Examination Period 3: 2018/19

**LEA300119N**

<table>
<thead>
<tr>
<th>Module Title</th>
<th>Leather Technology 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td>Six</td>
</tr>
<tr>
<td>Time Allowed</td>
<td>Two hours</td>
</tr>
</tbody>
</table>

Instructions to students:

- Enter your student number **not** your name on all answer books.
- Answer **four** out of **five** questions.
- Begin each question in a separate answer book; label each answer book clearly with the number of the question you are answering.
- The use of a calculator **is** permitted.

<table>
<thead>
<tr>
<th>No. of Pages</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Questions</td>
<td>5</td>
</tr>
</tbody>
</table>
Question 1 - Operational management

a. Explain “Pareto Analysis” with an example? (3 marks)

b. With the help of a diagram illustrate various manufacturing process types indicating the relation between volume of production and complexity/variety of the tasks as well as process flow. (8 marks)

c. Most of the manufacturing environment falls under one of the manufacturing process types that you have illustrated in question 1 b. Most of the companies usually use one or more of these processes. Explain any two of these manufacturing process types that may be applicable to leather manufacture. (10 marks)

d. What input do you need for a manufacturing process in order to produce a product? (3 marks)

e. What does JIT stand for in a manufacturing environment? (1 mark)

Total: 25 marks

Question 2 - Cleaner leather manufacture

Many tanneries have to meet stringent consent limits for water usage and effluent discharge. Select five from the following list:

i. pH
ii. Salinity
iii. TDS (total dissolved solids)
iv. SS (suspended solids)
v. BOD (biological oxidation demand)
vi. COD (chemical oxidation demand)
vii. Nitrogen (nitrites and nitrates)
viii. Ammonium salts
ix. Sulfur (sulfites and sulfates)
x. Chromium

Discuss each of the selected five with regard to processing techniques (including sources and best available technologies) and any effluent treatments that may be employed to meet them. (25 marks)
Question 3 - Beamhouse and tanning

a. What is the primary role of beamhouse? (1 mark)

b. How may aldehydes are used in garment leather processing and which properties will they improve? (3 marks)

c. Using a green weight of 1000kg, calculate the amount of BCS, basic chromium sulfate powder (33% basicity and 26% Cr₂O₃) needed to obtain a wet-blue with 3% Cr₂O₃ content (dry weight).
   Assume 75% efficiency.
   You must include all stages of the calculation. (6 marks)

d. Give three examples of how the efficiency of chromium tanning can be improved. (3 marks)

e. Compare pit and drum tanning system for vegetable tannages. (12 marks)

Total: 25 marks

Question 4 - Post-tanning

a. Explain the fundamental purpose of retanning (not dying or fatliquoring). (3 marks)

b. The post-tanning processes have to be adjusted based on the raw materials including the tanning types and end use specification. Discuss the influence of substrate (tanning types) on dyeing and fatliquoring. Your answer must contain the substrate characteristics and their interaction mechanisms with dyes/fatliquors. (15 marks)

c. Explain what specific factors a tanner needs to consider while drying a waterproof leather. Include the issues and how a tanner may overcome those issues. (7 marks)

Total: 25 marks
Question 5 - Finger-printing

a. It is important for a tanner to produce leathers according to specification. Explain what is specification.  
   (2 marks)

b. What may an ideal specification contain?  
   (5 marks)

c. Using the template overleaf compile a simple specification that could be used commercially between your tannery (that produces automotive) and a leather buyer from a leading manufacturer. You should choose the most important tests for each section.  
   (18 marks)

Total: 25 marks

Template follows overleaf
# Template

## Automotive Leather – Pigmented

### Leather Benchmarking / Fingerprinting:

<table>
<thead>
<tr>
<th>Test Title</th>
<th>Suggested requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Performance Tests:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Restricted Substances:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

End of Paper