

The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Agricultural & Plantation Engineering



0011

Study Programme	:	Bachelor of Science Honors in Engineering (Agricultural Engineering) Programme
Name of the Examination	:	Final Examination
Course Code and Title	:	AGX5308 Soil Management and Tillage Traction
Academic Year	:	2024/25
Date	:	~~14~~ th February 2026
Time	:	9 30-12 30h
Duration	:	3 hours

Index number

General instructions

1. Read all instructions carefully before answering the questions.
2. Answers should be in clear handwriting.
3. Do not use red colour pen.
4. This question paper consists of two (02) sections.

Section 1

- Consists of 15 questions in ~~31~~ **(06)** pages.
- Answer all questions.
- All questions carry equal marks.
- Write answers only in the space provided.
- Please do not remove the question paper from the examination hall.
- You may spend **one (01)** hour to answer this section.

Section 11

- Contain **six (06)** questions in **two (02)** pages.
 - Answer any **four (04)** questions.
 - You may spend **two (02)** hours to answer this section.
 - All questions carry equal marks.
 - Answer for each question should commence from a new page.
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SECTION 1

1. Draw a clearly labelled diagram of a typical soil profile showing the major horizons.

2. What are the main types of soil structures?

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3. Define the following Atterberg limits relevant to soil consistency.

Liquid limit

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Plastic limit

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4. Briefly explain the relationship between soil consistency and soil moisture content.

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5. Define the following terms.

Field Capacity of the soil

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Permanent Wilting Point

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6. Briefly describe the importance of soil biological properties on plant growth

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7. Define Cone Index (CI)

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8. State **two (2)** reasons why CI in question 7, is important in evaluating soil conditions for agricultural machinery

i.....

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ii.....

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9. What is meant by Clod strength of the soil?

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10. What is the difference between Bulk strength and Cols strength?

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11. State **three (3)** tillage practices that can improve soil aeration

- i.....
- ii.....
- iii.....

12. List **five (5)** benefits of Terrace Farming.

- i.....
- ii.....
- iii.....
- iv.....
- v.....

13. List **five (5)** benefits of conventional tillage

- i.
- ii.
- iii.
- iv.

V.

14. What is the importance of disc angles in Disc Plough during the tillage process

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15. Give your opinion on using Seeders /Transplanters in Upland Farming Sri Lanka.

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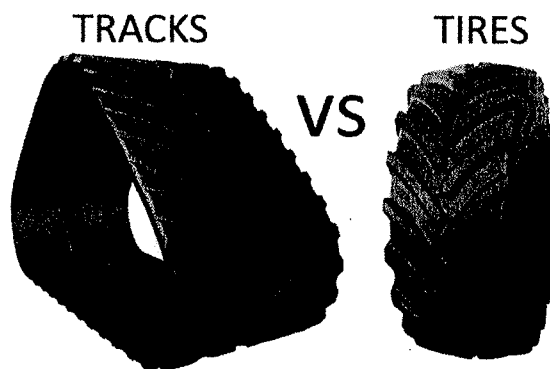
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SECTION 2: Answer any four (04) questions.

1. Discuss how soil characteristics influence tillage operations and land management practices.
(25 marks)

2. Compare tracked vehicles and rubber-tired vehicles in terms of:
 - Contact area
 - Ground pressure
 - Traction efficiency
 - Suitability for different soil conditions

Use appropriate equations and diagrams to support your answer
(25 marks)



3. Discuss the differences between upland farming and lowland farming with respect to soil types and suitability for agricultural machinery.
(25 marks)
4. **"Bulk density is a key indicator of soil compaction and land management quality."**
- a) Define soil bulk density and explain its importance in relation to tillage operations and root development.
(10 marks)
 - b) Briefly explain the core sampling method used to determine soil bulk density in the field.
(5 marks)
 - c) A soil core sample with a diameter of 5.0 cm and a height of 5.1 cm has an oven-dry mass of 480 g.
 - i. Calculate the bulk density of the soil.
 - ii. Interpret the result with respect to soil compaction and suitability for tillage.
(10 marks)
5. Explain the concept of weight transfer in tractors, describing how the tractor's weight is shifted between the front and rear axles. (Use appropriate diagrams and equations)
(25 marks)
6. Write short notes on following **three (3)** topics.
(25 marks)
- i) Methods of soil moisture conservation
 - ii) Measurements of Soil Compaction
 - iii) Formation of saline soil
 - iv) Land Reclamation
 - v) Land Classification