Module Title: Landfill Processes
Level: Five
Time Allowed: Two hours

Instructions to students:
- Enter your student number **not** your name on all answer books.
- Answer **all** questions from Section A and **two** questions from Section B.
- Section A carries 50% of the overall marks.
  Section B carries 50% of the overall marks.
- Neither books nor notes may be taken into the examination.
- The same material should not constitute a substantial part of more than one question.

<table>
<thead>
<tr>
<th>No. of Pages</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Questions</td>
<td>13</td>
</tr>
</tbody>
</table>
Section A

Answer all questions.

Question 1

Explain what aspects of leachate should be monitored and why. (8 marks)

Question 2

Differentiate between the minimum standards for liners and for the three types of landfill. (6 marks)

Question 3

Give three alternative materials that can be used for daily cover, for each one give one advantage and one disadvantage. (6 marks)

Question 4

What are the upper and lower explosive limits for methane. (2 marks)

Question 5

Sketch the effects that moisture can have on gas production in landfill sites. (6 marks)

Question 6

Outline three advantages of operating phasing on a landfill site. (6 marks)

Question 7

Define completion. (6 marks)
Question 8
Outline three factors that must be taken into account when considering completion. (6 marks)

Question 9
List four waste types banned from landfill by the Landfill Directive. (4 marks)

End of Section A
Section B follows overleaf
Section B

Answer two questions.

Question 10

Microorganisms responsible for the degradation of waste in a landfill site gain all their nutrients from the waste. Describe how different waste types degrade in a landfill and critically assess how changing water streams and types may influence microbial nutrition.

(25 marks)

Question 11

a. Describe the effects that untreated leachate would have if discharged to surface water.

(10 marks)

b. Describe three methods of leachate treatment describing the scientific principles by which they work, commenting on their applicability.

(15 marks)

Total: 25 marks

Question 12

The process of landfilling can have negative impacts on the environment. Outline the impacts and critically assess the environmental protection measures used at modern UK landfill sites.

(25 marks)
Question 13

Changes in composition of landfill gas

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<thead>
<tr>
<th>Stage</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>Level</td>
<td>Landfill gas composition: maximum value</td>
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a. Identify the gasses shown A→E, and the phases I→V. 

(10 marks)

b. Describe the processes that accompany these phases in the production of landfill gas.

(15 marks)

Total: 25 marks

End of Section B
End of Paper