

LG-105–MATERIAL TECHNOLOGY FOR LEATHER GOODS AND FOOTWEAR

Course Title:	Material Technology for Leather Goods and Footwear	Course code:	LG-105
Year:	I	Course group:	Core
Teaching scheme in periods:	120:30	Credits:	3
Methodology:	Lecture+ Tutorial	Total Contact periods:	150
CE:	60 Marks	SEE:	40 Marks

Pre requisites

Enthusiasm to learn the course and requires the basic knowledge of Applied Science and Mathematics at the Secondary school level.

COURSE OUTCOMES

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

CO	Course Outcomes
CO1	Explain the properties, sources, and types of upper leathers and their selection for leather goods and footwear fabrication.
CO2	Explain the characteristics of non-leather upper materials, such as poromerics and fabrics, and compare them with leather.
CO3	Explain the purpose, classification, and selection of finishing materials, adhesives, and threads used in footwear and leather goods manufacturing.
CO4	Identify different grinders, fittings, fasteners, and decorative accessories and explain their materials and applications.
CO5	Explain the composition, properties, and applications of natural and synthetic soling materials used in footwear.
CO6	Explain the materials, properties, and functional requirements of insoles, heels, bottom filling materials, toe puffs, and stiffeners.

BLUEPRINT OF MARKS FOR SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R		U	A	
1	Upper Leathers	25	Q4	Q1		Q9(a)	Q13(a)
2	Non-Leather Upper Materials	25					
3	Finishing Materials, Adhesives and Threads	25		Q2		Q10(a)	Q14(a)
4	Grinderies	25					
5	Soling Materials	25		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Insole, Heel and other Bottom materials	25			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total		150	08		08	08	

CO-PO Matrix:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	1	-	2	-	2	1	-	-	1
CO2	3	2	1	-	2	-	2	1	-	-	1
CO3	3	2	2	1	2	1	2	1	-	-	1
CO4	3	2	2	1	1	-	1	1	1	-	1
CO5	3	2	2	1	3	1	2	1	-	-	1
CO6	3	2	2	1	2	1	2	1	-	-	1

COURSE CONTENT

UNIT 1 – Upper Leathers

Duration: 25 Periods (L20.0 – T5.0)

Leathers – properties, Different type of leathers, Different Sources of leather, properties of different types of leathers – selection of Leather for Fabrications in Footwear.

UNIT 2 – Non-Leather Upper Materials

Duration: 25 Periods (L20.0 – T5.0)

Poromerics – Structure, Different layers, Materials with Leather like appearance, properties different type of poromerics – Characters of poromerics, Comparison of poromerics and leather.
Fabrics – Classification of Fabrics – Textile Fabrics – yarn classification – yarn, Fabrics differences, uses of Fabrics in Footwear.
Woven, Non-Woven, Knitted, Coated fabrics, knitted footwear.

UNIT 3 – Finishing Materials, Adhesives and Threads

Duration: 25 Periods (L20.0 – T5.0)

Cleaners, conditioner, fillers, dressings – purpose, materials used.
Different type of waxes.
Adhesives – Definition, Classification, Types – Composition, properties – Criteria for Selection of Adhesives.
Threads – Classification, types of threads, properties – Selection of threads – Thread count system – Ticket number.

UNIT 4 – Grinderies Duration:

25 Periods (L10.0 – T3.0)

Different fittings, fasteners, grinderies used in leather goods and footwear, materials used for fittings, fasteners, grinderies, ornamentation, decorative fittings.

UNIT 5 – Soling Materials Duration:

25 Periods (L20.0 – T5.0)

Natural soling materials – Leather Soles, Rubber, Properties – Drawbacks – Crape rubber, Unvulcanised rubber, properties of Natural soling materials, Vulcanizing process, properties of Vulcanized Rubber.
Synthetic Soling Materials – Thermosetting Plastics, Thermoplastics properties, examples – composition and properties of different synthetic soling materials like P.V.C, P.U, T.P.R, E.V.A, M.C.R, S.B.R, Nylons.

UNIT 6 – In sole, Heel and Other Bottom Materials Duration:

25 Periods (L20.0 – T5.0)

Insoles – Different insole materials, composition of insole materials, properties.
Bottom filling agents – Definition, Need of Bottom filling agents, different filling materials and properties.
Wood and metal – Different types of wood, uses of wood as sole, heel, last – shanks, materials, properties required.
Heels – Different materials used in Heel making.
Properties required for toe puff and stiffeners – materials used for toe puff and stiffeners.

Reference Books

1. Textbook of Footwear Materials by J. H. Thornton, The National Trade Press Ltd., London, 1970.
2. Footwear Materials and Process Technology by A. S. Harviy, New Zealand, Larsa Publications.
3. Polymeric Materials for Footwear, Ganga Radha Krishna.
4. For Adhesives, Indian Footwear Magazine, March–April, 1986.
5. For Threads, Indian Footwear Magazine, January–February, 1983; March–April, 1983; July–August, 1986.
6. Comprehensive Footwear Technology – Somanath Ganguly.

Suggested E-learning references

1. <http://icanmakeshoes.com>shoemaking>.
2. www.simpleshoemaking.com
3. <http://shoemakingcoursesonline.com>

Suggested Learning Outcomes

After Completion of the course, the student shall be able to undersatnd

1

- 1.1 Explain the qualities required for an upper material.
- 1.2 Explain following properties of leather which makes leather best upper material.
 - a. Strength and stretch
 - b. Elasticity and plasticity
 - c. Permeability, foot comfort
 - d. Flex resistance
 - e. Heat resistance
 - f. Water resistance
 - g. Surface performance
 - h. Ease of working
- 1.3 Identify Stretch and Tightness direction on leather.
- 1.4 Identify the Characteristics and variation in quality in different areas of leather.
- 1.5 Explain the reasons for variation in quality in different areas of leather.

- 1.6 Identify thickness variation in different areas of leather.
- 1.7 Explain the reasons for thickness variation in different areas of leather.
- 1.8 Identify colour variation in different areas of leather.
- 1.9 Explain the reason for the colour variation in different areas of leather.
- 1.10 List different sources of leather.
- 1.11 Classify leather based on sources of leather.
- 1.12 Distinguish and explain the properties of following leathers used in footwear manufacturing.

- a. Calf leather
- b. Side leather
- c. Full grain leather
- d. Corrected grain leather
- e. Split leather
- f. Embossed / Printed leather
- g. Patent leather
- h. Suede leather
- i. Nubuck leather

- 1.13 Explain the characteristics and uses of following leathers.

- a. Oil pull up leather
- b. Glazed kid leather
- c. Burnished leather
- d. Banwar leather
- e. Kattai leather
- f. Jug grain leather
- g. Nappa leather

2

- 2.1 Define poromerics.
- 2.2 State different materials used in poromerics.
- 2.3 Describe the structure of poromerics.
- 2.4 Explain the general properties of poromerics.
- 2.5 Compare poromerics and leather with respect of

- a. Strength, stretch
- b. Uniformity and continuity
- c. Easy of skiving, stitching operations
- d. Easy of folding operation
- e. Easy of lasting, sole attaching, finishing operations
- f. Flex resistance
- g. Comfort and water vapour permeability
- h. Abrasion resistance, durability

2.6 Classify the fibers.

2.7 Classify Natural fibers.

2.8 Classify Synthetic fibers.

2.9 Explain the properties of following natural fibers.

- a. Cotton
- b. Wool
- c. Jute
- d. Silk

2.10 Explain the properties of following synthetic fibers.

- a. Nylons
- b. Polyester
- c. Polyamide

2.11 Distinguish fiber, yarn, thread, fabric.

2.12 Explain the classification of fabrics.

2.13 Describe Woven fabric, Knitted fabric, Nonwoven fabric, Coated fabric.

2.14 Give examples for Woven fabric, Knitted fabric, Nonwoven fabric, Coated fabric.

2.15 Define reinforcement materials like toe puff and counter stiffeners.

2.16 Name the materials used in toe puff and stiffeners.

2.17 State the properties required for toe puffs.

2.18 State the properties required for stiffeners.

3

- 3.1 List different finishing materials.
- 3.2 Explain why we have to clean the upper before upper finishing.
- 3.3 List and identify different type of cleaners used in footwear finishing.
- 3.4 Explain chemical composition and how to select different type of cleaners.
- 3.5 State the objective of conditioning.
- 3.6 Explain different type of conditioners.
- 3.7 Explain the objective of upper filling operations.
- 3.8 Explain different type of filler used in footwear finishing.
- 3.9 Explain the purpose of the dressing.
- 3.10 Classify the dressings and list different type of waxes.
- 3.11 Define Adhesive.
- 3.12 Classify the adhesives.
- 3.13 Distinguish Temporary, Permanent adhesives with examples.
- 3.14 Explain the composition of following adhesives.
 - a. Vegetable paste
 - b. Rubber Latex
 - c. Natural rubber solution
 - d. Neoprene
 - e. Polyurethane
 - f. Hot melt adhesives
- 3.15 Identify the use of different adhesives in specific footwear fabrication operations.
- 3.16 Explain the properties of neoprene, PU, Hot melt adhesives.
- 3.17 Explain criteria for selection of adhesives.
- 3.18 State the properties required for threads to be used in footwear manufacturing.
- 3.19 Classify the threads.
- 3.20 Explain the properties of cotton, silk, polyester, polyamide threads.

3.21 Distinguish fiber, yarn, and thread. And define Yarn Count, Thread Count.

3.22 Explain length numbering and weight numbering of threads.

4

4.1 Define grinderies.

4.2 Define fitting.

4.3 Define fastener.

4.4 List examples of fittings.

4.5 List examples of fasteners.

4.6 Describe following grinderies used in footwear and leather goods manufacturing.

- a. Rivets
- b. Nails
- c. 'D' & 'O' Rings
- d. Zips
- e. Laces
- f. Strap fittings
- g. Handle fittings
- h. Handle holders
- i. Studs
- j. Hooks
- k. Eyelets
- l. Locks
- m. Buckles

4.7 Name the materials used for making of above grinderies.

4.8 Explain the specific purpose of the above grinderies.

4.9 Define decorative fitting.

4.10 List examples of decorative fittings.

4.11 Define ornamentation.

5

5.1 Distinguish leather, synthetic sole materials.

5.2 Explain the properties of vegetable tanned leather soles.

5.3 Explain the properties of chrome tanned leather soles.

5.4 Write the properties of Natural Rubber.

5.5 State the drawbacks of Rubber.

5.6 Explain vulcanization process.

5.7 List the properties of vulcanized rubber.

5.8 Explain why vulcanised rubber will be having superior properties compared to natural rubber.

5.9 Explain the properties of following type of rubbers.

- a. Crape rubber
- b. Gristle rubber
- c. Micro Cellular rubber

5.10 State the application and uses of above rubbers.

5.11 Define synthetic rubber.

5.12 Explain the composition, properties and uses of following synthetic rubbers.

- a. Styrene Butadiene rubber
- b. Polybutadiene rubber
- c. Nitrile rubber
- d. Resin rubber

5.13 Explain following properties required for good sole materials.

- a. Grain crack resistance
- b. Lightness
- c. Flexibility
- d. Air & water vapour permeability
- e. Uniformity
- f. Durability
- g. Non slip

5.14 Distinguish thermoplastics, thermosetting plastics.

5.15 Give examples for thermoplastics, thermosetting plastics.

5.16 Distinguish following synthetic soling materials.

- a. P.V.C
- b. Ethylene Vinyl Acetate
- c. Nylon
- d. Polyurethane
- e. Thermoplastic rubber

5.17 Explain the properties of above synthetic soling materials.

6

6.1 Explain properties required for insoles.

6.2 List different materials that can be used as insoles.

6.3 Classify insoles based on material.

6.4 Define bottom filling agent.

6.5 Name different bottom filling agents like

- a. Sawdust
- b. Leather scraps
- c. Felt
- d. Sponge rubber

6.6 State the properties required for bottom filling agents.

6.7 Explain the characteristics of following bottom filling agents.

- a. Sawdust
- b. Leather scraps
- c. Felt
- d. Sponge rubber

6.8 List different types of wood species.

6.9 Name different types of wood used in soles, clog sandals, heels, shoe lasts.

6.10 Explain the objective of toe puff and stiffeners used in footwear.

6.11 List different materials used as toe puffs.

6.12 List the different materials used as stiffeners.

- 6.13 Classify heel based on shape.
- 6.14 Explain different materials to be used as heels in footwear manufacturing.
- 6.15 Name the material that can be used in stiletto heel.
- 6.16 List different shank materials.
- 6.17 Explain the properties required for the shank material.
- 6.18 List different midsole materials.

Suggested Student Activities

1. Collect different types of shoe upper materials.
2. Collect various insole, soling materials used in footwear fabrication.
3. Prepare characteristics of different leathers chart.
4. Collect different types of leathers used for making of shoe uppers.
5. Collect different types of grinders used in footwear upper fabrication.
6. Surprise test.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATION (C-26)
I YEAR
MID-I EXAM
LG-105 MATERIAL TECHNOLOGY FOR LEATHER GOODS AND FOOTWEAR
MODEL QUESTION PAPER

Duration: 1 hour

Max. Marks: 20m

PART-A

Instructions: 1. Answer **ALL** questions.

2. Each question carries **ONE** mark. 4x1= 4 marks

1. List different sources of leather.
2. Draw the neat sketch of the skin and identify stretch and tightness directions.
3. Give examples for coated fabrics.
4. Name different materials that can be used as toe puffs in footwear manufacturing

PART-B

Instructions: 1. Answer **ALL** questions.

2. Each question carries **THREE** marks. 2x 3=6marks

- 5 (a) Distinguish suede and nubuck leathers.
(OR)
(b) Explain the difference between split leather and corrected grain leather.
- 6 (a) Explain non-woven fabrics with suitable examples.
(OR)
(b) State and explain different synthetic fibers.

PART-C

Instructions: 1. Answer **ALL** questions.

2. Each question carries **FIVE** marks. 2x5=10marks

7. a) Explain the suitability of different type of leathers for different type of footwear.
(OR)
b) Suggest the best suitable material for making shoe upper and justify your answer.
8. a) Compare leathers and synthetics with respect to shoe making characteristics.
(OR)
b) What are woven fabrics and explain their application in footwear.

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DIPLOMA EXAMINATION (C-26)
I YEAR
MID-II EXAM
LG-105 MATERIAL TECHNOLOGY FOR LEATHER GOODS AND FOOTWEAR
MODEL QUESTION PAPER

Duration: 1 hour Max. Marks: 20m

PART-A

Instructions: 1. Answer **ALL** questions.
2. Each question carries **ONE** mark. 4x1= 4 marks

1. Explain why we have to condition the upper before upper finishing.
2. Explain why we have to fill the upper during upper finishing.
3. What are studs?
4. Explain 'D' rings and 'O' rings.

PART-B

Instructions: 1. Answer **ALL** questions.
2. Each question carries **THREE** marks. 2x 3=6marks

- 5 (a) Explain different type of cleaners used in footwear upper cleaning.
(OR)
(b) What are wax crayons?
- 6 (a) Explain different type of locks used in leather goods and footwear manufacturing.
(OR)
(b) Explain different type of rivets used in leather goods and footwear manufacturing.

PART-C

Instructions: 1. Answer **ALL** questions.
2. Each question carries **FIVE** marks. 2x5=10marks

- 7 a) Explain how you will make shoe attractive by shoe dressings.
(OR)
b) Explain different type of waxes.
- 8 a) Explain different things you will do to make your shoe more attractive.
(OR)
b) Suggest different type of tacks to be used in different footwear making operations.

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DIPLOMA EXAMINATION (C-26)
I YEAR
END EXAM
LG-105 MATERIAL TECHNOLOGY FOR LEATHER GOODS AND FOOTWEAR
Model Question paper

Duration: 2 hours

Max. Marks: 40m

PART-A

Instructions: 1. Answer **ALL** questions. $08 \times 01 = 08$
2. Each question carries **ONE** mark.

1. Name different sources of leather.
2. List different type of tacks used in footwear fabrication.
3. List various temporary adhesives used in leather products fabrication.
4. Explain the difference between suede and nubuck leather.
5. What are thermoplastics? Give examples.
6. Name different materials that can be used as heels.
7. Distinguish fibre, yarn, thread.
8. What is yarn count?

PART-B

Instructions: 1. Answer **ALL** questions.
2. Each question carries **THREE** marks.

4X3=12

9. (a) Explain woven fabrics with suitable examples.
(OR)
(b) Explain the properties required for insole material.
10. a) What are shoe dressings?
(OR)
(b) Explain the classification of natural threads.
11. (a) Explain different materials that can be used as bottom fillers in footwear manufacturing.
(OR)
(b) Explain different materials that can be used as insoles in footwear manufacturing.
12. a) List the properties required for an adhesive to be used in footwear manufacturing.
(OR)
(b) What is shelf life and pot life of an adhesive?

PART-C

Instructions: 1. Answer **ALL** questions.

2. Each question carries **FIVE** marks. 4X5 = 20 Marks

13a) Suggest the sole materials for following type of footwear by explaining the reasons.

- a. Sports shoe with spikes
- b. Platform shoes
- c. Lightweight dress shoe.

(OR)

b) Explain the suitability of different type of leathers for different type of footwear.

14 a) Explain the composition of polychloroprene adhesive and its applications in footwear industry.

(OR)

(b) Explain different things you will do to make your shoe more attractive.

15(a) Explain the composition of polychloroprene adhesive and its applications in footwear industry.

(OR)

(b) Explain different uses of different type of woods in footwear manufacturing with suitable examples.

16(a) Explain different applications of PU adhesive in footwear industry.

(OR)

(b) What is hot melt adhesive? And explain its applications in footwear