST	FULL ADDRESS OF PUBLICATION
1.	APPLIED MATHEMATICS (Math-I & Math-II)	KAPOOR & TARAMAN	HINDI	1994	75.00	NAV BHARAT PRAKASHAN, MEERUT
2.	APPLIED MATHEMATICS (Math-I & Math-II)	Dr KAILASH SINHA	HINDI	1994	60.00	BHARAT BHARATI PRAKASHAN, MEERUT
3.	APPLIED MATHEMATICS (I & II)	LUTHERA	HINDI	1994	65.00	B. Tec. PRAKASHAN, LUCKNOW
4.	APPLIED MATHEMATICS (I & II)	P. GUPTA	HINDI	1994	65.00	ASIAN PUBLISHERS, MUZAFFAR NAGAR
5.	ADVANCE Engg. MATHS	H. K. DAS	ENGLISH	1994	125.00	S. CHAND & COo., RAM NAGAR NEW DELHI

1. DISCIPLINE : COMMUNICATION TECHNIQUES

Sl.No.	TEXT BOOK	AUTHOR	MEDIUM	EDITION YR	COST	FULL ADDRESS OF PUBLICATION
1.	ENGLISH FOR COMMUNICATION	V. SHASHIKUMAR M. N. K. BOSE	ENGLISH	1987	21.00	I. R. D. T. U. P., KANPUR
2.	SAMPRESHAN TAKNIK	Prof. R. PAL Dr. Smt NEERAJ SHUKLA Dr.SUBHASH GARG	HINDI	1989	15.00	I. R. D. T. U. P., KANPUR

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DISCIPLINE : APPLIED CHEMISTRY

Sl.No.	TEXT BOOK	AUTHOR	MEDIUM	EDITION YR	COST	FULL ADDRESS OF PUBLICATION
1.	ANUPRAYUKT RASAYAN	KHANNA & KHANNA & BOUNTRA	HINDI	1994	60.00	BHARAT BAARTI PRAKASHAN, MEERUT
2.	PRAYUKT RASAYAN	MAHENDRA AND SRIVASTAVA	HINDI	1994	58.00	B.TECH. PUBLISHERS,AMMINABAD LUCKNOW
3.	PRAYUKT RASAYAN SHASTRA	S. CHANDRA	HINDI	1994	60.00	NAV BHARAT PRAKASHAN, BEGUM BRIDGE ROAD,MEERUT
4.	APPLIED CHEMISTRY	V. P. MEHITA	HINDI	1993	60.00	ASIAN PUBLISHERS, 85-C NAI MANDI, MUZAFFAR NAGAR
5.	ENGINEERING RASAYAN	Dr. LALIT	HINDI	1994	45.00	DHANPAT RAI & SONS, 1682 NAI SARAK, DELHI
6.	ENGINEERING CHEMISTRY	P. C. JAIN	ENGLISH	1994	100.00	DHANPAT RAI & SONS, 1682 NAI SARAK, DELHI

1. DISCIPLINE : LEATHER TECHNOLOGY

Sl.No.	TEXT BOOK	AUTHOR	MEDIUM	EDITION YR	COST	FULL ADDRESS OF PUBLICATION
1.	ENVIRONMENT CHEM.	SAWYER	ENGLISH	LATEST		
2.	WASTE WATER ENGG. TREATMENT DISPOSAL & REUSE	METCALFA & EDDY	ENGLISH	LATEST		
3.	BIOLOGICAL WASTE TREATMENT	RAO, DUTTA	ENGLISH	LATEST		
4.	PRACTICAL INTRODUCTION TO THE DYES & FINISHING OF WOOD FABRICS	I. E. BEAKPARK	ENGLISH	1986	$ 7.50	DYEIS CO. PUBLICATIONS TRUST
5.	PHYSICAL CHEMISTRY OF LEATHER MAKING	Z.K.BIENKIEWIEZ	ENGLISH	1983	$49.00	KRIEGER PUBLISHING Co.
6.	GLOVING, CLOTHING & SPEICAL LEATHER	P. S. BRIGGS	ENGLISH	1981	$ 5.00	TROPICAL PRODUCT INSTT.,U.K.
7.	AUTOMATIC SPRAYING M/c FOR LEATHER PRODUCTION	D. N. PRICE	ENGLISH	LATEST	$45.00	SHOE TRADES PUB.,U.S.A.
8.	FARMING & ABBITION PRACTICES LEADING TO IMPARIED LEATHERS QUALITY	COMPILED	ENGLISH	1987	$20.00	BRITHSH LEATHER CONFEDRATION
9.	FUNGICIDES USED ON LEATHER	C. CALNAN	ENGLISH	1985	$ 6.00	LEATHER CONSERVATION CENTRE
10.	LEATHER DEFECTS- A GUIDE TO THEIR MECROSCOPY	M. DEMPSEY	ENGLISH	1974	$19.70	LEATHER & SHOE RESEARCH ASSOCIATION
11.	FUNDAMENTAL OF LEATHERS MANF.	HEIDEMANN	ENGLISH	1993	$61.80	EDNARD ROETHER
12.	HIDE SKINS IMPROVEMENTS IN DEVELOPING COUNTRIES	H. M. S. O.	ENGLISH	1985	$ 9.00	H. M. S. O.
13.	SAFE GARDING OF MULTI ROLLER M/c USED IN THE LEATHER PRODUCING INDUSTRIES		ENGLISH	1981	$ 8.00	LEATHER PRODUCIRS ASS.
14.	SAFE GARDING OF TANNERY DRUMS		ENGLISH	1980	$ 6.70	LEATHER PRODUCIRS ASS.
15.	SUPPLMENT TO SAFE GARDING OF TANNERY DRUMS		ENGLISH	1984	$ 5.35	LEATHER PRODUCIRS ASS.
16.	TAINNING OF HIDES & SKINS	LOCKHART SMITH C. J. ELLIOTT	ENGLISH	1974	$ 0.70	TROPICAL PRODUCT
17.	MODERN RATIONAL DYEING AND FINISHING OF VEG-SOLE LEATHER	J. MOSIEWICA J.	ENGLISH	1982	$19.99	SHOE TRADES PUB. CO., U.S.A.

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Sl.No.	TEXT BOOK	AUTHOR	MEDIUM	EDITION YR	COST	FULL ADDRESS OF PUBLICATION
18.	MODERNISATION RATIONAL PIT DRUMS TANNAGE OF VEG. SOLE LEATHER	MOSIEWICZ J.	ENGLISH	1976	$17.95	SHOE TRADES PUB. CO., U.S.A.
19.	CHEMISTRY AND TECH. OF LEATHER 4 VOLUME	F. O. FLAHERTY	ENGLISH	1992	$199.99	KALLEN BERGER W. E.
20.	LEATHER TECHNICIAN HAND BOOK	J.H. SHERPHOUSE	ENGLISH	1989	$18.50	LEATHER PRODUCIRS ASS.
21.	SKIN, HIDS & LEATHER AFICTS	J. J. TANCOUS	ENGLISH	1959	$57.00	TANNIRS COUNCIL, U. S. A.
22.	SURVEY OF MODERN VEG. TANNAGE		ENGLISH	1974	$25.20	TANNING EXPRACT PRO. FEDERATION
23.	DYES HOUSE LABORATORY PRACTICE	T. M. THOUMPSON	ENGLISH	1983	$ 7.20	DYES Co. PUBLICATION TRUST
24.	PRACTICAL LEATHER TECH.	T. C.THOSTENSEN	ENGLISH	1992	$34.95	KRIEGER PUBLISHING CO.,U.S.A
25.	MANF. OF UPPER LEATHER	D. H. TUCK	ENGLISH	1981	$ 5.00	TROPICAL PRODUCTS
26.	OILS AND LUBRICATION USED IN LEATHER	D. H. TUCK	ENGLISH	1983	$ 6.50	LEATHER CONSERVATION CENTRE
27.	FUNDAMENTALS OF POLLUTION CONTROL FOR LEATHER INDUSTRY	T.C. THORTENSEN	ENGLISH			SHOE TRADER PUB. Co., U.S.A.
28.	CHEMICALS FOR LEATHER INDUSTRY	COMPILED	ENGLISH	1994	200.00	N. L. D. P., MADRAS
29.	RAW MATERIALS FOR INDIAN LATHER	COMPILED	ENGLISH	1994	250.00	N. L. D. P., MADRAS
30.	MODERNISATION OF LEATHER INDUSTRY & DEV. OF LEATHER IN INDIA	COMPILED	ENGLISH	1994	200.00	N. L. D. P., MADRAS
31.	THEORY OF PRACTICE OF LEATHER MANF.	K. T. SARKAR	ENGLISH			
32.	LECTURE NOTES OF DYEING AND FINISHING	C. K. RAO	ENGLISH			C. L. R. I., MADRAS
33.	AN INTRODUCTION TO THE PRINCIPLE OF PHYSICAL TESTING OF LEATHER	S. S. DUTTA	ENGLISH		50.00	I. L. T. A., CALCUTTA
34.	PRACTICAL ASPECT OF THE MANF. OF UPPER LEATHER	J. DEY	ENGLISH		50.00	I. L. T. A., CALCUTTA

Corrected and Approved By B.T.E. on Dated 04.05.2017