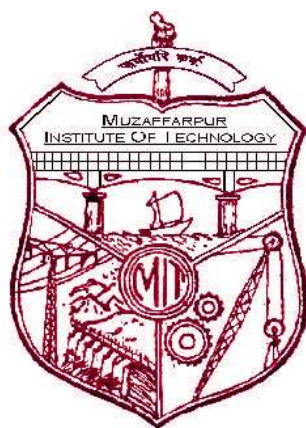
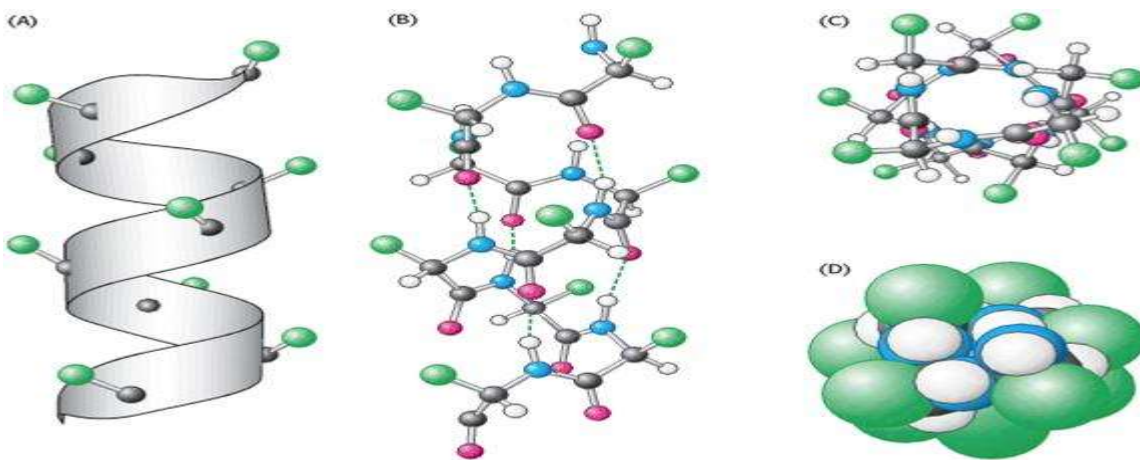


# MIT MUZAFFARPUR



## COURSE FILE OF Biochemistry of Protein (071403)



**Faculty Name:**

**ARATI KUMARI**

**ASSISTANT PROFESSOR, DEPARTMENT OF LEATHER**

**TECHNOLOGY**



विज्ञान एवं प्रावैधिकी विभाग  
Department of Science and Technology  
Government of Bihar

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### **VISION STATEMENT**

- To emerge as a national leader in graduate level studies in all sub areas of leather field and to make significant contribution to the development of the society, industry, nation and the world.

### **MISSION STATEMENT**

- Educate leather technology students to produce quality engineers who serve leading firms and different sectors of the industry and can work in multi-disciplinary environment to anticipate and address evolving challenges of the 21<sup>st</sup> century in tanning and footwear industry.
- Impart high performance knowledge in leather and footwear sector that are economic and environment friendly.
- To establish national leadership and provide technological support to the Indian leather industry.
- Improve fundamental knowledge of inter relationship between the built environment and natural systems.

### **PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):**

After successful completion of program, graduates will be able to

**PEO1:** Work in the Leather and chemical and footwear field.

**PEO2:** Pursue higher studies.

**PEO3:** Contribute in teaching, research and other developmental activities of Leather technology and its allied fields.

**PEO4:** Work in the multicultural and multidisciplinary groups for the sustainable development and growth of leather industry projects and profession.

### **PROGRAMME OUTCOMES (PO):**

Students who complete the B.E. degree in leather technology will be able to:

1. An ability to apply knowledge of mathematics, science, and engineering,
2. The ability to conduct laboratory experiments and to critically analyze and interpret experimental data.
3. The ability to perform design in leather by means of design experiences integrated throughout the professional component of the curriculum.
4. An ability to function on teams, that must integrate contributions from different areas of leather technology towards the solution of multi-disciplinary projects.
5. An ability to identify, formulate, and solve leather industry's problems.
6. An understanding of professional practice issues in leather technology including professional and ethical responsibility.
7. An ability to write and speak effectively.
8. The broad education necessary to understand the impact of leather fields solutions in a global and societal context.
9. A recognition of the need for, and an ability to engage in life-long learning,
10. An ability to use the techniques, skills, and modern tools necessary for leather technology practices.
11. Possess a thorough understanding of techniques that are appropriate to environment and country.
12. Possess ability to estimate costs, estimate quantities and evaluate materials for leather manufacturing.

### **COURSE OBJECTIVE AND COURSE OUTCOMES:**

|                                   |                                     |
|-----------------------------------|-------------------------------------|
| <b>Institute / College Name :</b> | MUZAFFARPUR INSTITUTE OF TECHNOLOGY |
| <b>Program Name</b>               | <b>B. Tech.Leather Technology</b>   |

|   |                                |                       |   |
|---|--------------------------------|-----------------------|---|
| <b>COURSE CODE</b>                                | 071403                         |                       |   |
| <b>COURSE NAME</b>                                | <b>Biochemistry of protein</b> |                       |   |
| <b>Lecture / Tutorial / Practical (per week):</b> | 3 – 0- 0                       | <b>Course Credits</b> | 3 |
| <b>Course Coordinator Name</b>                    | ARATI KUMARI                   |                       |   |

### Course Objective:

The objective of this course is to have a clear concept of grain structure of commercially viable hides/skins. The main aim is to have a clear understanding of biochemistry of collagen (leather making) such as qualitative and quantitative determination of aminoacids with their structure and sequence, solubility, three - dimensional structure, biosynthesis etc and also to have a knowledge of other proteins like keratin, reticulin, albumin etc.

### Course Outcomes (CO):

**CO1:** Became able to identify the grain structure of commercial hides/skins viz. cow, buffalo, goat, sheep etc. which plays a very important role in tannery, footwear industry, marketing of leather chemicals and other leather trades.

**CO2:** Students will become able to know the logic behind the receipt of chemicals used for different operations of tannery.

**CO3:** Students will become able to apply their knowledge and logic while working in various research organization (such as CLRI) and presenting their papers in different journals (such as JILTA) etc.

**CO4:** Students will become able to apply their knowledge and logic while working on today's burning topic of "Green Technology" such as Eco-friendly tanning etc.

### MAPPING OF COs AND POs

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1   |     |     |     |     |     | ✓   | ✓   |     | ✓   | ✓    |      |      |
| CO2   | ✓   | ✓   |     | ✓   | ✓   |     |     | ✓   |     | ✓    |      | ✓    |
| CO3   | ✓   | ✓   | ✓   | ✓   | ✓   |     | ✓   |     | ✓   | ✓    |      | ✓    |
| CO4   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    |

Correlation level:      1- slight (Low)                      2- moderate (Medium)                      3-substantial (High)

**COURSE SYLLABUS:**

| <b>Topic No.</b> | <b>Topic</b>  | <b>No. of Lecture</b> | <b>Weightage (%)</b> |
|------------------|---|-----------------------|----------------------|
| <b>I</b>         | <b>Fundamentals of Biochemistry</b>   | <b>8</b>              |                      |
| <b>1.</b>        | The molecular logic of life, strong and weak interactions   | 5                     | <b>5</b>             |
|                  | Introductory concept of cell, bio-molecules and water   |                       |                      |
| <b>2.</b>        | Histology and fibre packing in commercially viable hides/skins  | 3                     | <b>25</b>            |
|                  |   |                       |                      |
| <b>II</b>        | <b>Amino acids, peptides and proteins</b>   | <b>35</b>             |                      |
| 1.               | Chemistry, classification, determination of amino acids, Qualitative and Quantitative determination, structure of various amino acids             | 8                     | <b>15</b>            |
|                  | Formation of peptides, polypeptides and separation of proteins, covalent structure of proteins, Reaction of proteins with acids, bases and salts. |                       |                      |
| 2.               | Polarity of amino acids and ionization of proteins, electrophoresis, hydration, solubility of proteins, dielectric properties                     | 12                    | <b>30</b>            |

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|  |   |  |  |
|--|---|--|--|
|  | Intermolecular forces of proteins cross linking in collagen, Isoelectric point of |  |  |
|--|---|--|--|

|           |   |           |           |
|-----------|---|-----------|-----------|
|           | collagen and its manipulation in various stages of leather manufacture, Acid and base binding capacity of collagen, reversible and irreversible acid and base binding capacity of collagen  |           |           |
|           | Effects of anions, swelling (osmotic and lyotropic) and phase transition in collagen, helix-coil transition, denaturation and melting of collagen, Glass transition of collagen, shrinkage denaturation and optical birefringence of collagen |           |           |
| <b>3.</b> | Structure, function and chemical features of collagen reactive groups and cross linking   | 9         | <b>20</b> |
|           | Tropo- collagen molecules, sub-units of collagen, types of collagen, structure and function   |           |           |
|           | Fibril formation, precipitated forms of collagen, Electron microscopy of the collagen fibre, Bio-synthesis  |           |           |
| <b>4.</b> | Structure and functional role of other skin proteins like keratin, reticulin and elastin, albumin, globulin and mucins etc.   | 6         | <b>5</b>  |
|           | <b>Total Number of Lectures</b>   | <b>43</b> |           |

**MUZAFFARPUR INSTITUTE OF TECHNOLOGY**  
**B.Tech. 4<sup>th</sup> Semester (2016 Batch) PROVISIONAL TIME TABLE WITH EFFECT**  
**FROM 12.02.2018**

| 4 <sup>th</sup> SEMESTER Leather technology                                 |                  |                  |                  |                  | ROOM NO. LB-1                                  |               |                |                |
|---|------------------|------------------|------------------|------------------|--|---------------|----------------|----------------|
|   | 10:00 -<br>10:50 | 10:50 -<br>11:40 | 11:40 -<br>12:30 | 12:30 – 1:<br>20 | 1:20<br>–<br>1:50                              | 1:50-<br>2:40 | 2:40 -<br>3:30 | 3:30 –<br>4:20 |
| <b>MON</b>  |                  |                  |                  |                  | R<br><br>E<br><br>C<br><br>E<br><br>S<br><br>S |               |                |                |
| <b>TUES</b>   |                  |                  |                  |                  |  |               | BCOP(AK)       |                |
| <b>WED</b>  |                  | BCOP(AK)         |                  |                  |  |               |                |                |
| <b>THUR</b>   |                  |                  |                  |                  |  |               |                |                |
| <b>FRI</b>  |                  |                  |                  |                  |  |               | BCOP(AK)       |                |
| <b>SAT</b>  |                  |                  |                  |                  |  |               |                |                |
| FACULTY NAME: AK: ARATI KUMARI<br>PAPER NAME: BCOP: BIOCHEMISTRY OF PROTEIN |                  |                  |                  |                  |  |               |                |                |



**STUDENTS LIST:**

| <b>Sl. No.</b> | <b>College Roll No.</b> | <b>AKU Reg. No.</b> | <b>Name</b>      |
|----------------|-------------------------|---------------------|------------------|
| 1              | 16LT08                  | 16107107001         | ARCHANA KUMARI   |
| 2              | 16LT20                  | 16107107003         | RAVINDRA RAM     |
| 3              | 16LT15                  | 16107107004         | SURBHI SAURAV    |
| 4              | 16LT11                  | 16107107005         | AMAN SHRIVASTAVA |
| 5              | 16LT05                  | 16107107007         | VIKASH KUMAR     |
| 6              | 16LT19                  | 16107107008         | DEEPSHI          |
| 7              | 16LT16                  | 16107107009         | RAKESH KUMAR SAH |
| 8              | 16LT14                  | 16107107010         | RAKESH KUMAR     |
| 9              | 16LT17                  | 16107107011         | KRITIKA VAGMI    |

**Text Books:****TB1:** Physical Chemistry of Leather Making by K. Bienkiewicz**TB2:** Chemistry of tanning process by K. H. Gustavasan**COURSE PLAN**

| <b>Topic No.</b> | <b>Topic</b>  | <b>No. of Lecture/<br/>lecture no.</b> | <b>Text<br/>book</b>     |
|------------------|---|--|--------------------------|
| <b>I</b>         | <b>Fundamentals of Biochemistry</b>                       | <b>8</b>                               | <b>TB1 &amp;<br/>TB2</b> |
| <b>1.</b>        | The molecular logic of life, strong and weak interactions | 1-2                                    |                          |

|           |   |           |                      |
|-----------|---|-----------|----------------------|
|           | Introductory concept of cell, bio-molecules and water   | 3-5       |                      |
| 2.        | Histology and fibre packing in commercially viable hides/skins  | 6-8       |                      |
|           |   |           |                      |
| <b>II</b> | <b>Amino acids, peptides and proteins</b>   | <b>35</b> | <b>TB1 &amp; TB2</b> |
| 1.        | Chemistry, classification, determination of amino acids, Qualitative and Quantitative determination, structure of various amino acids             | 9-12      |                      |
|           | Formation of peptides, polypeptides and separation of proteins, covalent structure of proteins, Reaction of proteins with acids, bases and salts. | 13-16     |                      |
| 2.        | Polarity of amino acids and ionization of proteins, electrophoresis, hydration, solubility of proteins, dielectric properties                     | 17-19     |                      |

|    |  |       |  |
|----|--|-------|--|
|    | Intermolecular forces of proteins cross linking in collagen, Isoelectric point of collagen and its manipulation in various stages of leather manufacture, Acid and base binding capacity of collagen, reversible and irreversible acid and base binding capacity of collagen | 20-24 |  |
|    | Effects of anions, swelling (osmotic and lyotropic) and phase transition in collagen, helix-coil transition, denaturation and melting of collagen, Glass transition of collagen, shrinkage denaturation and optical birefringence of collagen                                | 25-28 |  |
| 3. | Structure, function and chemical features of collagen reactive groups and cross linking  | 29-31 |  |
|    | Tropo- collagen molecules, sub-units of collagen, types of collagen, structure and function  | 32-34 |  |
|    | Fibril formation, precipitated forms of collagen, Electron microscopy of the collagen fibre, Bio-synthesis   | 35-37 |  |

|    |   |           |  |
|----|---|-----------|--|
| 4. | Structure and functional role of other skin proteins like keratin, reticulin and elastin, albumin, globulin and mucins etc. | 38-43     |  |
|    | <b>Total Number of Lectures</b>   | <b>43</b> |  |

**DETAIL OF ASSIGNMENTS:**

| <b>S.No.</b> | <b>Assignment</b> | <b>Topic No.</b> |
|--------------|-------------------|------------------|
| 1            | Assignment 1      | 1,               |
| 2            | Assignment 2      | 2                |
| 3            | Assignment 3      | 2                |
| 4            | Assignment 4      | 2                |

**Biochemistry of Protein (071403)**

**Assignment -1**

- Q.1 Define biomolecules.
- Q.2 Detail the grain structure of cow, buffalo, goat and sheep.

**Biochemistry of Protein (071403)**

**Assignment - 2**

- Q.1 What do you mean by hydrolysis of protein?
- Q.2 Mention the classification of aminoacids.

**Biochemistry of Protein (071403)**

**Assignment -3**

- Q. 1 Define polypeptides.
- Q. 2 Discuss briefly the three- dimensional structure of collagen.

## **Biochemistry of Protein (071403)**

### **Assignment -4**

- Q.1 What are the crosslinking present in collagen?
- Q.2 Write about the hydration and solubility of proteins.

**B.Tech. VI sem. Leather Technology**  
**Mid Semester Examination-2018**

Subject: Biochemistry of Protein

Code: LT-071403

**Max. marks:20**

**Time :2Hours**

**Note:** Attempt any **four** questions. All questions have equal marks. Assume any missing data.

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**Q1.** Discuss the grain structure of live stock population viz. cow, buffalo, goat and sheep.

**Q2.** Define protein. Detail the reactions of protein with acids, bases and salts.

**Q3.** What do you mean by amino acid residue? Mention the classification of amino acid with their structures.

**Q4.** Write about the three dimensional structure of collagen.

**Q5.** Describe the cross linkages present in collagen which gives them stability.

**Q6.** Write short notes on any three:

(a) Gelatin                      (b) Iso-electric point of collagen

(c) Sequence of amino acids in collagen

d) Electron microscopy of collagen structure

e) Keratin                      f) Reticulin

Question bank:

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Code : 071301

**B.Tech (Leather Technology)**  
**3rd Semester Exam., 2017**

THEORY AND PRACTICES OF  
PRESERVATION AND PRETANNING  
PROCESSES

Time : 3 hours

Full Marks : 70

Instructions :

- (i) The marks are indicated in the right-hand margin.
- (ii) There are **NINE** questions in this paper.
- (iii) Attempt **FIVE** questions in all.
- (iv) Question No. 1 is compulsory.

1. Write in short on any seven of the following :

2×7=14

- (a) Wetting
- (b) Khari salt
- (c) Freeze drying
- (d) Wetting agents
- (e) Soaking
- (f) Curing
- (g) Drenching
- (h) Depickling
- (i) Deliming

8AK/37

( Turn Over )

2. What is liming? What are its objectives? What is pelt and lime blast? Explain the chemistry of unhairing. 14
3. Explain the principles and controls of deliming. 14
4. What are enzymes? Discuss the chemistry of proteolytic enzymes. 14
5. What is bating? Write about its control and necessity for desired properties. 14
6. What is pickling? What is its requirement? 14
7. Write down the objectives and necessity of degreasing, different degreasing systems and methods. 14
8. Discuss cleaner processing techniques in beamhouse operations. 14
9. Write a note on different preservation techniques for hides and skins. 14

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