

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
ЦЕНТРАЛЬНОУКРАЇНСЬКИЙ НАЦІОНАЛЬНИЙ ТЕХНІЧНИЙ
УНІВЕРСИТЕТ

КАФЕДРА МІЖНАРОДНИХ ЕКОНОМІЧНИХ ВІДНОСИН
ТА ІНОЗЕМНИХ МОВ

Навчальний посібник
**«English for Professional Communication in Machine Building»
(Agricultural Machinery)**

до вивчення дисципліни
«Іноземна мова фахового спілкування»
для здобувачів першого (бакалаврського) рівня вищої освіти
за спеціальністю G11 «Машинобудування»,
спеціалізація G11.03 «Технологічні машини та обладнання»

Навчальний посібник «English for Professional Communication in Machine Building (Agricultural Machinery)» до вивчення дисципліни «Іноземна мова фахового спілкування» для здобувачів першого (бакалаврського) рівня вищої освіти (4-й курс) за спеціальністю G11 «Машинобудування», спеціалізація G11.03 «Технологічні машини та обладнання». / Укладач: к.пед.н., доц. Головка І.О. — Кропивницький : ЦНТУ, 2026. — 108 с.

Рекомендовано Вченою радою Центральноукраїнського національного технічного університету як навчальний посібник для здобувачів першого (бакалаврського) рівня вищої освіти спеціальності G11 «Машинобудування».

(Протокол №_1_ від 28.09.2026 р.)

Рецензенти: Миценко В.І., д.е.н., доцент

Соколовська О.М., к.філол.н., доцент

Гавриленко О.М., к.пед.н., доцент.

ВСТУП

Пояснювальна записка

1. Призначення навчального посібника

Навчальний посібник «**English for Professional Communication in Machine Building (Agricultural Machinery)**» призначений для здобувачів першого (бакалаврського) рівня вищої освіти спеціальності **G11 «Машинобудування»**, спеціалізації **G11.03 «Технологічні машини та обладнання»**, які вивчають дисципліну «**Іноземна мова фахового спілкування**».

Посібник спрямований на формування та розвиток **іншомовної професійно-комунікативної компетентності** майбутніх фахівців машинобудівної галузі та передбачає поєднання мовної підготовки з фаховим змістом. Основна увага приділяється не лише засвоєнню спеціальної лексики, а передусім її **функціональному використанню в типових професійних та фахових ситуаціях**: під час опису технічних об'єктів і процесів, пояснення принципів роботи обладнання, порівняння технічних рішень, аналізу проблем, вибору обладнання, надання рекомендацій та обґрунтування професійних рішень.

Таким чином, іноземна мова розглядається не як ізольований навчальний предмет, а як **інструмент професійної діяльності та комунікації майбутнього інженера**.

2. Мета навчального посібника

Метою навчального посібника є створення системи навчально-методичної підтримки для формування здатності здобувачів використовувати англійську мову в професійному середовищі.

Для досягнення цієї мети посібник забезпечує поступовий перехід від:

фахової лексики → розуміння інформації → мовної практики → професійного спілкування → самостійного продукування висловлювання.

На рівні професійної діяльності ця послідовність реалізується як:

IDENTIFY → DESCRIBE → EXPLAIN → COMPARE → ANALYZE → RECOMMEND → JUSTIFY → DECIDE.

Отже, кінцевим результатом навчання є не механічне відтворення термінів чи мовних конструкцій, а здатність використовувати англійську мову для виконання професійно значущих комунікативних дій.

3. Методологічна основа посібника

Методична концепція посібника ґрунтується на поєднанні комунікативного, компетентнісного, професійно орієнтованого, діяльнісного та практико-орієнтованого підходів.

3.1. Комунікативний підхід передбачає використання англійської мови як засобу професійної взаємодії.

Навчання організовано таким чином, щоб здобувач не лише знав термін, а міг:

- зрозуміти його значення;
- використати його в контексті;
- описати технічний об'єкт або процес;
- поставити професійне запитання;
- пояснити технічну характеристику;
- обговорити можливі рішення;
- надати рекомендацію;
- аргументувати власний вибір.

Методична послідовність може бути представлена як:

TERM → MEANING → FUNCTION → CONTEXT → COMMUNICATION.

3.2. Компетентнісний підхід орієнтує навчальний процес на формування здатності застосовувати знання в практичній професійній діяльності. У межах посібника це реалізується через послідовність:

KNOW → UNDERSTAND → USE → COMMUNICATE → PRODUCE.

Здобувач поступово переходить від засвоєння професійної лексики за фахом до її використання у висловлюваннях, діалогах, рольових ситуаціях, презентаціях, резюме та технічних звітах.

3.3. Професійно орієнтований підхід ґрунтується на змісті тем, безпосередньо пов'язаних із професійною сферою майбутніх фахівців спеціальності G11.03 «Технологічні машини та обладнання».

3.4. Діяльнісний та практико-орієнтований підходи включають виконання конкретних професійно значущих дій. Здобувачі не лише читають і перекладають тексти, а виконують завдання, наближені до реальної професійної комунікації. Особливе місце посідає комунікативний алгоритм:

ASK → ANALYZE → RECOMMEND → JUSTIFY → DECIDE.

Цей алгоритм послідовно використовується в професійних діалогах, рольових ситуаціях та комунікативних завданнях.

4. Методи та навчальні технології

Для реалізації визначених підходів у посібнику поєднано традиційні та сучасні методи навчання іноземної мови фахового спрямування.

Комунікативні методи передбачають моделювання професійної взаємодії та використання англійської мови для розв'язання комунікативних завдань.

Ситуаційний метод базується на навчальних ситуаціях, які відтворюють типові професійні проблеми з фаху: вибір обладнання, визначення відповідної технології, аналіз технічних характеристик, усунення проблем та планування технічного обслуговування.

Role-play / рольова гра. Здобувачі виконують ролі інженера, оператора, керівника господарства, технічного консультанта тощо та використовують англійську мову для професійної взаємодії.

Case-based learning. Передбачає аналіз конкретної професійної ситуації, визначення проблеми, розгляд можливих рішень та вибір найбільш доцільного варіанта.

Problem-based learning. Завдання будуються навколо професійної проблеми, яку здобувач має проаналізувати та вирішити за допомогою англійської мови.

Task-Based Learning. Основною одиницею навчання виступає професійно орієнтоване завдання, результатом якого є конкретний продукт: відповідь, рекомендація, діалог, презентація, summary або technical report.

Scaffolding. Передбачено поступове зняття мовної підтримки:

CONTROLLED → GUIDED → SEMI-CONTROLLED → FREE PROFESSIONAL COMMUNICATION.

Спочатку здобувач працює з моделлю та готовими мовними конструкціями, а надалі самостійно будує професійне висловлювання.

Технології порівняння та систематизації

Порівняння технічних систем, компонентів та обладнання допомагає одночасно розвивати професійне мислення й іншомовне мовлення.

Мініпроектна та презентаційна діяльність

Передбачає підготовку коротких професійних презентацій, у яких здобувач систематизує інформацію та представляє її англійською мовою.

5. Структура навчального посібника

Кожна тематична одиниця має **уніфіковану структуру**, що забезпечує логічну послідовність навчання та полегшує роботу викладача й здобувачів.

PART I. READING & LANGUAGE

Task 1. Get Ready to Read

Актуалізація професійних знань, прогнозування змісту та підготовка до роботи з текстом.

Task 2. Key Vocabulary

Опрацювання ключової професійної лексики, словосполучень та мовних моделей.

Task 3. Read the Text

Робота з професійно орієнтованим текстом відповідно до рівня B1+/B2.

Task 4. Reading Comprehension

Перевірка розуміння інформації та її професійного змісту.

PART II. PROFESSIONAL COMMUNICATION & OUTPUT

Task 5. Vocabulary in Context

Перенесення вивченої лексики з контрольованих вправ у професійний контекст.

Task 6. Professional Communication

Професійний діалог, функціональна мова, керована практика та рольова ситуація.

Task 7. Speaking Practice

Ситуаційне мовлення та коротка професійна презентація.

Task 8. Professional Writing

Підготовка summary та technical report.

Отже, внутрішня логіка кожної теми має вигляд:

UNDERSTAND → PRACTISE → COMMUNICATE → PRODUCE.

Уніфікована структура дозволяє здобувачам поступово звикати до алгоритму роботи, а викладачеві — використовувати посібник як **готовий сценарій практичного заняття**.

6. Навчальний посібник розроблено таким чином, щоб забезпечити послідовне й доступне опрацювання професійного мовного матеріалу та поступовий перехід від рецептивних до продуктивних видів мовленнєвої діяльності.

Навчальний матеріал супроводжується достатньою кількістю прикладів, мовних моделей, професійних словосполучень за фахом, зразків діалогів, типових комунікативних конструкцій та модельних відповідей, що забезпечує необхідну підтримку здобувача під час виконання завдань.

Особлива увага приділяється поступовому зменшенню мовної опори: від контрольованих лексичних і мовних вправ — до керованої професійної комунікації та самостійного усного й писемного висловлювання.

7. Орієнтація на самостійну роботу

Навчальний посібник передбачає використання навчального матеріалу як в аудиторній роботі, так і під час **самостійного опрацювання**.

Самостійна робота може охоплювати:

- засвоєння та повторення професійної лексики за фахом;
- опрацювання професійно орієнтованих текстів;
- виконання лексичних і мовних вправ;
- підготовку професійних діалогів;
- виконання ситуаційних комунікативних завдань;
- підготовку міні презентацій;
- написання summary;
- підготовку technical reports;
- повторення тематичного матеріалу та підготовку до підсумкового контролю.

Структура завдань і наявність прикладів та моделей дають можливість здобувачеві **послідовно переходити від виконання навчальних дій за зразком до самостійного використання англійської мови в професійних ситуаціях**.

8. Очікувані результати навчання

Загальні компетенції 7. Здатність спілкуватися іноземною мовою

Результати навчання 11. Вільно спілкуватися з інженерним співтовариством усно і письмово державною та іноземною мовами.

У результаті опрацювання матеріалу навчального посібника здобувач має бути здатним:

Знати

- основну фахову термінологію англійською мовою;
- ключові словосполучення та мовні моделі фахового спілкування.

Розуміти

- тексти за фахом та технічну інформацію;
- основний зміст описів машин, систем, компонентів і технологічних процесів.

Описувати

- технічні об'єкти;
- компоненти машин;
- їх функції та характеристики;
- технологічні процеси.

Пояснювати

- принципи роботи технічних систем;
- взаємозв'язки між компонентами;
- переваги та функціональні можливості обладнання.

Порівнювати

- технічні системи;
- конструктивні рішення;
- типи машин та обладнання;
- їх переваги й обмеження.

Аналізувати

- професійну проблему;
- технічні характеристики;
- умови експлуатації;
- можливі варіанти технічного рішення.

Спілкуватися

- ставити професійні запитання;
- брати участь у технічному обговоренні;

- проводити професійний діалог;
- працювати в рольових ситуаціях.

Рекомендувати та обґрунтовувати

- відповідне обладнання або технологію;
- доцільне технічне рішення;
- власний вибір із наведенням аргументів.

Створювати

- короткі професійні усні повідомлення;
- мініпрезентації;
- summary;
- technical reports.

Таким чином, очікуваний результат можна узагальнити як **здатність використовувати англійську мову для розуміння, аналізу та обговорення професійної інформації, а також для прийняття й обґрунтування технічних рішень у типових ситуаціях професійного спілкування.**

9. Організація та контроль навчальних результатів

Система завдань посібника забезпечує можливість **поточного, тематичного та підсумкового контролю.**

Поточний контроль здійснюється через виконання лексичних, мовних, комунікативних і продуктивних завдань.

Тематичний контроль може передбачати перевірку:

- професійної лексики;
- розуміння професійного тексту;
- умінь описувати та пояснювати технічні системи;
- умінь порівнювати технічні рішення;
- професійного говоріння та письма.

Підсумковий контроль має відповідати загальній логіці розвитку професійно-комунікативних умінь.

Для першого семестру пріоритетною є послідовність:

UNDERSTAND → DESCRIBE → EXPLAIN → COMPARE.

Для другого семестру:

UNDERSTAND → ANALYZE → RECOMMEND → JUSTIFY → DECIDE.

Такий розподіл забезпечує поступове ускладнення професійно-комунікативної діяльності здобувачів.

10. Концептуальна модель методичного посібника

Методичний посібник побудовано на принципі **поступового переходу від мовного матеріалу до професійної дії.** Його загальну концепцію можна представити так:

PROFESSIONAL KNOWLEDGE

↓

PROFESSIONAL VOCABULARY

↓

UNDERSTANDING

↓

DESCRIPTION & EXPLANATION

↓

COMPARISON & ANALYSIS

↓

PROFESSIONAL COMMUNICATION

↓

RECOMMENDATION & JUSTIFICATION

↓

PROFESSIONAL DECISION

Саме ця послідовність визначає добір текстів, лексики, вправ, діалогів, ситуаційних завдань, презентацій та письмових робіт.

Підсумкова концепція

Навчальний посібник орієнтований на формування **не лише мовних знань, а здатності діяти англійською мовою у професійному середовищі.**

Його методична особливість полягає в тому, що **професійна дія стає одиницею навчання:** здобувач не просто вивчає термін, а використовує його для опису, пояснення, аналізу, обговорення та обґрунтування професійного рішення.

У цьому полягає основна методична логіка посібника:

Learn English → Use English → Communicate professionally → Make decisions.

UNIT 1. CLASSIFICATION AND MAIN TYPES OF AGRICULTURAL MACHINERY

PART I. READING & LANGUAGE

Task 1. Get Ready to Read

A. Think and Discuss

Answer the questions.

1. What types of agricultural machinery do you know?
2. What machines are commonly used for soil preparation?
3. What machines are used for planting and harvesting?
4. Why is modern machinery important for agriculture?

B. Predict

Look at the title of the text: **Classification and Main Types of Agricultural Machinery.**

Before reading, predict which groups of agricultural machinery will be mentioned in the text.

Choose from the list:

- power machines
- soil tillage machinery
- seeding and planting machines
- harvesting machinery
- transport machinery
- precision farming equipment

Useful language

- I think the text will mention ...
- I expect to read about ...
- In my opinion, the main group will be ...
- The text will probably describe ...

C. Check Your Prediction

Read the text and check which of your predictions were correct.

Task 2. Key Vocabulary

A. Core Vocabulary

Study the key terms and their Ukrainian equivalents.

English term	Ukrainian equivalent
agricultural machinery	сільськогосподарська техніка
productivity	продуктивність
manual labor	ручна праця
power machine	енергетична машина
attachment	навісне обладнання
soil tillage	обробіток ґрунту
plough	плуг
harrow	борона
cultivator	культиватор
seed drill	сівалка
planter	саджалка / сівалка точного висіву

harvesting machinery	збиральна техніка
combine harvester	зернозбиральний комбайн
precision farming	точне землеробство
sensor	датчик
efficiency	ефективність
resource consumption	споживання ресурсів

B. Professional Collocations

Match the words to form common professional collocations.

A	B
1. agricultural	a. productivity
2. farm	b. machinery
3. soil	c. tillage
4. tractor	d. attachment
5. crop	e. emergence
6. resource	f. consumption
7. precision	g. farming

C. Use the Vocabulary

Complete the sentences with the correct word or phrase from the vocabulary above.

1. Modern agricultural _____ helps farmers increase productivity.
2. Tractors can operate different _____ for specific farming operations.
3. Ploughs and cultivators are used for _____.
4. A _____ places seeds into the soil at a required depth.
5. A _____ is used to collect mature grain crops.
6. Precision farming uses GPS systems and _____.
7. Modern technologies can reduce _____ and improve efficiency.

D. Think in Collocations

Complete the phrases.

1. increase _____
2. reduce _____
3. prepare the _____
4. use tractor _____
5. improve crop _____
6. reduce resource _____

Then use any **three collocations** in your own sentences.

Task 3. Read the Text

Classification and Main Types of Agricultural Machinery

Modern agriculture depends heavily on agricultural machinery. Modern machines help farmers increase productivity, reduce manual labor, and use resources more efficiently. Agricultural machinery is used for many farming operations, including soil preparation, planting, crop care, harvesting, and transportation. According to their function and purpose, agricultural machines can be divided into several main groups.

One important group is **power machines**. Tractors and power tillers are the main examples. They provide power for other machines and can operate different **attachments**. Tractors are widely used on farms because they can perform many operations with different types of equipment.

Another major group is **soil tillage machinery**. It includes ploughs, harrows, and cultivators. These machines prepare the soil for planting by loosening, mixing, and leveling it. Proper soil tillage helps create suitable conditions for seeds and supports healthy crop growth.

Seeding and planting machines are used to place seeds or planting material into the soil. Seed drills and planters are common examples. They control the depth and spacing of seeds and help ensure uniform crop emergence. Accurate seeding also helps farmers use seeds efficiently.

Harvesting machinery is used to collect mature crops. The combine harvester is one of the most important harvesting machines. It can perform several operations, such as cutting, threshing, and cleaning grain. This allows farmers to harvest large areas efficiently and reduces the need for manual labor.

Modern farms also use **precision farming equipment**. GPS-based systems, sensors, and automated control technologies help farmers work more accurately. They can improve machine performance, reduce fuel and resource consumption, and increase overall efficiency.

Thus, agricultural machinery includes different groups of machines, each designed for specific farming operations. Understanding this classification helps agricultural engineers select suitable equipment, improve farm productivity, and support more efficient and sustainable agricultural production.

Task 4. Reading Comprehension

A. True or False

Read the statements and decide whether they are **True (T)** or **False (F)** according to the text.

1. Agricultural machinery helps farmers increase productivity and reduce manual labor.
2. Tractors are mainly used for harvesting mature crops.
3. Power machines can operate different attachments.
4. Ploughs, harrows, and cultivators are used for soil tillage.
5. Seed drills and planters control the depth and spacing of seeds.
6. A combine harvester can perform several harvesting operations.
7. Precision farming equipment is used only for transportation.
8. GPS-based systems and sensors can improve the accuracy of farming operations.

B. Multiple Choice

Choose the correct answer.

1. What is the main purpose of agricultural machinery?
 - a) To replace all farm workers
 - b) To perform farming operations more efficiently
 - c) To increase the amount of manual labor
 - d) To transport only agricultural products
2. Which machines belong to the group of power machines?
 - a) Ploughs and harrows
 - b) Seed drills and planters
 - c) Tractors and power tillers
 - d) Combine harvesters and trailers

3. What is the main function of soil tillage machinery?
 - a) To collect mature crops
 - b) To prepare the soil for planting
 - c) To transport agricultural products
 - d) To monitor weather conditions
4. Why are seed drills and planters important?
 - a) They clean harvested grain.
 - b) They control seed depth and spacing.
 - c) They provide power for tractors.
 - d) They reduce the need for soil preparation.
5. What operations can a combine harvester perform?
 - a) Ploughing and seeding
 - b) Planting and spraying
 - c) Cutting, threshing, and cleaning
 - d) Loading and transportation
6. How can precision farming equipment improve agricultural operations?
 - a) By increasing manual labor
 - b) By reducing the use of machinery
 - c) By improving accuracy and reducing resource consumption
 - d) By replacing all harvesting machines

C. Answer the Questions

Answer the questions in **1–2 complete sentences**.

1. Why are tractors important in modern agricultural machinery systems?
2. What machines are commonly used for soil tillage?
3. How do seed drills and planters improve the planting process?
4. What makes a combine harvester an efficient harvesting machine?
5. How do GPS-based systems and sensors help farmers?
6. Why is it important for agricultural engineers to understand the classification of agricultural machinery?

D. Identify the Main Idea

Match each paragraph with its main idea.

Paragraph	Main idea
1	a. Precision farming technologies
2	b. General role of agricultural machinery
3	c. Harvesting machinery
4	d. Power machines
5	e. Seeding and planting machines
6	f. Importance of machinery classification
7	g. Soil tillage machinery

PART II. PROFESSIONAL COMMUNICATION & OUTPUT

Task 5. Vocabulary in Context

A. Complete the sentences with the words from the box.

productivity · attachments · soil tillage · seed drill · combine harvester · sensors · resource consumption · efficiency

1. Modern agricultural machinery helps farmers increase _____.
2. Tractors can operate different _____ for specific farming operations.
3. Ploughs, harrows, and cultivators are used for _____.
4. A _____ places seeds into the soil at a controlled depth and spacing.
5. A _____ can perform cutting, threshing, and cleaning.
6. Precision farming systems use GPS technologies and _____.
7. Modern technologies can reduce fuel use and overall _____.
8. Better machine performance can increase farm _____.

B. Match the Terms with Their Definitions

Term	Definition
1. power machine	a. equipment used to place seeds in the soil
2. attachment	b. a machine that provides power for other equipment
3. soil tillage machinery	c. equipment connected to a tractor for a specific operation
4. seed drill	d. machines used to prepare the soil
5. combine harvester	e. equipment that uses digital technologies for accurate farming
6. precision farming equipment	f. a machine used to cut, thresh, and clean crops

C. Complete the Professional Collocations

Use the words from the box to complete the collocations.

farm · machine · crop · resource · soil · tractor

1. agricultural _____
2. farm _____
3. _____ productivity
4. _____ tillage
5. _____ attachment
6. _____ consumption

D. Use the Vocabulary

Complete the sentences with your own ideas.

1. Modern agricultural machinery can help farmers _____.
2. Tractors are important because they _____.
3. Soil tillage machinery is used to _____.
4. Precision farming equipment helps farmers _____.

Then compare your answers with a partner.

Task 6. Professional Communication

A. Read and translate Sample Professional Dialogue

Topic: Selecting Agricultural Machinery for Farm Operations

Agricultural Engineer: Good morning. I'd like to discuss the agricultural machinery used on your farm.

Farm Manager: Good morning. We mainly use tractors with different attachments for field operations.

Agricultural Engineer: What equipment do you use for soil tillage?

Farm Manager: We use ploughs for primary tillage and cultivators for preparing the soil before planting.

Agricultural Engineer: What about seeding equipment?

Farm Manager: We use seed drills for accurate seed placement and uniform crop emergence.

Agricultural Engineer: Do you use any modern technologies?

Farm Manager: Yes. We use GPS-based systems and sensors to improve the accuracy of our operations.

Agricultural Engineer: How do these technologies improve farm efficiency?

Farm Manager: They help us reduce fuel and resource consumption and improve machine performance.

Agricultural Engineer: What harvesting machinery do you use?

Farm Manager: We mainly use combine harvesters. They can perform cutting, threshing, and cleaning in one operation.

Agricultural Engineer: So, modern machinery helps you improve productivity and reduce manual labor.

Farm Manager: Exactly. The right machinery is essential for efficient and sustainable farming.

B. Useful Language. Use these phrases to discuss agricultural machinery.

Asking about machinery

- What type of machinery do you use for ...?
- What equipment is used for ...?
- Which machine is most suitable for ...?
- What about ...?

Describing functions

- It is used for ...
- Its main function is to ...
- It can perform ...
- It helps farmers to ...

Explaining advantages

- It improves ...
- It helps reduce ...
- It increases ...
- It allows farmers to ...

Giving an opinion

- I think ... is the most suitable option.
- In my opinion, ...
- I would recommend ...
- The main advantage is ...

C. Guided Dialogue

Work in pairs. Complete the dialogue using the information in the table.

Operation	Machinery	Main function
soil preparation	plough / cultivator	loosen and prepare the soil
planting	seed drill / planter	place seeds at the correct depth and spacing
harvesting	combine harvester	cut, thresh, and clean crops
precision farming	GPS / sensors	improve accuracy and reduce resource consumption

Student A — Agricultural Engineer

Ask your partner about:

1. machinery used on the farm;
2. equipment for soil preparation;
3. planting machinery;
4. harvesting machinery;
5. modern technologies.

Student B — Farm Manager

Describe:

1. the machinery used on your farm;
2. the main functions of the machines;
3. their advantages;
4. the technologies used to improve efficiency.

Use at least **five terms** from the Key Vocabulary.

D. Role-play: Choosing the Right Machinery

Work in pairs.

Student A — Agricultural Engineer

You are advising a farm manager who wants to improve farm productivity. Ask about:

- current machinery;
- soil conditions;
- planting operations;
- harvesting requirements;
- fuel and resource consumption.

Recommend suitable machinery and explain your choices.

Student B — Farm Manager

Your farm needs new equipment. Explain:

- which farming operations are difficult;
- what machinery you currently use;
- what problems you have with efficiency;
- what improvements you expect from new machinery.

Agree on **two or three machines or technologies** that would be most useful for the farm.

Task 7. Speaking Practice

A. Situation-Based Speaking

Situation: Improving Farm Productivity

A farm wants to increase productivity and reduce operating costs. The farm currently uses tractors, basic tillage equipment, and conventional seeding machines. The farm manager is considering purchasing new machinery and precision farming technologies.

Discuss the situation in pairs or small groups.

Consider:

- Which machines should be improved or replaced?
- What equipment is needed for soil preparation?
- What seeding machinery would be appropriate?
- How can harvesting efficiency be improved?
- How can GPS systems and sensors reduce resource consumption?

Your task: Make **three recommendations** and explain why they are useful.

Use:

- *We should ...*
- *I would recommend ...*
- *It would be better to ...*
- *This machine could help us ...*
- *The main advantage is ...*
- *It could reduce ... and increase ...*

B. Mini-Presentation

Topic: The Most Important Agricultural Machine for Farm Productivity

Prepare a **2–3-minute presentation**.

Follow this structure:

- 1. Introduction**
 - Name the machine.
 - Explain why it is important.
- 2. Main Function**
 - Describe what the machine does.
 - Explain which farming operation it performs.
- 3. Advantages**
 - Explain how it improves productivity.
 - Mention its effect on labor, time, fuel, or resource consumption.
- 4. Conclusion**
 - Explain why you consider this machine important for modern agriculture.

Useful Presentation Phrases

Introducing the topic

- Today I would like to talk about ...
- My presentation focuses on ...

Describing the machine

- This machine is mainly used for ...
- Its main function is to ...
- It is commonly used in ...

Explaining advantages

- One of its main advantages is ...
- It helps farmers to ...
- It can reduce ...
- It can increase ...

Concluding

- To sum up, ...
- In conclusion, I believe that ...
- For these reasons, ... is essential for modern farming.

Presentation requirement: Use at least **6 terms** from the Key Vocabulary.

Sample Mini-Presentation

The Most Important Agricultural Machine for Farm Productivity

Today I would like to talk about the **tractor**, which I consider the most important machine in modern agriculture.

A tractor is a **power machine** used for many farming operations. It can work with different **attachments** and perform tasks such as **soil tillage**, planting, transportation, and crop care. Because of its versatility, the tractor is the central machine on most farms.

One of the main advantages of a tractor is that it helps increase **productivity** and reduce **manual labor**. Farmers can use tractors with ploughs, cultivators, seed drills, and other equipment to complete field operations more efficiently. Modern tractors are also equipped with **GPS-based systems** and **sensors**, which improve accuracy and reduce **resource consumption**.

In addition, tractors help farmers save time and fuel while improving the quality of agricultural operations. They can be used in different weather and field conditions and support the effective use of modern farming technologies.

To sum up, I believe that the tractor is the most important agricultural machine because it improves **efficiency**, supports many farming operations, and plays a key role in modern agricultural production.

***Note:** You may choose another machine (a combine harvester, a seed drill, a planter, a cultivator, or precision farming equipment) for your presentation.*

Task 8. Professional Writing

A. Summary

Task: Write a summary of the text “**Classification and Main Types of Agricultural Machinery**”.

Write **80–100 words**.

Your summary should include:

- the main groups of agricultural machinery;
- the main functions of these machines;
- the role of modern technologies;
- the importance of agricultural machinery for farm productivity.

Model Summary

Classification and Main Types of Agricultural Machinery

Agricultural machinery plays an important role in modern farming. It helps farmers increase productivity, reduce manual labour, and use resources efficiently. Agricultural machines can be divided into several main groups. Power machines, such as tractors, provide energy for different operations and can work with various attachments. Soil tillage machinery prepares the soil for planting. Seed drills and planters place seeds at the required depth and spacing. Harvesting machinery, including combine harvesters, collects mature crops. Modern farms also use GPS-based systems and sensors to improve accuracy and reduce resource consumption. Understanding the classification of agricultural machinery helps engineers select suitable equipment for efficient farming.

B. Technical Report

Task: Write a short technical report about **one type of agricultural machinery**.

Length: 120–150 words

Choose **one** machine or equipment group:

- tractor;
- combine harvester;
- seed drill;
- planter;
- cultivator;
- precision farming equipment.

Your report should include:

1. **Name and classification**
What group does the machine belong to?
2. **Main function**
What is it used for?
3. **Main operations**
What operations can it perform?
4. **Advantages**
How does it improve farm productivity or efficiency?
5. **Modern technologies**
Does it use GPS, sensors, automated control, or other technologies?
6. **Conclusion**
Why is this machine important for modern agriculture?

Model Technical Report

Technical Report: The Role of Tractors in Modern Agriculture

A tractor is one of the most important **power machines** used in modern agriculture. Its main function is to provide power for different farming operations. Tractors can operate a wide range of **attachments**, including ploughs, cultivators, seed drills, and other equipment.

Tractors are commonly used for **soil tillage**, planting, crop care, transportation, and other field operations. Their versatility allows farmers to use one power machine for different tasks. As a result, tractors help increase **productivity** and reduce **manual labor**.

Modern tractors can be equipped with **GPS-based systems** and **sensors**. These technologies improve the accuracy of field operations and can help reduce fuel and **resource consumption**. Automated systems also support more efficient machine operation.

In conclusion, the tractor is a key element of modern agricultural machinery because it provides power, supports different farming operations, and improves overall farm **efficiency**.

Use **Technical Report Writing Template** while writing the variant of your own.

Paragraph 1 — Classification & function

A _____ is a type of _____ machinery. Its main function is to _____.

Paragraph 2 — Operations

It is commonly used for _____. It can perform _____.

Paragraph 3 — Advantages & technology

One of its main advantages is _____. Modern models can use _____.

Paragraph 4 — Conclusion

In conclusion, _____ is important because _____.

UNIT 2. DESIGN PRINCIPLES OF TRACTORS AND POWER UNITS

PART I. READING & LANGUAGE

Task 1. Get Ready to Read

A. Think and Discuss

Answer the questions.

1. What is the main function of a tractor?
2. What are the main parts or systems of a modern tractor?
3. Why does a tractor need an engine?
4. What is the purpose of the transmission?
5. What factors are important when designing a tractor?

B. Predict

Look at the title of the text: **Design Principles of Tractors and Power Units**

What aspects of tractor design do you expect to read about?

Choose from the list:

- engine power
- transmission
- chassis and frame
- wheels and tires
- hydraulic system
- operator's cab
- fuel consumption
- harvesting technology

Useful Language

- I think the text will focus on ...
- I expect to read about ...
- One important part is ...
- In my opinion, a tractor should be ...

C. Think Like an Engineer

Complete the sentence:

A good agricultural tractor should be _____, _____, and _____.

Compare your ideas with a partner.

Task 2. Key Vocabulary

A. Core Vocabulary

Study the key terms and their Ukrainian equivalents.

English term	Ukrainian equivalent
tractor	трактор
power unit	силовий агрегат
engine	двигун
engine power	потужність двигуна
torque	крутний момент
transmission	трансмисія
drivetrain	приводна система
chassis	шасі

English term	Ukrainian equivalent
frame	рама
axle	вісь / міст
wheel drive	колісний привод
four-wheel drive	повний привод
hydraulic system	гідравлічна система
implement	сільськогосподарське знаряддя / машина
attachment	навісне обладнання
traction	тягове зусилля / тяга
fuel consumption	витрата палива
fuel efficiency	паливна ефективність / економічність використання палива
operating conditions	умови експлуатації
operator's cab	кабіна оператора
power output	вихідна потужність

B. Professional Collocations

Match the words to form professional collocations.

A	B
1. engine	a. consumption
2. fuel	b. power
3. hydraulic	c. system
4. four-wheel	d. drive
5. agricultural	e. implement
6. operating	f. conditions
7. traction	g. force

C. Complete the Sentences

Complete the sentences with the words from the box.

engine · transmission · chassis · hydraulic system · traction · fuel consumption · power unit · four-wheel drive

- The _____ provides the energy required to operate the tractor.
- The _____ transfers power from the engine to the wheels or tracks.
- The _____ supports the main components of the tractor.
- A _____ helps a tractor operate effectively on difficult surfaces.
- The _____ is used to operate hydraulic implements.
- High _____ is important when a tractor pulls heavy equipment.
- Engineers try to reduce _____ while maintaining good performance.
- The tractor engine is an important part of the _____.

D. Use the Vocabulary

Complete the sentences with your own ideas.

- A tractor engine should provide ...
- A good transmission helps ...
- Four-wheel drive is useful when ...
- Engineers should consider fuel consumption because ...

Task 3. Read the Text

Design Principles of Tractors and Power Units

Tractors are one of the most important types of agricultural machinery. They are designed to provide power for different farming operations and to operate a wide range of agricultural implements. The design of a tractor depends on its intended purpose, operating conditions, required power, and level of efficiency.

The **engine** is the main power source of a tractor. Modern agricultural tractors usually use diesel engines because they provide high torque and are suitable for heavy-duty operations. Engine power is an important characteristic because it determines the type and size of equipment that the tractor can operate. At the same time, engineers try to achieve good fuel efficiency and reduce fuel consumption.

The **transmission** transfers power from the engine to the wheels or tracks. It allows the operator to select an appropriate speed and provides the required traction for different field conditions. Modern tractors may use mechanical, hydrostatic, or continuously variable transmissions. The choice of transmission depends on the tractor's design and intended applications.

The **chassis and frame** support the main components of the tractor. Axles, wheels, and other structural elements must be strong enough to withstand heavy loads and difficult operating conditions. The design of the chassis also affects tractor stability, mobility, and safety.

Another important system is the **hydraulic system**. It provides power for lifting and controlling agricultural implements. Hydraulic systems allow tractors to operate different attachments and adjust their position during field operations.

Modern tractor design also focuses on operator comfort and safety. The operator's cab can include an adjustable seat, control systems, climate control, and protective structures. These features reduce operator fatigue and improve working conditions.

Overall, tractor design requires a balance between engine power, traction, fuel efficiency, reliability, safety, and operator comfort. Agricultural engineers must consider these factors when developing power units for different farming applications.

Task 4. Reading Comprehension

A. True or False

Read the statements and decide whether they are **True (T)** or **False (F)**.

1. Tractors are designed to operate different agricultural implements.
2. Engine power has no effect on the equipment a tractor can operate.
3. Diesel engines are commonly used in modern agricultural tractors.
4. The transmission transfers power from the engine to the wheels or tracks.
5. The chassis supports the main components of a tractor.
6. Hydraulic systems are used only for controlling the engine.
7. Modern tractor design includes operator comfort and safety.
8. Tractor design requires a balance between several technical factors.

B. Multiple Choice

Choose the correct answer.

1. What is the main purpose of a tractor engine?
 - a) To control the operator's cab
 - b) To provide power for tractor operation
 - c) To reduce the size of agricultural implements
 - d) To improve soil quality

2. Why is engine power important?
 - a) It determines the type and size of equipment the tractor can operate.
 - b) It controls the operator's seat.
 - c) It replaces the transmission.
 - d) It determines the color of the tractor.
3. What is the main function of the transmission?
 - a) To cool the engine
 - b) To support the tractor frame
 - c) To transfer engine power to the wheels or tracks
 - d) To control the hydraulic oil
4. What does the hydraulic system allow a tractor to do?
 - a) Produce fuel
 - b) Lift and control agricultural implements
 - c) Replace the engine
 - d) Increase the size of the chassis
5. Which factor is related to operator comfort?
 - a) Adjustable seat
 - b) Engine torque only
 - c) Wheel diameter only
 - d) Fuel tank capacity only
6. What must agricultural engineers consider when designing a tractor?
 - a) Only engine power
 - b) Only fuel consumption
 - c) A combination of technical and operational factors
 - d) Only the tractor's appearance

C. Answer the Questions

Answer in **1–2 complete sentences**.

1. Why is the engine important for tractor operation?
2. What is the function of the transmission?
3. How does the chassis affect tractor performance?
4. What is the purpose of the hydraulic system?
5. Why are operator comfort and safety important?
6. What factors should engineers consider when designing a tractor?

D. Complete the Classification

Match each tractor component or system with its main function.

Component / system	Function
1. engine	a. supports the main tractor components
2. transmission	b. lifts and controls implements
3. chassis	c. provides the main power
4. hydraulic system	d. transfers power to the wheels or tracks
5. operator's cab	e. provides a safe and comfortable working environment

PART II. PROFESSIONAL COMMUNICATION & OUTPUT

Task 5. Vocabulary in Context

A. Complete the Sentences with the words from the box.

torque · transmission · chassis · traction · hydraulic system · fuel efficiency · engine power · operating conditions

1. High engine _____ allows a tractor to operate heavy equipment.
2. The _____ transfers power from the engine to the wheels.
3. The _____ supports the main components of the tractor.
4. Good _____ is important when working on wet or uneven fields.
5. The _____ can lift and control agricultural implements.
6. Engineers aim to improve _____ and reduce fuel consumption.
7. Tractor design must take different _____ into account.
8. Engine _____ affects the size and type of equipment that a tractor can operate.

B. Match the Terms with Their Definitions

Term

Definition

- | | |
|---------------------|--|
| 1. torque | a. the ability of a tractor to move and pull equipment effectively |
| 2. transmission | b. a system that transfers engine power to the wheels |
| 3. traction | c. turning force produced by an engine |
| 4. chassis | d. the main supporting structure of a vehicle |
| 5. hydraulic system | e. a system used to lift and control implements |

C. Complete the Professional Collocations

Use the words from the box.

engine · fuel · four-wheel · agricultural · operating · hydraulic

1. _____ power
2. _____ consumption
3. _____ drive
4. _____ implement
5. _____ conditions
6. _____ system

Task 6. Professional Communication

A. Read and translate Sample Professional Dialogue

Topic: Discussing Tractor Design

Agricultural Engineer: What type of tractor are you looking for?

Farm Manager: We need a tractor for heavy field operations and soil tillage.

Agricultural Engineer: In that case, engine power and traction will be important factors.

Farm Manager: What engine power would you recommend?

Agricultural Engineer: It depends on the implements you plan to use and the operating conditions.

Farm Manager: We also need good fuel efficiency. Fuel consumption is quite high with our current tractor.

Agricultural Engineer: Then I would recommend a modern diesel engine with an efficient transmission.

Farm Manager: What about four-wheel drive?

Agricultural Engineer: Four-wheel drive would improve traction, especially in wet or difficult field conditions.

Farm Manager: We also use several hydraulic implements.

Agricultural Engineer: Then the hydraulic system should have sufficient capacity to lift and control them safely.

Farm Manager: What other features should we consider?

Agricultural Engineer: I would also consider operator comfort, safety, reliability, and ease of maintenance.

Farm Manager: That sounds reasonable. We need a tractor that is powerful but also efficient and comfortable.

B. Useful Language

Asking about Requirements

- What type of tractor do you need?
- What operations will it perform?
- What engine power do you require?
- What operating conditions should we consider?

Discussing Technical Characteristics

- The main characteristic is ...
- It is equipped with ...
- It provides ...
- It is designed for ...

Making Recommendations

- I would recommend ...
- It would be better to choose ...
- You should consider ...
- A suitable option would be ...

Explaining Reasons

- This is important because ...
- The main reason is ...
- It can help to ...
- This would improve ...

C. Guided Dialogue

Work in pairs.

Use the information below to complete a professional dialogue.

Tractor A

- medium engine power
- two-wheel drive
- mechanical transmission
- low cost
- suitable for simple field operations

Tractor B

- high engine power
- four-wheel drive
- modern transmission
- higher fuel efficiency
- suitable for heavy field operations

Student A — Agricultural Engineer

Recommend one of the tractors.

Discuss:

- engine power;
- drive system;
- transmission;
- fuel consumption;
- operating conditions.

Student B — Farm Manager

Your farm needs a new tractor.

Explain:

- what operations you perform;
- what type of soil you have;
- what implements you use;
- how important fuel efficiency is.

Choose the most suitable tractor together and explain your decision.

D. Role-play: Selecting a Tractor

Student A — Agricultural Engineer

You are advising a farm manager who needs a new tractor.

Ask about:

- field size;
- soil conditions;
- agricultural implements;
- required engine power;
- fuel efficiency;
- operator comfort.

Recommend a tractor configuration and explain your choice.

Student B — Farm Manager

You are planning to purchase a tractor.

Explain:

- what farming operations you perform;
- which implements you use;
- what problems you have with your current tractor;
- what technical characteristics are important to you.

Agree with the engineer on the **three most important tractor characteristics**.

Task 7. Speaking Practice

A. Situation-Based Speaking

Situation: Choosing a Tractor for a Farm

A farm is planning to purchase a new tractor. The farm performs soil tillage, planting, transportation, and crop care. The fields are sometimes wet and uneven, and the farm uses several heavy implements.

Discuss:

- What engine power is required?
- Is four-wheel drive necessary?
- What type of transmission would be suitable?
- How important is fuel efficiency?
- What hydraulic capacity is required?
- What safety and comfort features should the tractor have?

Your task: Make **three recommendations** and explain your choices.

Useful Language

- We should choose ...
- I would recommend ...
- The tractor should have ...
- It would be better to use ...
- This option is suitable because ...
- The main advantage is ...
- This would improve ...

B. Mini-Presentation

Topic: The Ideal Tractor for a Modern Farm

Prepare a **2–3-minute presentation**.

Follow this structure:

1. **Introduction**
 - Describe the type of farm.
 - Explain what the tractor will be used for.
2. **Technical Characteristics**
 - engine power;
 - transmission;
 - drive system;
 - hydraulic system.
3. **Advantages**
 - productivity;
 - fuel efficiency;
 - traction;
 - operator comfort and safety.
4. **Conclusion**
 - Explain why your tractor configuration is suitable for the farm.

Useful Presentation Phrases

Introducing the Topic

- Today I would like to describe ...
- My presentation focuses on ...
- The tractor I am going to describe is designed for ...

Describing Technical Characteristics

- It is equipped with ...
- The engine provides ...
- The transmission allows ...
- The tractor uses ...

Explaining Advantages

- One of its main advantages is ...
- It provides good traction ...

- It helps reduce ...
- It improves ...

Concluding

- To sum up, ...
- In conclusion, ...
- This tractor would be a suitable choice because ...

Presentation requirement: Use at least **7 terms** from the Key Vocabulary.

Sample Mini-Presentation

The Ideal Tractor for a Modern Farm

Today I would like to describe an ideal tractor for a modern farm. The tractor is designed for soil tillage, planting, transportation, and crop care. It should have enough **engine power** to operate heavy agricultural implements efficiently.

The tractor should use **four-wheel drive** because the farm has wet and uneven fields. This drive system provides better **traction** and improves mobility in difficult **operating conditions**. An efficient **transmission** is also important because it allows the operator to select a suitable speed for different operations.

The tractor should have a modern **hydraulic system** for lifting and controlling different implements. Good **fuel efficiency** is another important characteristic because it helps reduce fuel consumption and operating costs.

The **operator's cab** should provide a safe and comfortable working environment. Modern control systems can also make tractor operation easier.

To sum up, an ideal modern tractor should combine sufficient engine power, good traction, efficient transmission, reliable hydraulic systems, fuel efficiency, and operator comfort.

Note: You may choose another tractor configuration if you can justify your choice.

Task 8. Professional Writing

A. Summary

Task

Write a summary of the text “**Design Principles of Tractors and Power Units.**”

Length: 80–100 words

Your summary should include:

- the main purpose of a tractor;
- the function of the engine and transmission;
- the role of the chassis and hydraulic system;
- the importance of safety and operator comfort;
- the main principles of tractor design.

Model Summary

Design Principles of Tractors and Power Units

Tractors are important power machines designed to perform different agricultural operations and operate various implements. The engine provides the main power, while the transmission transfers this power to the wheels or tracks. The chassis and frame support the main components and affect tractor stability and mobility. A hydraulic system provides power for lifting and controlling agricultural implements. Modern tractor design also focuses on operator safety and comfort. Engineers must balance engine power, traction, fuel efficiency, reliability, and safety. These factors help create tractors that are suitable for different farming operations and operating conditions.

B. Technical Report Task Write a short technical report about **the design of a modern agricultural tractor**. **Length: 120–150 words**

Your report should include:

1. **Purpose**
 - What is the tractor designed for?
2. **Power Unit**
 - What type of engine does it use?
 - What is the role of engine power and torque?
3. **Transmission and Drive**
 - What type of transmission or drive system is suitable?
4. **Hydraulic System**
 - What implements can it operate?
5. **Efficiency and Safety**
 - How can fuel consumption, operator comfort, and safety be improved?
6. **Conclusion**
 - Why is this design suitable for modern agriculture?

Model Technical Report

Technical Report: Design of a Modern Agricultural Tractor

A modern agricultural tractor is designed to provide power for a wide range of farming operations. It should have a reliable diesel engine with sufficient **engine power** and **torque** to operate heavy agricultural implements.

The **transmission** should transfer engine power efficiently and provide suitable speeds for different operations. **Four-wheel drive** is recommended for farms with difficult field conditions because it provides better **traction** and mobility.

A modern **hydraulic system** is also essential. It allows the tractor to lift and control different implements, such as ploughs, cultivators, and seed drills. Good **fuel efficiency** is important for reducing fuel consumption and operating costs.

The tractor should also have a safe and comfortable **operator's cab** with modern control systems. In conclusion, an efficient tractor should combine power, traction, reliability, safety, and operator comfort to meet the requirements of modern agriculture.

C. Report Writing Template

Use the template to plan your technical report.

Paragraph 1 — Purpose

A modern agricultural tractor is designed to _____.

It is commonly used for _____.

Paragraph 2 — Power Unit

The tractor is equipped with _____.

The engine provides _____.

High engine power/torque is important because _____.

Paragraph 3 — Transmission and Hydraulic System

The transmission _____.

The tractor uses _____ drive because _____.

The hydraulic system allows the tractor to _____.

Paragraph 4 — Efficiency and Conclusion

One important advantage is _____.

The tractor can improve _____ and reduce _____.

In conclusion, this tractor is suitable for modern agriculture because _____.

UNIT 3. INTERNAL COMBUSTION ENGINES IN AGRICULTURAL EQUIPMENT

PART I. READING & LANGUAGE

Task 1. Get Ready to Read

A. Think and Discuss

Answer the questions.

1. What is the main function of an engine in agricultural machinery?
2. What type of engines are commonly used in modern tractors?
3. Why is engine power important for agricultural machinery?
4. What factors can affect engine performance?
5. Why is regular engine maintenance important?

B. Look and Predict

Look at the title of the text: **Internal Combustion Engines in Agricultural Equipment**

Before reading, predict what information the text may contain.

Choose **five** topics from the list.

- types of agricultural engines
- engine components
- fuel injection
- soil preparation
- combustion process
- engine cooling
- lubrication
- harvesting methods
- fuel consumption
- engine maintenance

Useful Language

- I think the text will focus on ...
- I expect to read about ...
- One important factor is ...
- In my opinion, ...
- I would say that ...
- This is important because ...

C. Think Like an Engineer

Complete the sentences. Compare your ideas with a partner.

1. A good agricultural engine should be _____ and _____.
2. Engine efficiency is important because _____.
3. Regular engine maintenance helps to _____.

Task 2. Key Vocabulary

A. Core Vocabulary

Study the key terms and their Ukrainian equivalents.

English term	Ukrainian equivalent
internal combustion engine	двигун внутрішнього згорання
diesel engine	дизельний двигун

English term	Ukrainian equivalent
engine component	компонент / складова двигуна
cylinder	циліндр
piston	поршень
crankshaft	колінчастий вал
combustion chamber	камера згоряння
fuel injection	упорскування палива
air intake	впуск повітря
exhaust system	система випуску відпрацьованих газів
ignition	запалювання
combustion process	процес згоряння
engine power	потужність двигуна
engine torque	крутний момент двигуна
engine efficiency	ефективність двигуна
fuel consumption	витрата палива
cooling system	система охолодження
lubrication system	система мащення
operating temperature	робоча температура
engine maintenance	технічне обслуговування двигуна

B. Professional Collocations

Match the words to form professional collocations.

A	B
1. internal combustion	a. consumption
2. fuel	b. system
3. cooling	c. engine
4. lubrication	d. process
5. combustion	e. system
6. engine	f. injection
7. fuel	g. power
8. engine	h. efficiency

C. Complete the Sentences

Complete the sentences with the words from the box.

piston · cylinder · fuel injection · crankshaft · cooling system · lubrication system · combustion chamber · exhaust system

- The _____ moves up and down inside the cylinder.
- The _____ is the space where the fuel-air mixture burns.
- The _____ converts the piston's movement into rotary motion.
- The _____ supplies fuel to the engine.
- The _____ helps maintain a suitable engine temperature.
- The _____ reduces friction between moving engine components.
- The _____ contains the piston and guides its movement.
- The _____ removes exhaust gases from the engine.

D. Use the Vocabulary

Complete the sentences with your own ideas.

1. A diesel engine is suitable for agricultural machinery because ...
2. The cooling system is important because ...
3. Fuel injection affects ...
4. Regular engine maintenance helps to ...
5. High engine efficiency means ...

Useful Language

- It is used to ...
- Its main function is to ...
- It helps to ...
- It is responsible for ...
- It improves ...
- It reduces ...
- It provides ...

Task 3. Read the Text

Internal Combustion Engines in Agricultural Equipment

Internal combustion engines are the main power source for many types of modern agricultural equipment. They are widely used in tractors, combine harvesters, forage harvesters, and other machines because they can provide the power and torque required for demanding agricultural operations. The performance of an agricultural machine largely depends on the efficiency, reliability, and operating condition of its engine.

Most modern agricultural machines use **diesel engines**. A diesel engine converts the chemical energy of fuel into mechanical energy through the **combustion process**. Air enters the engine through the **air intake**, while fuel is delivered by the **fuel injection** system. Inside the **cylinder**, the fuel burns in the **combustion chamber**, producing gases that create pressure on the **piston**.

The piston moves up and down inside the cylinder. This movement is transferred to the **crankshaft**, which converts the piston's linear motion into rotary motion. The rotary motion can then be used to drive the machine and its working systems. The amount of **engine power** and **engine torque** determines the ability of agricultural equipment to perform different operations and work with various implements.

An engine must also operate within a suitable temperature range. The **cooling system** removes excess heat and helps maintain the required **operating temperature**. At the same time, the **lubrication system** supplies oil to moving components and reduces friction and wear. Both systems are essential for reliable engine operation.

Another important part of engine design is the **exhaust system**. It removes exhaust gases produced during combustion and directs them away from the engine. Modern agricultural engines are also designed to improve **engine efficiency** and reduce **fuel consumption** while maintaining sufficient power.

Regular **engine maintenance** is essential for reliable and efficient operation. Maintenance may include checking oil levels, filters, cooling systems, fuel injection components, and other engine parts. Proper maintenance can reduce wear, prevent breakdowns, and extend engine service life.

Overall, internal combustion engines play a central role in agricultural machinery. Their performance depends on the interaction of several systems and components. For agricultural engineers, understanding the basic combustion process, engine components, efficiency, and maintenance is essential for selecting, operating, and servicing modern agricultural equipment.

Task 4. Reading Comprehension

A. True or False

Read the statements and decide whether they are **True (T)** or **False (F)**.

1. Internal combustion engines are widely used in modern agricultural machinery.
2. Diesel engines convert mechanical energy into chemical energy.
3. Air enters the engine through the air intake.
4. Fuel injection supplies fuel to the engine.
5. The piston moves only in a rotary motion.
6. The crankshaft converts the piston's linear motion into rotary motion.
7. The cooling system helps maintain a suitable operating temperature.
8. The lubrication system reduces friction and wear.
9. The exhaust system supplies fuel to the combustion chamber.
10. Regular engine maintenance can help prevent breakdowns and extend engine service life.

B. Multiple Choice

Choose the correct answer.

1. Why are internal combustion engines widely used in agricultural machinery?
 - a) They reduce the size of agricultural fields.
 - b) They provide power and torque for demanding operations.
 - c) They replace all agricultural implements.
 - d) They eliminate the need for fuel.
2. What type of engine is commonly used in modern agricultural machines?
 - a) Steam engine
 - b) Electric engine
 - c) Diesel engine
 - d) Hydraulic engine
3. What happens in the combustion chamber?
 - a) Oil is filtered.
 - b) Fuel burns and produces pressure on the piston.
 - c) Exhaust gases are cooled.
 - d) The crankshaft is lubricated.
4. What is the function of the crankshaft?
 - a) To supply fuel
 - b) To remove exhaust gases
 - c) To convert the piston's linear motion into rotary motion
 - d) To cool the engine
5. What is the main function of the cooling system?
 - a) To increase fuel consumption
 - b) To maintain a suitable engine temperature
 - c) To supply fuel
 - d) To control the transmission
6. Why is the lubrication system important?
 - a) It reduces friction and wear.
 - b) It increases exhaust emissions.
 - c) It supplies air to the engine.
 - d) It replaces the cooling system.

7. What is one purpose of regular engine maintenance?
- a) To increase engine weight
 - b) To prevent all fuel consumption
 - c) To reduce wear and prevent breakdowns
 - d) To replace the combustion process

C. Answer the Questions

Answer the questions in **1–2 complete sentences**.

- 1. Why are diesel engines commonly used in agricultural machinery?
- 2. How does fuel enter the engine?
- 3. What happens to the piston during the combustion process?
- 4. What is the function of the crankshaft?
- 5. Why are engine power and torque important for agricultural equipment?
- 6. What is the role of the cooling system?
- 7. How does the lubrication system protect engine components?
- 8. Why is regular engine maintenance necessary?

D. Complete the Process

Put the stages of the basic engine power process in the correct order.

- a) The piston moves.
- b) Air enters the engine.
- c) Fuel is injected.
- d) Fuel burns in the combustion chamber.
- e) The crankshaft converts the piston's movement into rotary motion.
- f) Mechanical power is produced for the machine.

Correct order:

- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____
- 6. _____

PART II. PROFESSIONAL COMMUNICATION & OUTPUT

Task 5. Vocabulary in Context

A. Complete the Sentences

Complete the sentences with the words from the box.

combustion chamber · piston · crankshaft · fuel injection · cooling system · lubrication system · exhaust system · engine efficiency

- 1. The _____ is the part of the engine where fuel burns and produces pressure.
- 2. The _____ moves up and down inside the cylinder.
- 3. The _____ converts the piston's linear motion into rotary motion.
- 4. The _____ supplies fuel to the engine.
- 5. The _____ removes excess heat from the engine.
- 6. The _____ reduces friction and wear between moving components.
- 7. The _____ removes exhaust gases produced during combustion.
- 8. Good _____ helps an agricultural machine operate effectively while using less fuel.

B. Match the Terms with Their Definitions. Match each term with the correct definition.

Term	Definition
1. internal combustion engine	a. a system that removes excess heat from an engine
2. fuel injection	b. a component that moves up and down inside a cylinder
3. piston	c. an engine in which fuel burns inside the engine
4. crankshaft	d. a system that supplies fuel to the engine
5. cooling system	e. a rotating component that converts piston movement into rotary motion
6. lubrication system	f. a system that reduces friction between moving parts

C. Complete the Professional Collocations

Use the words from the box.

engine · fuel · combustion · cooling · lubrication · exhaust

1. _____ power
2. _____ consumption
3. _____ chamber
4. _____ system
5. _____ system
6. _____ system

D. Choose the Correct Word

Choose the correct option in each sentence.

1. The **piston** / **crankshaft** moves up and down inside the cylinder.
2. The **cooling** / **fuel injection** system controls the engine temperature.
3. The **lubrication** / **exhaust** system reduces friction between moving parts.
4. The **fuel injection** / **combustion chamber** system supplies fuel to the engine.
5. The **crankshaft** / **piston** converts linear motion into rotary motion.
6. The **exhaust** / **cooling** system removes gases produced during combustion.

Task 6. Professional Communication

A. Read and translate Sample Professional Dialogue

Discussing Engine Performance and Maintenance

Agricultural Engineer:	Good morning. I'd like to discuss the engine performance of your tractor.
Farm Manager:	Good morning. We have noticed that the engine has recently become less efficient.
Agricultural Engineer:	What problems have you observed?
Farm Manager:	Fuel consumption has increased, and the engine sometimes loses power during heavy field operations.
Agricultural Engineer:	When was the engine last serviced?
Farm Manager:	About six months ago.

Agricultural Engineer:	Then we should check the fuel injection system, air intake, and filters first.
Farm Manager:	Could the cooling system also be causing the problem?
Agricultural Engineer:	Yes. If the engine operates at an excessively high temperature, its performance may decrease.
Farm Manager:	What about the lubrication system?
Agricultural Engineer:	We should check the oil level and condition as well. Poor lubrication can increase friction and wear.
Farm Manager:	How can we improve engine efficiency?
Agricultural Engineer:	Regular maintenance is essential. We should inspect the main engine components and replace worn or damaged parts.
Farm Manager:	That makes sense. We need to reduce fuel consumption and prevent serious engine problems.
Agricultural Engineer:	Exactly. Proper maintenance can improve engine efficiency, reliability, and service life.

B. Useful Language. Learn the suggested phrases to make up the dialogue of your own.

Describing a Problem

- We have noticed a problem with ...
- The engine is ...
- Fuel consumption has increased.
- The engine is losing power.
- The engine temperature is too high.
- The machine is not operating efficiently.

Asking about a Problem

- What problems have you observed?
- When did the problem start?
- When was the engine last serviced?
- Have you checked the ...?
- Could the problem be related to ...?

Suggesting Possible Causes

- The problem may be caused by ...
- It could be related to ...
- We should check ...
- One possible cause is ...

Making Recommendations

- I recommend checking ...
- We should inspect ...
- It would be better to ...
- Regular maintenance can help to ...

C. Guided Dialogue

Work in pairs. Make up the dialogur of your own using the information provided.

Situation: Engine Performance Problem

A tractor has recently shown **reduced engine performance** and **increased fuel consumption**.

Student A — Agricultural Engineer

Ask about:

- engine performance;
- fuel consumption;
- engine temperature;
- maintenance history;
- fuel injection;
- cooling system;
- lubrication system.

Suggest possible causes and recommend appropriate maintenance.

Student B — Farm Manager

Explain that:

- the tractor has lost some power;
- fuel consumption has increased;
- the engine sometimes becomes too hot;
- the last maintenance was several months ago;
- the tractor operates heavy agricultural implements.

Ask the engineer what should be checked first.

Useful phrases

Engineer:

- What symptoms have you noticed?
- We should check ...
- The problem may be caused by ...
- I recommend inspecting ...

Farm Manager:

- We have noticed that ...
- Could it be a problem with ...?
- What should we check first?
- How can we prevent this problem in the future?

D. Role-play: create the situation on the topic: Diagnosing an Engine Problem

Student A — Agricultural Engineer

A tractor engine is not performing normally.

Your task is to:

1. Ask the farm manager about the symptoms.
2. Identify possible causes.
3. Recommend several checks.
4. Explain how regular maintenance can prevent similar problems.

Use at least **6 terms from the Key Vocabulary**.

Student B — Farm Manager

Your tractor has the following problems:

- increased fuel consumption;
- reduced engine power;
- high operating temperature;
- unusual engine noise.

Explain the problems to the engineer and answer the engineer's questions.

Together, decide what should be checked first.

Final Decision

At the end of the role-play, agree on:

1. the **most likely cause** of the problem;
2. the **first component/system to inspect**;
3. one **maintenance measure** that could prevent the problem in the future.

Task 7. Speaking Practice

A. Situation-Based Speaking

Situation: Improving the Performance of an Agricultural Engine

A farm manager wants to improve the performance of the engines used in the farm's tractors and other agricultural machines.

Discuss the following questions:

1. What factors affect engine performance?
2. How can fuel consumption be reduced?
3. Why are cooling and lubrication systems important?
4. How can regular maintenance improve engine efficiency?
5. Which engine components should be inspected regularly?
6. What can happen if an engine is not properly maintained?

Your task

As an agricultural engineer, give the farm manager **three recommendations** for improving engine performance and reliability. Explain the reason for each recommendation.

Useful Language

- The first thing I would recommend is ...
- We should regularly check ...
- It is important to ...
- This can help to ...
- Another important factor is ...
- If the system is not maintained properly, ...
- This would improve ...
- As a result, ...

B. Mini-Presentation

Topic: How to Improve the Efficiency of an Agricultural Engine

Prepare a **2–3-minute presentation**.

Follow this structure:

1. Introduction

- Explain why engine efficiency is important in agricultural machinery.

2. Main Factors

Discuss:

- fuel consumption;
- engine power;
- fuel injection;
- cooling;
- lubrication.

3. Maintenance

Explain:

- what should be checked regularly;
- how maintenance affects engine performance;
- how it can prevent breakdowns.

4. Conclusion

Explain why an efficient and well-maintained engine is important for modern agricultural equipment.

Presentation requirement: Use at least 7 terms from the Key Vocabulary.

Sample Mini-Presentation

How to Improve the Efficiency of an Agricultural Engine

Today I would like to explain how to improve the efficiency of an agricultural engine. Engine efficiency is important because agricultural machines often operate for many hours under heavy loads. An efficient engine can provide sufficient power while reducing fuel consumption.

One important factor is the **fuel injection** system. It should operate correctly to ensure that the engine receives the appropriate amount of fuel. The **air intake** should also be clean because the combustion process requires sufficient air.

The **cooling system** helps maintain the correct operating temperature. If the engine becomes too hot, its performance may decrease. The **lubrication system** is also essential because it reduces friction and wear between moving components.

Regular **engine maintenance** is necessary to check the main components and identify possible problems before they become serious. Proper maintenance can improve **engine efficiency**, reduce fuel consumption, and extend engine service life.

To sum up, an efficient agricultural engine requires correct fuel injection, effective cooling and lubrication, and regular maintenance. These factors help agricultural machinery operate reliably and efficiently.

Task 8. Professional Writing

A. Summary

Task: Write a short summary: “**Internal Combustion Engines in Agricultural Equipment.**”

Length: 80–100 words. Your summary should include:

- the role of internal combustion engines in agricultural machinery;
- the basic combustion process;
- the main engine components and systems;
- the importance of engine efficiency;
- the role of regular maintenance.

Model Summary

Internal Combustion Engines in Agricultural Equipment

Internal combustion engines are an important power source for modern agricultural machinery. Diesel engines convert the chemical energy of fuel into mechanical energy through the combustion process. Air enters the engine, while fuel injection supplies fuel to the combustion chamber. The pressure produced during combustion moves the piston, and the crankshaft converts this movement into rotary motion. Cooling and lubrication systems help maintain suitable operating conditions and reduce wear. Engine efficiency is important for reducing fuel consumption. Regular maintenance helps prevent breakdowns, improve reliability, and extend engine service life.

B. Technical Report

Task. Write a short technical report about the operation and maintenance of an agricultural diesel engine. **Length: 120–150 words**

Your report should include:

1. **Purpose**
 - Explain the role of the engine in agricultural machinery.
2. **Operating Principle**
 - Describe how fuel and air enter the engine.
 - Explain the role of combustion.
 - Describe the movement of the piston and crankshaft.

3. Main Systems

- cooling system;
- lubrication system;
- fuel injection;
- exhaust system.

4. Efficiency and Maintenance

- explain how engine efficiency can be improved;
- explain why regular maintenance is necessary.

5. Conclusion

- summarize the importance of proper engine operation and maintenance.

Model Technical Report

Technical Report: Operation and Maintenance of an Agricultural Diesel Engine

An agricultural diesel engine is designed to provide the power required for tractors and other agricultural equipment. It converts the chemical energy of fuel into mechanical energy through the combustion process.

During operation, air enters the engine through the air intake, while the fuel injection system supplies fuel to the combustion chamber. Fuel burns and produces pressure that moves the piston inside the cylinder. The crankshaft converts this linear movement into rotary motion and transfers mechanical power to the machine.

Several systems are essential for reliable operation. The cooling system maintains a suitable operating temperature, while the lubrication system reduces friction and wear. The exhaust system removes gases produced during combustion.

Regular engine maintenance is necessary to improve engine efficiency, reduce fuel consumption, prevent breakdowns, and extend service life. Proper maintenance ensures reliable engine performance during demanding agricultural operations.

C. Report Writing Template

Use the template to plan your technical report.

Paragraph 1 — Purpose

An agricultural diesel engine is designed to _____.

It provides power for _____.

Paragraph 2 — Operating Principle

During operation, air enters the engine through _____.

Fuel is supplied by _____.

The fuel burns in _____ and produces _____.

The piston _____, while the crankshaft _____.

Paragraph 3 — Main Systems

The cooling system _____.

The lubrication system _____.

The exhaust system _____.

Paragraph 4 — Efficiency and Maintenance

Good engine efficiency helps to _____.

Regular maintenance is necessary because _____.

It can prevent _____ and extend _____.

Conclusion

In conclusion, proper engine operation and maintenance are important because _____.

Writing requirement: Use at least **8 terms** from the Key Vocabulary and maintain a **formal technical style**.

UNIT 4

HYDRAULIC AND PNEUMATIC SYSTEMS IN AGRICULTURAL MACHINERY

PART I. READING & LANGUAGE

TASK 1. GET READY TO READ

A. Think and Discuss

Discuss the questions with a partner.

1. Why are hydraulic systems important in modern tractors?
2. What agricultural machines use pneumatic systems?
3. What is the main difference between hydraulic and pneumatic systems?
4. What components can you see in a hydraulic system?
5. Why is pressure important for both systems?
6. What problems can occur if a hydraulic system is not maintained properly?

B. Look and Predict

Look at the two chains and predict what the text will explain.

Hydraulic system

Pump → Pressurized fluid → Valve → Cylinder → Controlled movement

Pneumatic system

Compressor → Compressed air → Valve → Actuator → Controlled movement

Complete the sentences:

1. A hydraulic system uses _____ to transmit power.
2. A pneumatic system uses _____.
3. A pump is associated mainly with a _____ system.
4. A compressor is associated mainly with a _____ system.
5. Both systems can produce _____ movement.

C. Think Like an Engineer

Complete the table.

System	Working medium	Main component	Typical application
Hydraulic	_____	_____	lifting heavy implements
Pneumatic	_____	_____	_____

TASK 2. KEY VOCABULARY

A. Core Vocabulary

Term	Ukrainian
hydraulic system	гідравлічна система
pneumatic system	пневматична система
hydraulic fluid	гідравлічна рідина
compressed air	стиснене повітря
pump	насос
compressor	компресор
valve	клапан
cylinder	циліндр

Term	Ukrainian
actuator	виконавчий механізм
hose	шланг
reservoir	резервуар, бак
air tank	повітряний резервуар
pressure	тиск
pressure control	контроль тиску
power transmission	передача потужності
lifting	підйом
steering	керування / рульове керування
maintenance	технічне обслуговування
leak	витік
durability	довговічність
operator effort	зусилля оператора

B. Professional Collocations

Match the words.

1	hydraulic	a	air
2	compressed	b	maintenance
3	pressure	c	effort
4	fluid	d	control
5	system	e	performance
6	machine	f	system
7	regular	g	check
8	operator	h	machinery

C. Vocabulary in Context

Complete the sentences.

1. Hydraulic systems use a _____ to transmit power.
2. Pneumatic systems operate with _____.
3. A _____ controls the direction of fluid or air.
4. Hydraulic _____ can lift heavy implements.
5. Regular _____ helps prevent system failure.
6. A small _____ can reduce system performance.

TASK 3. READ THE TEXT

Hydraulic and Pneumatic Systems in Modern Agricultural Machinery

Hydraulic and pneumatic systems are important parts of modern agricultural machinery. They transmit power and control the movement of machine components. These systems reduce operator effort and make many agricultural operations more efficient and precise.

A hydraulic system uses a liquid, usually hydraulic oil, to transmit power. A typical system includes a pump, valves, cylinders, hoses and a fluid reservoir. The pump moves the hydraulic fluid through the system, while valves control its direction and pressure. Hydraulic cylinders convert hydraulic pressure into mechanical movement. They are commonly used for lifting implements, controlling steering systems and adjusting machine components.

Pneumatic systems use compressed air instead of hydraulic fluid. Their main components include a compressor, valves, air tanks, hoses and pneumatic actuators. Pneumatic systems are generally lighter and can provide rapid movement. They are often used in seeders, sprayers and automated control devices.

The two systems have different advantages. Hydraulic systems are suitable for applications that require high force and smooth movement. Pneumatic systems can be useful when light weight, rapid movement and simple control are important.

Maintenance is essential for both systems. Hydraulic systems require regular checks of fluid levels, hoses, filters and pressure. Pneumatic systems require pressure monitoring and inspection for air leaks. Proper maintenance improves reliability, safety and service life.

The choice between hydraulic and pneumatic technology depends on the machine design, required force, operating conditions and performance requirements. Engineers must select the most suitable system for a particular application.

TASK 4. READING COMPREHENSION

A. True / False

1. Hydraulic and pneumatic systems are used only in tractors.
2. Hydraulic systems normally use oil to transmit power.
3. Pumps are important components of hydraulic systems.
4. Pneumatic systems use compressed air.
5. Pneumatic systems are generally heavier than hydraulic systems.
6. Hydraulic systems are suitable for high-force applications.
7. Maintenance is not important for pneumatic systems.
8. Engineers should consider operating conditions when selecting a system.

B. Multiple Choice

1. What does a hydraulic system use to transmit power?
A. Compressed air
B. Hydraulic fluid
C. Electricity
D. Fuel
2. What is the function of a hydraulic pump?
A. To cool the engine
B. To store compressed air
C. To move hydraulic fluid through the system
D. To reduce machine weight
3. Which system uses a compressor?
A. Hydraulic
B. Mechanical
C. Pneumatic
D. Transmission
4. Which system is generally more suitable for high-force applications?
A. Pneumatic
B. Hydraulic
C. Electrical
D. Mechanical

5. What should engineers consider when selecting a system?
- A. Machine colour
 - B. Operator age
 - C. Operating conditions and performance requirements
 - D. Fuel tank size only

C. Answer the Questions

1. What is the main function of hydraulic and pneumatic systems?
2. What are the main components of a hydraulic system?
3. How does a hydraulic cylinder work?
4. What is the main working medium of a pneumatic system?
5. Where are pneumatic systems commonly used?
6. Why are hydraulic systems suitable for heavy applications?
7. What maintenance is required for hydraulic systems?
8. What factors influence the choice between hydraulic and pneumatic systems?

PART II. PROFESSIONAL COMMUNICATION & OUTPUT

TASK 5. VOCABULARY IN CONTEXT

A. From Component to Function

Match each component with its function.

Component	Function
1. pump	a. stores hydraulic fluid
2. valve	b. produces compressed air
3. cylinder	c. controls fluid/air direction
4. compressor	d. converts pressure into movement
5. reservoir	e. moves hydraulic fluid

B. Complete the Technical Descriptions

Use: **pump – pressure – valve – cylinder – compressed air – leak**

1. A hydraulic _____ moves fluid through the system.
2. A _____ controls the direction of fluid flow.
3. A hydraulic _____ converts pressure into mechanical movement.
4. Pneumatic systems use _____ as their working medium.
5. Correct _____ is necessary for safe operation.
6. A hydraulic or pneumatic _____ can reduce system efficiency.

C. Choose the Correct Verb

1. Hydraulic systems **transmit** / **consume** power.
2. Pumps **move** / **store** hydraulic fluid.
3. Valves **control** / **produce** fluid flow.
4. Cylinders **convert** / **inspect** pressure into movement.
5. Maintenance **improves** / **damages** reliability.

TASK 6. PROFESSIONAL COMMUNICATION

A. Make the Useful Language Active while discussing the problem.

Asking about a problem

- What seems to be the problem?
- What is wrong with the system?

- Have you checked the pressure?
- Have you inspected the hoses?

Explaining a cause

- The problem may be caused by...
- A leak can reduce...
- A blocked filter can affect...
- This component may not be working properly.

Making a recommendation

- We should check...
- I recommend inspecting...
- We need to clean or replace...
- It would be better to test...

Confirming a solution

- That could be the problem.
- This should improve the system performance.
- Let's test the system under load.
- We need to monitor the pressure.

B. Read and translate Sample Professional Dialogue

Troubleshooting a Hydraulic System

Scenario: The hydraulic lift of a tractor is moving slowly.

Engineer: What seems to be the problem with the hydraulic lift?

Operator: The lift is moving very slowly and sometimes stops.

Engineer: Have you checked the hydraulic fluid level?

Operator: Yes. The fluid level seems normal.

Engineer: What about the hoses?

Operator: I found a small leak near one of the connections.

Engineer: That could be the problem. A leak can reduce system pressure.

Operator: Should we check the valves as well?

Engineer: Yes. A blocked valve can also affect fluid flow.

Operator: What about the filter?

Engineer: A clogged filter can reduce oil flow. We should clean or replace it.

Operator: After the repair, should we test the lift?

Engineer: Definitely. Test it under a standard load and monitor the pressure.

C. Complete the Dialogue

Use: **pressure – leak – filter – inspect – replace – hydraulic fluid**

Engineer: First, we need to _____ the hydraulic system.

Operator: Should I check the _____ level?

Engineer: Yes. Then inspect the hoses for a _____.

Operator: What about the _____?

Engineer: If it is clogged, we may need to _____ it.

Operator: Should we also monitor the system _____?

D. Professional Challenge

Situation

A tractor operator reports that:

- the hydraulic lift moves slowly;
- the pressure is unstable;
- there is a small oil leak.

You are the agricultural engineer.

Discuss:

1. What may be causing the problem?
2. What components should be inspected?
3. What action should be taken?
4. How should the system be tested afterwards?

TASK 7. SPEAKING PRACTICE

A. Situation-Based Speaking

Situation 1. Choosing a System

A new agricultural machine needs a power system for:

- lifting a heavy implement;
- precise movement;
- reliable operation.

Discuss whether a **hydraulic or pneumatic system** is more suitable.

Situation 2. Maintenance Advice

An operator asks:

“How can I prevent problems with the hydraulic system?”

Give at least five recommendations.

B. Mini-Presentation

Topic: Hydraulic and Pneumatic Systems in Agricultural Machinery

Time: 2–3 minutes

Suggested Structure

1. Introduction: role of fluid power systems
2. Hydraulic systems — working principle
3. Main hydraulic components
4. Pneumatic systems — working principle
5. Main pneumatic components
6. Applications of both systems
7. Advantages and limitations
8. Maintenance requirements
9. Conclusion

Useful Opening

Today I would like to talk about hydraulic and pneumatic systems used in agricultural machinery. These systems are important because they transmit power and control machine movements.

Useful Conclusion

To conclude, both systems have important applications in agricultural machinery. Hydraulic systems are generally more suitable for high-force operations, while pneumatic systems are useful for lighter and faster movements. The appropriate choice depends on machine requirements and operating conditions.

TASK 8. PROFESSIONAL WRITING

A. Summary

Task

Write an **80–100-word summary** of the text.

Include:

- the purpose of hydraulic and pneumatic systems;
- their working media;
- main components;
- applications;
- maintenance.

Model Summary

Hydraulic and pneumatic systems are important parts of modern agricultural machinery. Hydraulic systems use hydraulic fluid to transmit power and are suitable for lifting heavy implements and controlling machine components. Their main components include pumps, valves, cylinders and hoses. Pneumatic systems use compressed air and are commonly used in seeders, sprayers and automated devices. They are generally lighter and can provide rapid movement. Both systems require regular maintenance. Hydraulic systems need fluid, pressure and leak checks, while pneumatic systems require pressure monitoring and leak inspection. The choice depends on machine requirements and operating conditions.

B. Technical Report

Topic:

Design and Maintenance of Hydraulic and Pneumatic Systems in Agricultural Machinery

Write 120–150 words.

Include:

1. purpose of the systems;
2. main components;
3. typical applications;
4. advantages;
5. maintenance requirements;
6. final recommendation.

Technical Report Template

Hydraulic and pneumatic systems are important for _____.

A hydraulic system uses _____ and includes _____.

It is commonly used for _____.

A pneumatic system uses _____ and includes _____.

It is often used for _____.

The main advantage of hydraulic systems is _____, while pneumatic systems are useful because _____.

Proper maintenance requires _____.

Engineers should select the appropriate system according to _____.

Overall, _____.

Model Technical Report

Design and Maintenance of Hydraulic and Pneumatic Systems in Agricultural Machinery

Hydraulic and pneumatic systems are important for power transmission and machine control. A hydraulic system uses hydraulic fluid and includes a pump, valves, cylinders, hoses and a reservoir. It is commonly used for lifting heavy implements, steering and adjusting machine

components. A pneumatic system uses compressed air and includes a compressor, valves, air tanks and actuators. It is often used in seeders, sprayers and automated devices. Hydraulic systems provide high force and smooth movement, while pneumatic systems are generally lighter and suitable for rapid movements. Proper maintenance is essential for both systems. Hydraulic systems require regular checks of fluid levels, pressure, filters and hoses. Pneumatic systems require pressure monitoring and leak inspection. Engineers should select a system according to machine design, operating conditions and performance requirements.

FINAL PROFESSIONAL CHALLENGE

TASK 9. ROLE-PLAY

Scenario: Selecting a Power System for a New Agricultural Machine

A manufacturer is developing a new agricultural machine.

Roles

Agricultural Engineer

You evaluate technical requirements and recommend the most suitable system.

Farm Manager

You are concerned about reliability, maintenance and operating costs.

Machine Operator

You are concerned about ease of operation, safety and operator effort.

Discuss:

- required force;
- system weight;
- movement speed;
- pressure;
- maintenance;
- reliability;
- operator effort;
- final choice.

Model Decision

Agricultural Engineer: The machine requires high lifting force, so I would recommend a hydraulic system.

Farm Manager: What about maintenance?

Agricultural Engineer: It requires regular fluid, pressure and leak checks, but it provides reliable high-force operation.

Operator: Will it be easy to control?

Agricultural Engineer: Yes. Hydraulic systems can provide smooth and precise movement.

Farm Manager: Then I agree with the hydraulic option.

UNIT 5

TRACTOR TRANSMISSION SYSTEMS: MECHANICAL, HYDROSTATIC, AND CVT

PART I. READING & LANGUAGE

TASK 1. GET READY TO READ

A. Think and Discuss

Answer the questions.

1. What is the main function of a transmission system in a tractor?
2. What types of tractor transmissions do you know?
3. Why are gears used in mechanical transmissions?
4. What is important when a tractor operates under changing field conditions?
5. Why is operator comfort important in modern tractors?

B. Look and Predict

Look at the title:

“Tractor Transmission Systems: Mechanical, Hydrostatic, and CVT”

Choose **five topics** that you expect to find in the text.

- engine types
- mechanical transmissions
- hydraulic pumps and motors
- gear shifting
- fuel efficiency
- operator comfort
- harvesting methods
- CVT systems
- field conditions
- engine emissions

Useful Language

- I think the text will focus on ...
- I expect to read about ...
- One important factor is ...
- In my opinion, ...
- I would say that ...
- This is important because ...

C. Think like an Engineer

Complete the statements.

1. A tractor transmission system is designed to _____.
2. Mechanical transmissions are suitable for _____.
3. Hydrostatic transmissions are useful when _____.
4. CVT systems can improve _____ and _____.
5. The choice of transmission depends on _____.

TASK 2. KEY VOCABULARY

A. Core Vocabulary

Term	Ukrainian
transmission system	трансмiсія
mechanical transmission	механічна трансмісія

Term	Ukrainian
hydrostatic transmission	гідростатична трансмісія
continuously variable transmission (CVT)	безступенева трансмісія
gear	передача / шестерня
shaft	вал
hydraulic pump	гідравлічний насос
hydraulic motor	гідравлічний двигун
engine power	потужність двигуна
fuel efficiency	паливна економічність
precision	точність
operator effort	зусилля оператора
automated control	автоматичне керування
comfort	комфорт
field conditions	умови поля

B. Professional Collocations

Match the words to make professional collocations.

1	transfer	a	efficiency
2	manual	b	conditions
3	hydrolic	c	control
4	smooth speed	d	effort
5	Fuel	e	shifting
6	operator	f	changes
7	automated	g	pump
8	field	h	engine power

C. Complete the Sentences

Use the correct words from the box.

transmission | gears | hydraulic pump | fuel efficiency | operator effort | field conditions

1. A mechanical _____ uses gears and shafts.
2. Mechanical systems require manual shifting of _____.
3. A hydrostatic system uses a _____ and hydraulic motor.
4. CVT can improve _____.
5. Smooth speed control can reduce _____.
6. Engineers must consider _____ when selecting a transmission.

TASK 3. READ THE TEXT

Tractor Transmission Systems: Mechanical, Hydrostatic, and CVT

Modern tractors use different types of transmission systems to transfer engine power to the wheels. The main types are **mechanical, hydrostatic, and continuously variable transmissions (CVT)**. Choosing the right transmission depends on the type of farming operation, field conditions, and tractor size.

Mechanical transmissions are common in general-purpose tractors. They use gears and shafts to transfer power and require manual shifting. Mechanical transmissions are reliable, durable, and suitable for heavy loads. However, frequent gear changes can increase operator effort and reduce comfort.

Hydrostatic transmissions use hydraulic pumps and motors to transfer power. They allow smooth speed changes without shifting gears manually, which is convenient for tasks requiring variable speed and precision. Hydrostatic transmissions are often used in small to medium tractors and in specialized implements.

Continuously variable transmissions (CVT) provide a continuous range of gear ratios. CVT allows optimal engine performance, fuel efficiency, and smooth operation at different speeds. Modern tractors with CVT offer automated control and are widely used for precision farming. Each transmission type has advantages and limitations. Mechanical transmissions are strong and cost-effective, hydrostatic systems are easy to operate and precise, and CVT systems maximize efficiency and comfort. Engineers must select the right system to meet performance, economic, and ergonomic requirements.

TASK 4. READING COMPREHENSION

A. True / False

Read the text and decide whether the statements are **True (T)** or **False (F)**.

1. Mechanical transmissions are commonly used in general-purpose tractors.
2. Mechanical transmissions do not require manual gear shifting.
3. Hydrostatic transmissions use hydraulic pumps and motors.
4. Hydrostatic systems allow smooth speed changes.
5. CVT systems provide only a small number of fixed gear ratios.
6. CVT can improve fuel efficiency and operator comfort.
7. The choice of transmission depends only on tractor size.
8. Engineers should consider performance, economic, and ergonomic requirements.

B. Multiple Choice

Choose the correct answer.

1. Which transmission is common in general-purpose tractors?

- a) Hydrostatic
- b) Mechanical
- c) CVT
- d) Pneumatic

2. What does a hydrostatic transmission use to transfer power?

- a) Gears and chains
- b) Hydraulic pumps and motors
- c) Belts and pulleys
- d) Electric batteries

3. What is an important advantage of hydrostatic transmission?

- a) Manual gear shifting
- b) Low operator comfort
- c) Smooth speed changes
- d) Limited speed control

4. What is an important advantage of CVT?

- a) Fixed gear ratios
- b) Continuous speed variation
- c) Manual shifting
- d) High operator effort

5. Why are CVT systems suitable for precision farming?

- a) They require frequent gear changes.
- b) They provide smooth operation and automated control.

c) They are always the cheapest option.

d) They are used only in large tractors.

6. What should engineers consider when selecting a transmission?

a) Tractor color and design

b) Brand popularity

c) Performance, economic, and ergonomic requirements

d) Cabin size only

C. Answer the Questions

Answer in 1–2 complete sentences.

1. What is the main function of a tractor transmission system?
2. What are the main characteristics of mechanical transmissions?
3. Why are hydrostatic transmissions useful for precision tasks?
4. What advantages does CVT offer?
5. What factors should engineers consider when selecting a transmission?

PART II. PROFESSIONAL COMMUNICATION & OUTPUT

TASK 5. VOCABULARY IN CONTEXT

A. Complete the Sentences

Complete the sentences with the correct words from the box.

transmission | shifting | hydraulic pump | smooth speed changes | fuel efficiency | precise | field conditions | operator effort

1. Mechanical transmissions use gears and shafts to transfer power through the _____.
2. Manual gear _____ can increase operator effort.
3. A hydrostatic transmission uses a _____ and a hydraulic motor.
4. Hydrostatic systems allow _____ without manual gear selection.
5. CVT systems can improve _____ during long working operations.
6. Hydrostatic transmissions are useful for tasks requiring _____ speed control.
7. Engineers must consider _____ when selecting a transmission.
8. Frequent gear changes can increase _____.

B. Choose the Best Transmission

Read each situation and choose the most suitable transmission type.

- 1.** A tractor is designed for general-purpose agricultural work and heavy loads.

Mechanical / Hydrostatic / CVT

- 2.** A small tractor is used for operations requiring frequent and precise speed adjustments.

Mechanical / Hydrostatic / CVT

- 3.** A modern high-performance tractor is intended for precision farming and automated operation.

Mechanical / Hydrostatic / CVT

- 4.** The main priority is simple, reliable, and cost-effective operation.

Mechanical / Hydrostatic / CVT

- 5.** The main priorities are fuel efficiency, smooth operation, and operator comfort.

Mechanical / Hydrostatic / CVT

TASK 6. PROFESSIONAL COMMUNICATION

A. Read and translate Sample Professional Dialogue

Choosing a Transmission for a New Tractor

Agricultural Engineer: We need to select a transmission system for the new tractor model.

Farm Manager: What options should we consider?

Agricultural Engineer: The main options are mechanical, hydrostatic, and CVT transmissions.

Farm Manager: We need the tractor for heavy field operations. Which system would be suitable?

Agricultural Engineer: A mechanical transmission is a reliable option for heavy loads. It uses gears and shafts to transfer engine power.

Farm Manager: But what about operator comfort?

Agricultural Engineer: That is one of its limitations. Frequent gear shifting can increase operator effort.

Farm Manager: Could we consider a hydrostatic transmission?

Agricultural Engineer: Yes. It provides smooth speed changes and precise control without manual gear shifting.

Farm Manager: And what are the advantages of CVT?

Agricultural Engineer: CVT provides continuous speed variation, good fuel efficiency, and smooth operation. It can also include automated control.

Farm Manager: Which system would you recommend for a modern precision-farming tractor?

Agricultural Engineer: I would recommend CVT because it combines efficiency, operator comfort, and precise speed control.

Farm Manager: What is the main limitation?

Agricultural Engineer: It is generally a more expensive and complex solution.

Farm Manager: I see. We should compare performance and cost before making the final decision.

Agricultural Engineer: Exactly. The final choice should depend on field conditions, tractor requirements, and the intended operations.

B. Useful Language: Professional Consultation

1. ASK — Asking about Requirements

- What type of operations will the tractor perform?
- What type of transmission do you need?
- What loads will the tractor handle?
- How important is precise speed control?
- What are the main operating conditions?
- Is operator comfort an important requirement?

2. ANALYZE — Discussing Technical Characteristics

- The system uses...
- It is designed to...
- One important characteristic is...
- The main advantage is...
- One limitation is...
- This system is suitable for...

3. RECOMMEND — Making Recommendations

- I would recommend...

- A suitable option would be...
- You should consider...
- It would be better to choose...
- I would suggest using...

4. JUSTIFY — Explaining Advantages

- This allows the tractor to...
- This can improve...
- This helps reduce...
- This is particularly important for...
- The main benefit is...
- This solution is suitable because...

C. Useful Language Practice

Step 1. Match the Function

Match each sentence with its function.

1. What type of operations will the tractor perform?
2. The system provides smooth speed control.
3. I would recommend a CVT transmission.
4. This can improve fuel efficiency.

- a. Making a recommendation
- b. Asking about requirements
- c. Explaining an advantage
- d. Discussing technical characteristics

Step 2. Complete the Professional Phrases

Use: **recommend** | **required** | **provides** | **important** | **designed** | **reduce**

1. What type of transmission is _____?
2. The system _____ smooth speed control.
3. One _____ characteristic is fuel efficiency.
4. The transmission is _____ to operate under changing field conditions.
5. I would _____ a CVT system.
6. Smooth operation can _____ operator effort.

Step 3. Build Professional Sentences

Use the prompts to make complete sentences.

1. mechanical transmission / reliable / heavy loads
2. hydrostatic system / smooth speed changes
3. CVT / fuel efficiency / operator comfort
4. I / recommend / CVT
5. this system / reduce / operator effort
6. engineers / consider / field conditions

D. Professional Communication Challenge

Situation: Selecting a Transmission for a New Tractor

Student A — Agricultural Engineer. You must select a transmission for a new tractor.

Ask about:

- type of agricultural operations;
- tractor size;
- expected loads;
- need for precise speed control;

- operator comfort;
- fuel efficiency.

Then:

1. discuss the characteristics of the three transmission types;
2. recommend one transmission;
3. explain **at least two advantages**;
4. mention **one limitation**.

Student B — Farm Manager

You need a new tractor for:

- heavy field operations;
- changing field conditions;
- long working periods;
- precision speed control;
- comfortable operation.

You want good fuel efficiency but also need to consider the cost of the tractor.

Communication Requirement

Use:

- **at least 6 Useful Language expressions**;
- **at least 8 Key Vocabulary terms**.

Model Answer

Engineer: What type of operations will the tractor perform?

Farm Manager: It will be used for heavy field operations and long working periods.

Engineer: What about speed control and operator comfort?

Farm Manager: We need precise speed control and comfortable operation.

Engineer: In this case, I would recommend a CVT transmission. It provides smooth speed variation and good fuel efficiency.

Farm Manager: What is its main advantage over a mechanical transmission?

Engineer: It reduces the need for manual gear shifting and can improve operator comfort.

Farm Manager: What about the cost?

Engineer: CVT is generally more expensive, so we should consider the economic requirements as well.

Farm Manager: That makes sense. Let's compare the total cost and expected performance before making the final decision.

TASK 7. SPEAKING PRACTICE

A. Situation-Based Speaking

Topic: Choosing the Best Transmission for a Tractor

Imagine that you are an **agricultural engineer** advising a farm manager.

A farm needs a new tractor for different agricultural operations.

Discuss:

1. **Mechanical transmission** — reliability, heavy loads, manual shifting.
2. **Hydrostatic transmission** — smooth speed changes, precision, ease of operation.
3. **CVT** — continuous speed variation, fuel efficiency, comfort.
4. **Field conditions** — why they influence the choice.
5. **Operator requirements** — effort and comfort.
6. **Economic factors** — cost and efficiency.

Give **three technical recommendations** and explain your reasons.

Model Answer

There are three main transmission types used in modern tractors: mechanical, hydrostatic, and CVT. Mechanical transmissions are reliable and suitable for heavy loads, but they require manual gear shifting. Hydrostatic transmissions provide smooth speed changes and precise control, so they are useful for specialized operations. CVT provides continuous speed variation, good fuel efficiency, and operator comfort. For a modern tractor used in precision farming, I would recommend CVT. However, engineers should also consider field conditions, tractor size, operating requirements, and cost before making the final decision.

B. Mini-Presentation

Topic: Transmission Systems in Modern Tractors

Prepare a 2–3-minute presentation.

Follow this structure:

1. **Introduction** — What is a transmission system?
2. **Mechanical transmission** — features, advantages, limitations.
3. **Hydrostatic transmission** — operation, applications, advantages.
4. **CVT** — speed variation, fuel efficiency, comfort.
5. **Comparison** — which system is best for which conditions?
6. **Conclusion** — your recommendation.

Presentation Requirement

Use:

- 5–6 key points;
- at least 8 technical terms;
- at least 3 Useful Language expressions.

Teacher's Support

A useful comparison:

	Transmission	Main advantage	Main limitation	Suitable for
Mechanical		Reliable and cost-effective	Manual gear shifting	Heavy loads, general-purpose work
Hydrostatic		Smooth speed control	Less suitable for some heavy-load applications	Precision and variable-speed tasks
CVT		Efficiency, comfort, continuous speed variation	Higher cost and complexity	Modern and precision-farming tractors

Model Opening

Today I would like to discuss three main types of tractor transmissions: mechanical, hydrostatic, and CVT. Each system has specific advantages and limitations, so engineers must select a transmission according to field conditions and operating requirements.

Model Conclusion

In my opinion, CVT is the most suitable option for a modern precision-farming tractor because it provides smooth operation, fuel efficiency, and operator comfort. However, mechanical and hydrostatic systems can be better choices for specific agricultural operations.

TASK 8. PROFESSIONAL WRITING

A. Summary

Write a summary of the text in 80–100 words.

Include:

- the three main transmission types;

- one advantage of each;
- one limitation;
- factors influencing the choice.

Model Summary

Tractor Transmission Systems

Modern tractors use three main types of transmission: mechanical, hydrostatic, and continuously variable transmission (CVT). Mechanical systems are reliable, durable, and suitable for heavy loads, but manual gear shifting increases operator effort. Hydrostatic transmissions provide smooth speed changes and precise control, making them useful for specialized operations. CVT offers continuous speed variation, good fuel efficiency, and high operator comfort. Each system has advantages and limitations. Engineers should select a transmission according to the type of farming operation, field conditions, tractor size, performance requirements, cost, and operator needs.

B. Technical Report

Topic: Selecting a Transmission System for a Modern Tractor

Write a **120–150-word technical report**.

Your report should include:

1. purpose of the transmission system;
2. mechanical transmission;
3. hydrostatic transmission;
4. CVT;
5. comparison of advantages and limitations;
6. final recommendation.

Useful Structure

Introduction:

The transmission system is essential for...

Mechanical transmission:

It is suitable for... However,...

Hydrostatic transmission:

It provides... This makes it suitable for...

CVT:

It offers... One important advantage is...

Recommendation:

For a modern tractor used for..., I would recommend...

Model Technical Report

Selecting a Transmission System for a Modern Tractor

A transmission system is essential for transferring engine power to the wheels and controlling tractor operation. Mechanical transmissions are reliable, durable, and suitable for heavy loads and general-purpose agricultural work. However, they require manual gear shifting, which can increase operator effort. Hydrostatic transmissions provide smooth speed changes and precise control, making them suitable for operations requiring frequent speed adjustments. CVT systems offer continuous speed variation, good fuel efficiency, and improved operator comfort. They are particularly suitable for modern tractors and precision farming. However, CVT systems are generally more expensive and complex. When selecting a transmission, engineers should consider field conditions, tractor size, operating requirements, performance, cost, and operator comfort. For a high-performance precision-farming tractor, I would recommend a CVT system because of its efficiency, smooth operation, and automated control.

UNIT 6

DESIGN AND OPERATION OF SOIL TILLAGE EQUIPMENT

PART I. READING & LANGUAGE

TASK 1. GET READY TO READ

A. Think and Discuss

Answer the questions.

1. What is soil tillage?
2. Why is soil preparation important before planting?
3. What types of tillage equipment do you know?
4. What is the main function of a plow?
5. Why do engineers need to consider soil conditions when selecting tillage equipment?

B. Look and Predict

Look at the title: “**Design and Operation of Soil Tillage Equipment**”

Choose **five topics** that you expect to find in the text.

- plows
- hydraulic adjustments
- harvesting machinery
- harrows
- soil compaction
- cultivators
- engine emissions
- rotary tillers
- seedbed preparation
- tractor transmission

C. Think like an Engineer

Complete the statements.

1. A suitable tillage implement should depend on _____.
2. Plows are mainly used to _____.
3. Harrows are used to _____.
4. Cultivators are useful for _____.
5. Modern tillage equipment can use hydraulic adjustments to control _____.

TASK 2. KEY VOCABULARY

A. Core Vocabulary

Term	Ukrainian
soil tillage	обробіток ґрунту
plow	плуг
moldboard plow	корпусний плуг
disc plow	дисковий плуг
chisel plow	долотоподібний плуг
harrow	борона
tine harrow	зубова борона
disc harrow	дискова борона
cultivator	культиватор

Term	Ukrainian
rotary tiller	роторийний культиватор
seedbed	посівне ложе
aeration	аерація ґрунту
soil compaction	ущільнення ґрунту
hydraulic adjustment	гідравлічне регулювання
mounted implement	навісний агрегат
pull-type implement	причіпний агрегат

B. Professional Collocations

Match the words to make professional collocations.

1	soil	a	conditions
2	crop	b	adjustment
3	seedbed	c	residues
4	soil	d	compaction
5	hydraulic	e	tillage
6	mounted	f	implement
7	pull-type	g	implement
8	field	h	preparation

C. Complete the Sentences

Use the correct words from the box.

plow | harrow | cultivator | rotary tiller | seedbed | soil compaction

1. A _____ turns over the soil and can bury crop residues.
2. A _____ breaks clods and levels the soil.
3. A _____ loosens soil between crop rows and controls weeds.
4. A _____ uses rotating blades to mix and pulverize the soil.
5. Harrows help prepare a suitable _____ for planting.
6. Proper tillage can reduce _____.

TASK 3. READ THE TEXT

Design and Operation of Soil Tillage Equipment

Soil tillage is a critical process in agriculture that prepares the field for planting. Tillage equipment includes **plows, harrows, cultivators, and rotary tillers**. The choice of equipment depends on soil type, crop requirements, and field conditions.

Plows are used to turn over the soil, bury crop residues, and improve aeration. They can be **moldboard, disc, or chisel plows**, each designed for specific soil and field conditions.

Harrows break clods, level the soil, and refine the seedbed. **Disc harrows and tine harrows** are common, and their selection depends on soil texture and moisture.

Cultivators loosen the soil between rows and control weeds. They can be mounted on tractors or used as pull-type implements.

Rotary tillers use rotating blades to mix and pulverize the soil. They are efficient for small fields and garden plots and can reduce preparation time.

Modern tillage equipment often includes **hydraulic or mechanical adjustments** for depth, angle, and pressure. Proper design improves soil structure, reduces compaction, and increases crop yields. Engineers must balance equipment efficiency, durability, and ease of operation when developing new tillage implements.

TASK 4. READING COMPREHENSION

A. True / False

Read the text and decide whether the statements are **True (T)** or **False (F)**.

1. Soil tillage prepares the field for planting.
2. Plows are used mainly to control weeds between crop rows.
3. Moldboard, disc, and chisel plows are different types of plows.
4. Harrows can break clods and refine the seedbed.
5. Cultivators can be used to control weeds between rows.
6. Rotary tillers use rotating blades.
7. Rotary tillers are especially efficient for small fields and garden plots.
8. Modern tillage equipment cannot adjust working depth.
9. Proper tillage can reduce soil compaction.
10. Engineers should consider efficiency, durability, and ease of operation.

B. Multiple Choice

Choose the correct answer.

1. What is the main purpose of soil tillage?

- a) To harvest crops
- b) To prepare the field for planting
- c) To transport crops
- d) To increase tractor speed

2. Which implement turns over the soil?

- a) Harrow
- b) Cultivator
- c) Plow
- d) Rotary tiller

3. What is the main function of a harrow?

- a) Control engine speed
- b) Break clods and refine the seedbed
- c) Harvest crops
- d) Transport soil

4. Which implement is used to control weeds between rows?

- a) Cultivator
- b) Plow
- c) Disc harrow
- d) Rotary tiller

5. What do rotary tillers use to mix and pulverize soil?

- a) Gears
- b) Hydraulic motors
- c) Rotating blades
- d) Tines only

6. Modern tillage equipment may include hydraulic adjustments for:

- a) fuel consumption only
- b) depth, angle, and pressure
- c) engine temperature only
- d) tractor speed only

C. Answer the Questions

Answer in 1–2 complete sentences.

1. What factors influence the choice of tillage equipment?
2. What are the main functions of plows?
3. Why are harrows used after or during soil preparation?
4. What is the purpose of cultivators?
5. Where are rotary tillers particularly useful?
6. Why are hydraulic adjustments important in modern tillage equipment?
7. What should engineers balance when developing new tillage implements?

PART II. PROFESSIONAL COMMUNICATION & OUTPUT

TASK 5. VOCABULARY IN CONTEXT

A. Complete the Sentences

Complete the sentences with the correct words from the box.

plow | harrow | cultivator | rotary tiller | seedbed | soil compaction | hydraulic adjustment | field conditions

1. A _____ turns over the soil and incorporates crop residues.
2. A _____ is used to break clods and refine the seedbed.
3. A _____ loosens soil between crop rows and helps control weeds.
4. A _____ uses rotating blades to mix and pulverize the soil.
5. Proper tillage helps create a good _____ for planting.
6. Excessive traffic of heavy machinery can increase _____.
7. Modern implements may use _____ to control working depth and angle.
8. Engineers must consider _____ when selecting tillage equipment.

B. Choose the Right Implement

Read each situation and choose the most suitable implement.

1. The soil is heavy and compacted, and the field requires deep soil loosening.

Plow / Harrow / Cultivator / Rotary tiller

2. The soil surface contains large clods after primary tillage and needs leveling.

Plow / Harrow / Cultivator / Rotary tiller

3. The main task is to control weeds between crop rows.

Plow / Harrow / Cultivator / Rotary tiller

4. A small plot requires intensive soil mixing and preparation.

Plow / Harrow / Cultivator / Rotary tiller

TASK 6. PROFESSIONAL COMMUNICATION

A. Read and translate Sample Professional Dialogue

Selecting the Right Tillage Implement

Agricultural Engineer: We need to prepare this field for the next crop.

Farm Manager: What type of tillage equipment should we use?

Agricultural Engineer: First, we need to consider the field conditions. The soil is heavy and quite compacted.

Operator: Would a plow be suitable for this soil?

Agricultural Engineer: Yes. A chisel plow would be a suitable option for loosening the compacted layer.

Farm Manager: What should we use after plowing?

Agricultural Engineer: I would recommend a disc harrow to break the clods and refine the seedbed.

Operator: And how can we control weeds between the crop rows?

Agricultural Engineer: A cultivator is suitable for inter-row soil loosening and weed control.

Farm Manager: What about a rotary tiller?

Agricultural Engineer: It can be effective for finer soil preparation, especially on small fields. However, we should consider fuel consumption and the risk of excessive soil disturbance.

Operator: Can we adjust the working depth?

Agricultural Engineer: Yes. Modern implements often have hydraulic adjustments for depth, angle, and pressure.

Farm Manager: So, what is your recommendation?

Agricultural Engineer: I recommend using a chisel plow first, followed by a disc harrow. A cultivator can then be used for inter-row weed control.

Farm Manager: That seems appropriate for these field conditions.

Agricultural Engineer: Exactly. The equipment should be selected according to soil type, crop requirements, and field conditions.

B. Useful Language: Professional Consultation

1. ASK — Asking about Requirements

- What type of soil are we working with?
- What are the field conditions?
- What crop will be planted?
- What is the main tillage objective?
- How deep should the soil be loosened?
- Do we need to control weeds between rows?

2. ANALYZE — Discussing Technical Characteristics

- This implement is designed to...
- It is suitable for...
- Its main function is to...
- One important characteristic is...
- This system allows us to...
- One limitation is...

3. RECOMMEND — Making Recommendations

- I would recommend...
- A suitable option would be...
- We should consider...
- It would be better to use...
- I suggest using...

4. JUSTIFY — Explaining Advantages

- This is suitable because...
- This can improve...
- This helps reduce...
- This allows us to...
- The main advantage is...
- This is particularly useful for...

C. Useful Language Practice

Step 1. Match the Function

1. What type of soil are we working with?
 2. This implement is designed to break soil clods.
 3. I would recommend a disc harrow.
 4. This can improve the quality of the seedbed.
- a. Making a recommendation
 - b. Asking about requirements
 - c. Explaining an advantage
 - d. Discussing technical characteristics

Step 2. Complete the Phrases

Use: **recommend** | **suitable** | **designed** | **improve** | **required** | **reduce**

1. What working depth is _____?
2. A chisel plow is _____ for heavy soil.
3. This implement is _____ to loosen compacted soil.
4. I would _____ a disc harrow after plowing.
5. Proper tillage can _____ soil structure.
6. Good equipment selection can _____ soil compaction.

Step 3. Build Professional Sentences

Use the prompts to make complete sentences.

1. plow / turn over the soil / bury residues
2. harrow / break clods / refine seedbed
3. cultivator / control weeds / between rows
4. rotary tiller / small fields / efficient
5. hydraulic adjustment / control / working depth
6. engineer / consider / soil type and field conditions

D. Professional Communication Challenge

Situation: Preparing a Field for Planting

Student A — Agricultural Engineer. You have inspected a field. The field has:

- heavy soil;
- compacted areas;
- large soil clods;
- weeds between crop rows.

Recommend a sequence of tillage operations.

You should:

1. ask about the crop and field requirements;
2. analyze the soil conditions;
3. recommend suitable implements;
4. explain why each implement is needed;
5. discuss working depth and hydraulic adjustment;
6. mention one possible limitation.

Student B — Farm Manager / Operator. You need to prepare the field efficiently. Ask about:

- equipment selection;
- working depth;
- seedbed preparation;
- weed control;

- fuel consumption;
- operator effort.

Communication Requirement

Use:

- at least 6 Useful Language expressions;
- at least 8 Key Vocabulary terms;
- at least 3 different types of tillage equipment.

Model Answer

Engineer: What type of crop will be planted?

Farm Manager: We are preparing the field for the next crop. The soil is heavy and compacted.

Engineer: In this case, I would recommend a chisel plow first. It is suitable for loosening compacted soil.

Operator: What should we use after that?

Engineer: I suggest using a disc harrow. It can break clods and refine the seedbed.

Farm Manager: What about weed control?

Engineer: A cultivator is suitable for controlling weeds between rows.

Operator: Can we adjust the working depth?

Engineer: Yes. The hydraulic adjustment allows us to control the depth and pressure.

Farm Manager: What about a rotary tiller?

Engineer: It is efficient for finer soil preparation, especially in small fields, but we should consider fuel consumption and excessive soil disturbance.

Farm Manager: Good. Let's use the chisel plow, followed by the disc harrow and cultivator.

TASK 7. SPEAKING PRACTICE

A. Situation-Based Speaking

Topic: Choosing Tillage Equipment for Different Field Conditions

You are an **agricultural engineer** advising a farm manager.

For each situation, recommend the most suitable equipment and explain why.

Situation 1

Heavy, compacted soil requires deep loosening.

Your recommendation: _____

Situation 2

The field has large clods after primary tillage.

Your recommendation: _____

Situation 3

The main problem is weeds between crop rows.

Your recommendation: _____

Situation 4

A small field requires intensive soil mixing and fine preparation.

Your recommendation: _____

B. Mini-Presentation

Topic: Soil Tillage Equipment: Types and Functions

Prepare a 2–3-minute presentation.

Follow this structure:

1. **Introduction** — importance of soil tillage.
2. **Plows** — types, functions, applications.
3. **Harrows** — purpose and selection.
4. **Cultivators and rotary tillers** — applications and efficiency.
5. **Modern adjustments** — depth, angle, and pressure.
6. **Benefits** — soil structure, reduced compaction, crop yield.

Presentation Requirement

Use:

- 5–6 key points;
- at least 8 technical terms;
- at least 3 Useful Language expressions.

Model Presentation

Today I would like to discuss soil tillage equipment and its main functions. Soil tillage is important because it prepares the field for planting and improves soil conditions.

Plows are used to turn over the soil and bury crop residues. Common types include moldboard, disc, and chisel plows. **Harrows** are used to break clods, level the soil, and refine the seedbed.

Cultivators loosen the soil between crop rows and help control weeds. **Rotary tillers** use rotating blades to mix and pulverize the soil and are particularly useful in small fields.

Modern tillage equipment often has **hydraulic adjustments** for working depth, angle, and pressure. These adjustments improve precision and adaptation to field conditions.

In conclusion, I would recommend selecting tillage equipment according to soil type, crop requirements, and field conditions. Proper equipment selection can improve efficiency and protect soil quality.

TASK 8. PROFESSIONAL WRITING

A. Summary

Write a summary of the text in 80–100 words.

Include:

- the purpose of soil tillage;
- the four main types of equipment;
- their main functions;
- modern adjustments;
- the role of engineers.

Model Summary

Soil tillage is an important agricultural process that prepares fields for planting. Different implements are used for different operations. Plows turn over the soil, bury crop residues, and improve aeration, while harrows break clods and refine the seedbed. Cultivators loosen soil between rows and control weeds. Rotary tillers use rotating blades to mix and pulverize soil and are particularly useful for small fields. Modern tillage equipment can include hydraulic adjustments for depth, angle, and pressure. Engineers must select suitable equipment according to soil type, crop requirements, field conditions, efficiency, durability, and ease of operation.

B. Technical Report

Topic: Selection of Soil Tillage Equipment for a Specific Field

Write a 120–150-word technical report.

Imagine that you are an agricultural engineer selecting equipment for a farm.

Your report should include:

1. field and soil conditions;
2. required tillage operations;
3. recommended equipment;
4. working adjustments;
5. advantages and possible limitations;
6. final recommendation.

Useful Structure

Introduction:

The field under consideration has...

Problem:

The main soil-related problem is...

Equipment selection:

A suitable option would be...

Operation:

The implement can be used to...

Adjustments:

The working depth/angle/pressure should be...

Recommendation:

I would recommend...

Model Technical Report

Selection of Soil Tillage Equipment for a Specific Field

The field under consideration has heavy soil with several compacted areas and large soil clods. The main objective is to prepare a suitable seedbed while reducing excessive soil compaction. I would recommend using a chisel plow as the first tillage implement because it can loosen compacted soil and improve soil structure. A disc harrow should then be used to break clods, level the field, and refine the seedbed. For later weed control between crop rows, a cultivator would be appropriate. The working depth and pressure should be adjusted according to soil conditions. Hydraulic adjustment can improve control and precision during operation. A rotary tiller could also be considered for finer preparation, particularly in small areas, but fuel consumption should be evaluated. Overall, the selected equipment should provide an effective balance of efficiency, durability, soil protection, and ease of operation.

UNIT 7

SEEDING AND PLANTING EQUIPMENT TECHNOLOGIES

PART I. READING & LANGUAGE

TASK 1. GET READY TO READ

A. Think and Discuss

Answer the questions.

1. What is the main purpose of seeding and planting equipment?
2. Why are seed depth and spacing important?
3. What is the difference between a seed drill and a planter?
4. What crops are commonly planted with a seed drill?
5. What crops are commonly planted with a row-crop planter?
6. Why are GPS systems and sensors used in modern seeding equipment?

B. Look and Predict

Look at the words below. Which **six** do you expect to find in the text?

seed drill • planter • hopper • GPS • sensor • harvesting • VRT • seed depth • transmission • calibration • crop residues • fuel injection

C. Think Like an Engineer

Complete the statements.

1. A seed drill is mainly used for _____.
2. A planter is designed for _____.
3. The seed metering system controls _____.
4. GPS guidance can reduce _____.
5. Sensors can monitor _____.
6. VRT allows the machine to change _____.

TASK 2. KEY VOCABULARY

A. Core Vocabulary

English term	Ukrainian equivalent
seeding	висів насіння
planting	садіння / висаджування
seed drill	зернова сівалка
planter	просапна сівалка / сівалка точного висіву
row crop	просапна культура
small-grain crops	зернові культури
hopper	бункер
seed metering system	висівний апарат
metering unit	висівний механізм
furrow opener	сошник
disc opener	дисковий сошник
row unit	висівна секція
gauge wheels	опорні / регулювальні колеса
press wheels	прикочувальні колеса
seed tube	насіннєпровід
covering device	загортач

English term	Ukrainian equivalent
precision farming	точне землеробство
GPS guidance system	система GPS-навігації
sensor	датчик
real-time monitoring	моніторинг у реальному часі
variable rate technology (VRT)	технологія змінної норми висіву
seed rate	норма висіву
calibration	калібрування
soil conditions	стан ґрунту
moisture level	рівень вологості
field efficiency	ефективність роботи в полі
overlap	перекриття
gap	пропуск
no-till	нульовий обробіток ґрунту
minimum tillage	мінімальний обробіток ґрунту
soil disturbance	порушення ґрунту
crop residues	рослинні рештки
maintenance	технічне обслуговування
inspection	перевірка / огляд
adjustment	регулювання
wear	зношування
malfunction	несправність

B. Professional Collocations

Match the words to make professional collocations.

1	seed	a	conditions
2	seed	b	residues
3	planting	c	rate
4	field	d	monitoring
5	soil	e	calibration
6	crop	f	adjustment
7	hydraulic/mechanical	g	depth
8	real-time	h	efficiency

C. Vocabulary in Context

Complete the sentences with the correct word.

seed drill • planter • hopper • metering system • furrow opener • sensor • calibration • VRT

1. A _____ is mainly used for small-grain crops.
2. A _____ provides precise seed spacing for row crops.
3. The _____ stores seeds before they enter the metering system.
4. The _____ controls the amount of seed delivered to the soil.
5. A _____ creates a furrow for seed placement.
6. A _____ can detect problems with seed flow.
7. Proper _____ ensures accurate seed distribution.
8. _____ allows the seeding rate to change according to field conditions.

TASK 3. READ AND TRANSLATE THE TEXT

Seeding and Planting Equipment Technologies

Seeding and planting equipment plays a crucial role in modern agricultural engineering. Its main function is to place seeds into the soil at the correct depth, spacing, and time. Accurate seed placement is essential for uniform germination and healthy crop development.

There are two main types of equipment used for this purpose: **seed drills and planters**. Seed drills are typically used for small-grain crops such as wheat, barley, and oats. They distribute seeds continuously along rows and cover them with soil. A typical seed drill includes a hopper, seed metering system, furrow openers, and covering devices.

Planters, on the other hand, are designed for row crops such as corn, sunflower, and soybeans. They provide precise control over seed spacing and depth. A planter usually consists of seed hoppers, metering units, row units, gauge wheels, and press wheels. These components work together to ensure that individual seeds are placed at approximately equal distances.

Modern seeding technologies have significantly improved machine performance. **GPS-based guidance systems** help reduce overlap and missed areas in the field. As a result, farmers can save seeds, fuel, and time.

Another important development is the use of **electronic seed metering systems**. These systems control the number of seeds delivered to the soil and can improve accuracy compared with conventional mechanical systems. Some advanced machines are equipped with sensors that monitor seed flow, soil conditions, and machine performance in real time.

Variable Rate Technology (VRT) is also widely used in modern agriculture. It allows the seeding rate to change automatically according to field conditions such as soil type, moisture level, and nutrient availability. This helps optimize plant population and improve overall field efficiency.

In addition, **no-till and minimum-till technologies** require specialized seeding equipment. These machines are designed to work in fields with crop residues and minimal soil disturbance. They often use disc openers and strong frames to ensure stable operation under difficult conditions.

Regular maintenance and correct adjustment of seeding equipment are essential for reliable operation. Key components such as seed discs, openers, chains, and sensors should be inspected and cleaned regularly. Proper calibration of the metering system ensures accurate seed distribution and helps prevent uneven crop emergence.

In conclusion, advanced seeding and planting technologies are an important part of modern agricultural machinery. They improve efficiency, reduce input costs, and support sustainable farming practices.

TASK 4. READING COMPREHENSION

A. True or False

Read the text and decide whether the statements are **True (T)** or **False (F)**.

1. The main purpose of seeding equipment is to place seeds at the correct depth and spacing.
2. Seed drills are mainly used for crops such as corn and sunflower.
3. Planters are designed for row crops.
4. A hopper stores seeds before they are delivered to the soil.
5. Gauge wheels help control planting depth.
6. GPS guidance can reduce overlap and missed areas.
7. Electronic metering systems can improve seed placement accuracy.
8. VRT applies the same seeding rate across the whole field.

9. No-till equipment is designed for minimal soil disturbance.
10. Sensors can monitor seed flow and machine performance.
11. Calibration is important for accurate seed distribution.
12. Regular maintenance is unnecessary for modern seeding equipment.

B. Multiple Choice

Choose the correct answer.

1. What is the main function of a seed drill?

- A. To harvest crops
- B. To plant small-grain crops
- C. To prepare the soil
- D. To transport grain

2. What is the main advantage of a planter?

- A. Deep soil tillage
- B. Crop harvesting
- C. Precise seed spacing and depth
- D. Reduced tractor weight

3. What is the function of a seed metering system?

- A. To control seed delivery
- B. To open the soil
- C. To cover the seeds
- D. To control tractor speed

4. How does GPS guidance improve seeding operations?

- A. It increases seed size.
- B. It reduces overlap and missed areas.
- C. It increases soil moisture.
- D. It replaces the seed hopper.

5. What does VRT allow the operator to do?

- A. Change the seeding rate according to field conditions
- B. Increase engine power automatically
- C. Change crop type during operation
- D. Eliminate the need for calibration

6. Why is calibration important?

- A. It increases machine weight.
- B. It reduces soil moisture.
- C. It ensures accurate seed distribution.
- D. It replaces maintenance.

C. Answer the Questions

Answer in 1–2 complete sentences.

1. What is the difference between a seed drill and a planter?
2. What are the main components of a seed drill?
3. What are the main components of a planter?
4. How can GPS guidance improve seeding efficiency?
5. What information can sensors monitor?
6. How does VRT work?
7. Why are maintenance and calibration important?

TASK 5. VOCABULARY IN CONTEXT

A. Complete the Sentences

Complete the sentences with the words from the box.

seed drill • planter • hopper • metering system • gauge wheels • press wheels • sensor • calibration

1. A _____ is commonly used for wheat, barley, and oats.
2. A _____ is designed for precise planting of row crops.
3. The _____ stores seeds before they enter the metering system.
4. The _____ controls the amount of seed delivered to the soil.
5. _____ help control planting depth.
6. _____ press the soil over the seeds after planting.
7. A _____ can detect problems with seed flow during operation.
8. Proper _____ ensures accurate seed distribution.

B. Choose the Right Equipment

Read the situations and choose the most suitable equipment or technology.

1. A farmer needs to sow wheat over a large field.
→ **Seed drill**
2. A farmer needs to plant corn with precise row spacing.
→ **Planter**
3. The operator wants to monitor seed flow during operation.
→ **Sensors**
4. Different parts of the field have different soil conditions.
→ **VRT**
5. The machine produces uneven seed distribution.
→ **Check calibration and the metering system.**
6. The farm uses no-till technology and has a large amount of crop residues.
→ **Specialized no-till seeding equipment with disc openers**

Answer using the following model:

I would choose ... because ...

For example:

I would choose a planter because precise seed spacing is important for corn.

TASK 6. PROFESSIONAL COMMUNICATION

A. Read and translate Sample Professional Dialogue

Topic: Choosing Seeding Equipment for a Farm

Roles:

Agricultural Engineer — recommends suitable equipment.

Farm Manager — explains farm requirements and asks questions.

Choosing Seeding Equipment for a Farm

Farm Manager: We need new seeding equipment for the next season. What would you recommend?

Agricultural Engineer: First, we need to consider the crops you grow. What are you going to plant?

Farm Manager: Mainly wheat and corn.

Agricultural Engineer: In that case, you will need both a seed drill and a planter. A seed drill is suitable for wheat, while a planter is better for corn.

Farm Manager: What is the main advantage of a planter?

Agricultural Engineer: It provides precise control of seed spacing and depth. This helps achieve uniform crop emergence.

Farm Manager: What about the seed metering system?

Agricultural Engineer: I would recommend an electronic metering system. It can improve seed delivery accuracy.

Farm Manager: Do we really need sensors?

Agricultural Engineer: Yes. Sensors can monitor seed flow and detect problems during operation.

Farm Manager: Our fields have different soil conditions. Can the machine adapt to them?

Agricultural Engineer: Yes. I would recommend Variable Rate Technology. It can automatically adjust the seeding rate according to soil conditions.

Farm Manager: What about no-till fields with crop residues?

Agricultural Engineer: For those fields, you should consider specialized no-till equipment with disc openers.

Farm Manager: How can we ensure accurate operation?

Agricultural Engineer: Regular calibration and maintenance are essential. You should check the metering system, openers, seed tubes, and sensors before operation.

Farm Manager: So, what is your final recommendation?

Agricultural Engineer: I recommend a seed drill for wheat and a precision planter for corn, preferably with electronic metering, sensors, and VRT.

Farm Manager: That sounds like a suitable solution.

B. Useful Language: Professional Consultation

1. ASK — Asking about Requirements

- What crops are you going to plant?
- What type of soil do you have?
- What planting depth is required?
- What row spacing do you need?
- What are the field conditions?
- Do you use no-till or minimum-till technology?

2. ANALYZE — Discussing Technical Characteristics

- The machine is designed to ...
- This system controls ...
- One important characteristic is ...
- This equipment is suitable for ...
- The main function of this component is ...
- This technology allows the operator to ...

3. RECOMMEND — Making Recommendations

- I would recommend ...
- A suitable option would be ...
- You should consider ...
- I suggest using ...
- It would be better to choose ...
- For this type of crop, I would recommend ...

4. JUSTIFY — Explaining Advantages

- The main advantage is ...
- This helps improve ...
- This allows the machine to ...
- This can reduce ...
- This is particularly important for ...
- This is suitable because ...

C. Controlled Practice

Step 1. Match the Function

Match each sentence with its function.

1. What crops are you going to plant?
2. The system controls the seed delivery rate.
3. I would recommend a precision planter.
4. This can reduce seed waste.

- a. Making a recommendation
- b. Asking about requirements
- c. Explaining an advantage
- d. Discussing technical characteristics

Step 2. Complete the Professional Phrases

Use: **recommend • suitable • controls • improve • reduce • required**

1. What planting depth is _____?
2. This equipment is _____ for row crops.
3. The metering system _____ seed flow.
4. I would _____ a precision planter.
5. Electronic metering can _____ seed placement accuracy.
6. VRT can _____ seed waste in some field conditions.

Step 3. Build Professional Sentences

Use the prompts to make complete sentences.

1. planter / precise / seed spacing
2. seed drill / suitable / wheat
3. sensors / monitor / seed flow
4. VRT / adjust / seeding rate
5. calibration / ensure / accurate seed distribution
6. no-till equipment / reduce / soil disturbance

D. PROFESSIONAL COMMUNICATION CHALLENGE

Situation: Selecting Seeding Equipment

A farm is planning the next planting season.

Farm conditions:

- wheat and corn are the main crops;
- some fields have different soil conditions;
- the farm wants to reduce seed waste;
- several fields use minimum-till technology;
- accurate seed placement is important.

Student A — Agricultural Engineer. You should:

1. Ask about crops and field conditions.
2. Discuss seed depth and spacing.

3. Recommend a seed drill or planter.
4. Discuss the metering system.
5. Recommend sensors or VRT if appropriate.
6. Explain the advantages of your recommendation.

Student B — Farm Manager. You should:

1. Explain which crops you grow.
2. Describe your field conditions.
3. Ask about seed spacing and depth.
4. Ask about electronic metering.
5. Ask whether VRT is useful.
6. Ask about calibration and maintenance.

Communication Requirement. Use:

- at least 6 Useful Language expressions;
- at least 8 Key Vocabulary terms;
- both seed drill and planter;
- at least one modern technology.

Model Answer

Selecting Seeding Equipment

Engineer: What crops are you going to plant?

Farm Manager: We are going to plant wheat and corn.

Engineer: What are the field conditions?

Farm Manager: Some fields have different soil conditions, and we use minimum tillage in several areas.

Engineer: In that case, I would recommend a seed drill for wheat and a planter for corn.

Farm Manager: Why is a planter better for corn?

Engineer: A planter provides precise seed spacing and depth. This helps improve crop uniformity.

Farm Manager: What about seed control?

Engineer: I suggest using an electronic metering system and sensors. They can improve seed delivery accuracy and monitor seed flow.

Farm Manager: Can we adapt the seeding rate to different soils?

Engineer: Yes. VRT can adjust the seed rate according to field conditions.

Farm Manager: What should we do before starting work?

Engineer: Regular calibration and inspection are essential.

Farm Manager: That sounds like a good solution.

Engineer: Yes. This combination can improve accuracy, reduce seed waste, and increase field efficiency.

TASK 7. SPEAKING PRACTICE

A. Situation-Based Speaking

Situation: Choosing the Best Seeding Equipment

You are an agricultural engineer. A farm manager asks you to recommend seeding equipment. The farm:

- grows wheat, corn, and sunflower;
- has large fields;
- has different soil conditions;

- wants precise seed placement;
- wants to reduce seed waste;
- uses some no-till fields.

Discuss:

1. Which machine is suitable for wheat?
2. Which machine is suitable for corn and sunflower?
3. What seed depth and spacing should be considered?
4. What components are important?
5. Would you recommend electronic metering?
6. Are sensors useful?
7. Can VRT improve field efficiency?
8. What maintenance is required?

Student's Support

Wheat → seed drill

Corn / sunflower → planter

Precision → metering system + gauge wheels

Monitoring → sensors

Different soil conditions → VRT

No-till → specialized equipment + disc openers

Reliable operation → calibration + maintenance

Note: use the construction 'For _____ I would recommend _____ because _____.'

B. Mini-Presentation

Topic: Modern Seeding and Planting Technologies

Prepare a 2–3 minute presentation.

Follow this structure:

1. Introduction

What is the purpose of seeding and planting equipment?

2. Main Types

Seed drills and planters.

3. Applications

Small-grain crops and row crops.

4. Main Components

Hopper, metering system, openers, gauge wheels, press wheels.

5. Modern Technologies

GPS, sensors, electronic metering, VRT.

6. Benefits

Accuracy, efficiency, reduced seed waste, resource saving.

Requirements

Use:

- **8–10 technical terms;**
- **at least 3 Useful Language expressions;**
- one comparison between a seed drill and a planter;
- one example of modern technology.

Student's Support

Recommended sequence:

Seed drill → small-grain crops

Planter → row crops

Metering → seed delivery
GPS → accuracy
Sensors → monitoring
VRT → variable seeding rate
Calibration → accurate operation

Model Mini-Presentation

Modern Seeding and Planting Technologies

Today I would like to talk about modern seeding and planting technologies. The main purpose of this equipment is to place seeds at the correct depth and spacing.

There are two main types of machines: seed drills and planters. Seed drills are mainly used for small-grain crops such as wheat and barley. Planters are designed for row crops such as corn and sunflower and provide more precise seed spacing.

Important components include the hopper, seed metering system, furrow openers, gauge wheels, and press wheels. Modern machines also use GPS guidance, electronic metering systems, sensors, and Variable Rate Technology.

These technologies improve planting accuracy, reduce overlap and seed waste, and help farmers use resources more efficiently. I would recommend regular calibration and maintenance because they are essential for reliable operation.

TASK 8. PROFESSIONAL WRITING

A. Summary

Task

Write a **summary of 80–100 words** about **Seeding and Planting Equipment Technologies**.

Use this plan:

1. Main purpose of seeding equipment.
2. Difference between seed drills and planters.
3. Main components.
4. Modern technologies.
5. Main benefits.

Useful Language

The text describes ...

The main purpose of ... is ...

Seed drills are mainly used for ...

Planters are designed for ...

Modern machines use ...

These technologies help ...

In conclusion, ...

Model Summary

Seeding and Planting Equipment Technologies

Seeding and planting equipment is essential for accurate and efficient crop production. The main types are seed drills and planters. Seed drills are mainly used for small-grain crops, while planters are designed for row crops and provide precise seed spacing. Important components include hoppers, metering systems, openers, gauge wheels, and press wheels. Modern machines use GPS guidance, electronic metering systems, sensors, and Variable Rate Technology. These technologies improve seed placement, reduce overlap and seed waste, and increase field efficiency. Regular calibration and maintenance are also necessary for reliable operation and uniform crop emergence.

B. Technical Report

Topic: Selection of Seeding Equipment for a Farm

Write a **technical report of 120–150 words**.

Situation

A farm grows **wheat, corn, and sunflower**. Some fields have different soil conditions, and the farm wants to improve planting accuracy and reduce seed waste.

Your report should include:

1. **Purpose** — what equipment is required.
2. **Equipment selection** — seed drill / planter.
3. **Main components** — metering system, openers, gauge wheels, etc.
4. **Modern technologies** — GPS, sensors, VRT.
5. **Calibration and maintenance**.
6. **Expected benefits**.

Report Structure

1. Introduction

The purpose of this report is to ...

2. Equipment Selection

For wheat, ...

For corn and sunflower, ...

3. Technical Characteristics

The equipment should include ...

4. Modern Technologies

It would be useful to use ...

5. Maintenance

Regular ... is necessary ...

6. Conclusion

This solution can improve ... and reduce ...

Model Technical Report

Selection of Seeding Equipment for a Farm

The purpose of this report is to recommend suitable seeding equipment for a farm growing wheat, corn, and sunflower. The farm has different soil conditions and wants to improve planting accuracy and reduce seed waste.

For wheat, I would recommend a seed drill because it is suitable for small-grain crops. For corn and sunflower, a precision planter would be more appropriate because it provides accurate seed spacing and depth. The equipment should include reliable seed metering systems, furrow or disc openers, gauge wheels, and press wheels.

Modern technologies such as GPS guidance, sensors, and VRT can improve field efficiency and allow the seeding rate to be adjusted according to soil conditions. Regular calibration, inspection, and cleaning are also essential.

In conclusion, the recommended equipment can improve seed placement, reduce seed waste, and support efficient and sustainable farming.

UNIT 8

HARVESTING MACHINERY: COMBINES AND SPECIALIZED HARVESTERS

PART I. READING & LANGUAGE

TASK 1. GET READY TO READ

A. Think and Discuss

Answer the questions.

1. What is harvesting?
2. Why is harvesting efficiency important in modern agriculture?
3. What types of harvesting machinery do you know?
4. What crops can be harvested with a combine harvester?
5. What operations can a combine harvester perform?
6. Why are specialized harvesters used for some crops?

B. Look and Predict

Look at the words below. Which **six** words or phrases do you expect to find in the text?

combine harvester

- header
- threshing drum
- grain tank
- GPS
- yield monitoring
- planter
- potato harvester
- transmission
- cleaning system
- seed metering
- sugar beet harvester

C. Think like an Engineer

Complete the statements.

1. A combine harvester is a _____ machine.
2. The header is used to _____.
3. The threshing drum separates _____.
4. The cleaning system removes _____.
5. Specialized harvesters are designed for _____.
6. GPS and yield monitoring help farmers _____.

TASK 2. KEY VOCABULARY

A. Core Vocabulary

English Term	Ukrainian Equivalent
harvesting machinery	збиральна техніка
combine harvester	зернозбиральний комбайн
specialized harvester	спеціалізований збиральний агрегат
crop	сільськогосподарська культура
cutting	зрізання
threshing	обмолот
separating	відділення

English Term	Ukrainian Equivalent
cleaning	очищення
header	жатка
threshing drum	молотильний барабан
grain tank	зерновий бункер
impurities	домішки
productivity	продуктивність
efficiency	ефективність
labor costs	трудоі витрати
forage harvester	кормозбиральний комбайн
yield monitoring	моніторинг врожайності
automatic control	автоматичне керування

B. Professional Collocations

Match the words to make professional collocations.

1	harvesting	a	harvester
2	combine	b	costs
3	specialized	c	monitoring
4	labour	d	control
5	threshing	e	machinery
6	grain	f	drum
7	yield	g	tank
8	automatic	h	harvester

C. Complete the Professional Phrases

Complete the sentences using the words from the box.

cutting • threshing • separating • cleaning • grain tank • productivity • yield monitoring • automatic control

- The header performs the _____ operation.
- The threshing drum performs the _____ process.
- The separation system is responsible for _____ grain from the remaining crop material.
- The _____ system removes impurities from the grain.
- Clean grain is collected in the _____.
- Modern harvesting machinery can increase _____.
- _____ provides information about crop performance and field productivity.
- _____ can reduce the operator's workload.

D. Think in Systems

Complete the harvesting process using the correct terms.

header • threshing drum • separation system • cleaning system • grain tank

1. _____

↓

cuts the crop

2. _____

↓

separates grain from stalks

3. _____



separates grain from remaining crop material

4. _____



removes impurities

5. _____



stores the cleaned grain

TASK 3. READ AND TRANSLATE THE TEXT

Harvesting Machinery: Combines and Specialized Harvesters

Harvesting machinery plays a crucial role in modern agriculture. It allows farmers to collect crops quickly, efficiently, and with minimal losses. Among the most important types of harvesting equipment are **combine harvesters** and **specialized harvesters**.

A **combine harvester** is a multifunctional machine that performs several operations at the same time: **cutting, threshing, separating, and cleaning** grain. This significantly reduces labor costs and increases productivity. Combines are widely used for harvesting crops such as wheat, barley, and corn.

The main components of a combine harvester include the **header, threshing drum, separation system, and grain tank**. The header cuts the crop, while the threshing drum separates the grain from the stalks. After that, the cleaning system removes impurities before the grain is stored in the tank.

In addition to combines, there are **specialized harvesters** designed for specific crops. For example, potato harvesters, sugar beet harvesters, and forage harvesters are used in different agricultural sectors. These machines are adapted to the characteristics of each crop and provide better efficiency and quality.

Modern harvesting machinery is equipped with advanced technologies such as **GPS systems, automatic control, and yield monitoring**. These innovations help farmers optimize harvesting processes and reduce losses.

TASK 4. READING COMPREHENSION

A. True or False

Read the text and decide if the statements are **True (T)** or **False (F)**.

1. Harvesting machinery is not important in modern agriculture.
2. A combine harvester performs only one function.
3. The header is used for cutting crops.
4. Specialized harvesters are used for all types of crops.
5. Modern harvesting machinery uses advanced technologies.
6. Cleaning systems remove impurities from grain.

B. Multiple Choice

Choose the correct answer **A, B, C, or D**.

1. What is the main function of a combine harvester?

- A) Only cutting crops
- B) Performing several harvesting operations
- C) Transporting grain
- D) Storing crops

2. What does the threshing drum do?

- A) Cuts crops
- B) Stores grain
- C) Separates grain from stalks
- D) Cleans impurities

3. What is the function of the cleaning system?

- A) Cutting
- B) Separating
- C) Removing impurities
- D) Transporting grain

4. Specialized harvesters are designed for:

- A) All crops
- B) Only grains
- C) Specific crops
- D) Small farms only

5. Modern harvesting machinery often includes:

- A) Manual control only
- B) No technology
- C) GPS and automatic systems
- D) Only mechanical parts

C. Answer the Questions

1. Why is harvesting machinery important in modern agriculture?
2. What operations can a combine harvester perform?
3. What crops can combine harvesters be used for?
4. What is the function of the header?
5. What does the threshing drum do?
6. Why are specialized harvesters used?
7. What technologies are used in modern harvesting machinery?

PART II. PROFESSIONAL COMMUNICATION & OUTPUT

TASK 5. VOCABULARY IN CONTEXT

A. Complete the Sentences

Use the words from the box.

Word Bank:

combine harvester, header, threshing drum, grain tank, specialized harvester, GPS, yield monitoring, automatic control

1. A _____ performs several harvesting operations.
2. The _____ cuts the crop.
3. The _____ separates grain from stalks.
4. Clean grain is collected in the _____.
5. A _____ is designed for a specific crop.
6. _____ can help reduce overlap and optimize field operations.
7. _____ provides information about crop productivity in different areas of a field.
8. _____ can reduce the operator's workload.

B. Choose the Right Harvester

Choose the most suitable option for each situation.

- 1. A farmer needs to harvest wheat efficiently.**
 - A) Potato harvester
 - B) Combine harvester
 - C) Sugar beet harvester
- 2. A farm specializes in potato production.**
 - A) Potato harvester
 - B) Combine harvester
 - C) Forage harvester
- 3. A farmer wants to collect forage crops.**
 - A) Forage harvester
 - B) Potato harvester
 - C) Sugar beet harvester
- 4. A farmer wants to monitor crop yield during harvesting.**
 - A) Yield monitoring system
 - B) Header
 - C) Grain tank
- 5. A farmer wants to reduce the operator's workload.**
 - A) Automatic control
 - B) Threshing drum
 - C) Grain tank

TASK 6. PROFESSIONAL COMMUNICATION

A. Read and translate Sample Professional Dialogue

Choosing Harvesting Machinery

Farm Manager: We need to improve our harvesting process. We grow mainly wheat and corn. What type of machine would you recommend?

Agricultural Engineer: I would recommend a modern combine harvester for these crops. It can perform several operations at the same time.

Farm Manager: What operations can it perform?

Agricultural Engineer: It can cut, thresh, separate, and clean the grain before storing it in the grain tank.

Farm Manager: What about harvesting losses?

Agricultural Engineer: Modern combines can reduce losses through automatic control, GPS guidance, and yield monitoring.

Farm Manager: We also grow forage crops. Can we use the same machine?

Agricultural Engineer: A specialized forage harvester would be a better option for forage crops because it is designed for this specific type of crop.

Farm Manager: So we need both types of equipment?

Agricultural Engineer: Yes. A combine is suitable for grain crops, while a specialized harvester is more appropriate for specific crops such as forage.

Farm Manager: That sounds reasonable. We should compare the machines before making the final decision.

B. Useful Language: Professional Consultation

1. ASKING ABOUT REQUIREMENTS

- What crops do you need to harvest?
- What type of harvesting operation do you need?
- What are the main field conditions?
- How important is harvesting efficiency?
- Do you need yield monitoring?
- Do you need automatic control?

2. ANALYZING TECHNICAL CHARACTERISTICS

- This machine is designed to...
- Its main function is to...
- It is suitable for...
- The header is responsible for...
- The threshing drum performs...
- This system helps to...

3. MAKING RECOMMENDATIONS

- I would recommend...
- A suitable option would be...
- You should consider...
- I suggest choosing...
- It would be better to use...

4. JUSTIFYING THE CHOICE

- The main advantage is...
- This allows the machine to...
- It helps improve...
- This can reduce...
- It is particularly suitable for...
- This is important because...

Communication Algorithm

ASK → ANALYZE → RECOMMEND → JUSTIFY → FINAL DECISION

C. Practice the Useful Language

Step 1. Match the Function

1. What crops do you need to harvest?
2. This machine is designed for specific crops.
3. I would recommend a combine harvester.
4. This can reduce harvesting losses.

a) Making a recommendation

b) Asking about requirements

c) Justifying a choice

d) Analyzing technical characteristics

Step 2. Complete the Professional Phrases

Use:

recommend / suitable / advantage / reduce / designed / improve

1. I would _____ a combine harvester.
2. A specialized harvester is _____ for specific crops.
3. The main _____ of automatic control is reduced operator workload.
4. Modern technologies can _____ harvesting losses.

5. This machine is _____ to harvest grain crops.
6. Yield monitoring can help _____ harvesting efficiency.

Step 3. Build Professional Sentences

Use the prompts to make complete sentences.

1. combine harvester / several operations / performs
2. header / cut / crop
3. threshing drum / separate / grain
4. specialized harvester / specific crops
5. GPS / optimize / harvesting
6. yield monitoring / provide / information / about

D. Professional Communication Challenge

Situation

A farm grows **wheat, corn, and forage crops**. The farm manager wants to:

- increase harvesting efficiency;
- reduce crop losses;
- reduce operator workload;
- monitor yield;
- choose suitable machinery for different crops.

Student A – Agricultural Engineer

You should:

1. ask about the farm's crops and requirements;
2. analyze the available harvesting options;
3. recommend suitable equipment;
4. explain the advantages;
5. justify your recommendation.

Student B – Farm Manager

Ask the engineer about:

- machine functions;
- suitable crops;
- harvesting efficiency;
- technology;
- possible losses;
- operator workload.

Use at least:

- 6 Useful Language phrases;
- 6 vocabulary items;
- one combine harvester;
- one specialized harvester;
- two modern technologies.

Model Answer

Choosing suitable harvesting machinery

Engineer: What crops do you need to harvest?

Manager: We grow wheat, corn, and forage crops.

Engineer: I would recommend a combine harvester for wheat and corn. It can perform cutting, threshing, separating, and cleaning.

Manager: What can we use for forage crops?

Engineer: A specialized forage harvester would be a suitable option because it is designed specifically for forage crops.

Manager: Can we reduce harvesting losses?

Engineer: Yes. GPS and yield monitoring can help optimize harvesting operations and monitor field productivity.

Manager: What about the operator's workload?

Engineer: Automatic control can reduce the operator's workload and improve harvesting efficiency.

Manager: Then we should use a combine for grain crops and a specialized harvester for forage.

Engineer: I agree. This combination is the most suitable for your farm.

TASK 7. SPEAKING PRACTICE

A. Situation-Based Speaking

Choosing the Best Harvesting Equipment

You are an agricultural engineer. A farm needs to harvest:

- wheat;
- corn;
- forage crops.

The farm manager wants to:

- increase productivity;
- reduce harvesting losses;
- improve efficiency;
- monitor yield;
- reduce operator workload.

Your Task

Recommend suitable harvesting equipment and explain your choice.

Use the structure:

1. **Farm requirements**
2. **Suitable machinery**
3. **Main functions**
4. **Modern technologies**
5. **Advantages**
6. **Final recommendation**

Model Answer

The farm grows wheat, corn, and forage crops. I would recommend a combine harvester for wheat and corn because it can perform several operations, including cutting, threshing, separating, and cleaning. For forage crops, a specialized forage harvester would be more suitable. I also recommend using GPS, yield monitoring, and automatic control. These technologies can improve harvesting efficiency, reduce losses, and reduce the operator's workload.

B. Mini-Presentation

Topic: Modern Harvesting Machinery

Prepare a 2–3-minute presentation.

Include:

1. the role of harvesting machinery;
2. combine harvesters;
3. main combine components;
4. specialized harvesters;
5. modern technologies;
6. advantages for modern agriculture.

Presentation Structure

Introduction

Harvesting machinery plays an important role in modern agriculture.

Main Part

A combine harvester is a multifunctional machine. It performs...

The main components include...

Specialized harvesters are designed for...

Modern harvesting machinery uses...

Conclusion

These technologies help farmers improve efficiency and reduce harvesting losses.

Model Presentation

Harvesting machinery plays an important role in modern agriculture. It helps farmers collect crops quickly, efficiently, and with minimal losses.

One of the most important machines is the combine harvester. It can perform several operations, including cutting, threshing, separating, and cleaning. Its main components include the header, threshing drum, separation system, and grain tank.

Specialized harvesters are designed for specific crops. For example, potato harvesters, sugar beet harvesters, and forage harvesters are adapted to particular crops.

Modern harvesting machinery also uses GPS, automatic control, and yield monitoring. These technologies help optimize harvesting operations, reduce losses, and improve productivity.

In conclusion, modern harvesting machinery makes harvesting more efficient and supports sustainable agricultural production.

TASK 8. PROFESSIONAL WRITING

A. Write a Summary

Task

Write an **80–100-word summary** of the text *Harvesting Machinery: Combines and Specialized Harvesters*.

Include:

- the role of harvesting machinery;
- combine harvesters;
- main components and operations;
- specialized harvesters;
- modern technologies.

Useful Language

- The text deals with...
- The main purpose of...
- A combine harvester...
- The main components include...
- Specialized harvesters...
- Modern technologies such as...
- These technologies help...

Model Summary

The text deals with harvesting machinery used in modern agriculture. Combine harvesters are multifunctional machines that perform cutting, threshing, separating, and cleaning operations. Their main components include the header, threshing drum, separation system, and grain tank. Specialized harvesters are designed for specific crops such as potatoes, sugar beet, and forage crops. Modern harvesting machinery uses technologies such as GPS, automatic control, and yield monitoring. These technologies help farmers optimize harvesting processes, reduce losses, improve efficiency, and increase productivity.

B. Technical Report

Topic: Selection of Harvesting Machinery for a Farm

Write a **120–150-word technical report**.

Your report should include:

1. farm crops;
2. recommended harvesting machinery;
3. main machine functions;
4. modern technologies;
5. expected advantages.

Technical Report Template

TECHNICAL REPORT

Subject: Selection of Harvesting Machinery

Farm profile:

The farm grows _____.

Recommended machinery:

For grain crops, I recommend _____.

For specific crops, a suitable option is _____.

Machine functions:

The combine can _____.

Modern technologies:

The machinery should be equipped with _____.

Expected benefits:

These technologies can help _____.

Conclusion:

Therefore, _____.

Model Technical Report

Subject: Selection of Harvesting Machinery

The farm grows wheat, corn, and forage crops. For grain crops, I recommend using a modern combine harvester because it can perform several operations, including cutting, threshing, separating, and cleaning. The main components are the header, threshing drum, separation system, and grain tank. For forage crops, a specialized forage harvester would be a more suitable option.

The harvesting machinery should be equipped with GPS, automatic control, and yield monitoring. These technologies can help optimize harvesting operations, reduce losses, and improve productivity. Automatic control can also reduce the operator's workload.

Conclusion: The combination of a combine harvester and specialized forage harvester is suitable for the farm because it provides efficient harvesting of different crops.

FINAL LESSON CHECK

Complete the sentences.

1. A combine harvester is a _____ machine.
2. The _____ cuts the crop.
3. The _____ separates grain from stalks.
4. The cleaning system removes _____.
5. A _____ harvester is designed for a specific crop.
6. GPS can help _____ harvesting operations.
7. _____ monitoring provides information about crop productivity.
8. Automatic control can reduce the _____ workload.

Key professional contrast for Unit 8

Combine harvester	Specialized harvester
Multifunctional	Designed for a specific crop
Wheat, barley, corn	Potatoes, sugar beet, forage crops
Cutting	Crop-specific harvesting operations
Threshing	Adapted to crop characteristics
Separating	Better suitability for a particular crop
Cleaning	Specific harvesting technology

UNIT 9

PRECISION AGRICULTURE AND SMART FARMING EQUIPMENT

PART I. READING & LANGUAGE

TASK 1. GET READY TO READ

A. Think and Discuss

Answer the questions.

1. What is precision agriculture?
2. Why do farmers need accurate field data?
3. What technologies can help farmers monitor field conditions?
4. How can GPS improve agricultural operations?
5. Why is it important to control the application of fertilizers and pesticides?
6. What advantages can smart farming equipment provide?

B. Look and Predict

Before reading, choose the words you expect to see in the text.

Word Bank:

- *precision agriculture*
- *sensors*
- *GPS*
- *data analytics*
- *VRT*
- *soil variability*
- *crop yield*
- *autonomous machines*
- *transmission*
- *threshing drum*
- *real-time data*
- *monitoring*

C. Think Like an Engineer

Complete the technology → function → benefit chain.

Technology	Main Function	Benefit
GPS	_____	_____
Sensors	_____	_____
VRT	_____	_____
Data analytics	_____	_____
Autonomous machines	_____	_____

TASK 2. KEY VOCABULARY

A. Core Vocabulary

English Term	Ukrainian Equivalent
precision agriculture	точне землеробство
smart farming equipment	розумна сільськогосподарська техніка
sensors	датчики
GPS navigation	GPS-навігація

English Term	Ukrainian Equivalent
data analytics	аналітика даних
variable rate technology (VRT)	технологія змінної норми внесення
soil variability	варіативність ґрунту
field conditions	польові умови
crop yield	урожайність
input application	внесення ресурсів
real-time data	дані в реальному часі
monitoring systems	системи моніторингу
decision-making	прийняття рішень
operational efficiency	операційна ефективність
autonomous machines	автономні машини
semi-autonomous machines	напівавтономні машини
resource consumption	використання ресурсів
sustainability	сталий розвиток

B. Professional Collocations

Match the words.

1	precision	a	variability
2	smart farming	b	yield
3	GPS	c	technology
4	real-time	d	effeciency
5	soil	e	agriculture
6	crop	f	equipment
7	variable rate	g	navigation
8	operational	h	data
9	autonomous	i	machines
10	resourse	j	consumption

C. Complete Professional Phrases

Use the words:

monitor / adjust / collect / improve / reduce / support

1. Sensors _____ field conditions.
2. Sensors _____ data about soil and crops.
3. VRT can _____ input application rates.
4. Data analytics _____ decision-making.
5. Smart equipment can _____ operational efficiency.
6. Precision agriculture can _____ resource waste.

D. Think in Systems

Complete the chain:

Sensors → Data → Analysis → Decision → Action → Result

TASK 3. READ THE TEXT

Precision Agriculture and Smart Farming Equipment

Precision agriculture is an advanced approach to farming that uses digital technologies to optimize agricultural production. It focuses on increasing productivity while reducing costs, environmental impact, and resource consumption.

Smart farming equipment plays a key role in this process. Modern agricultural machines are equipped with **GPS navigation systems, sensors, data analytics tools, and automated control systems**. These technologies allow farmers to monitor field conditions, analyze soil variability, and apply inputs such as fertilizers, seeds, and pesticides with greater accuracy.

One of the most important technologies in precision agriculture is **Variable Rate Technology (VRT)**. It enables machinery to adjust the application rate of inputs according to specific field conditions. As a result, farmers can avoid overuse of fertilizers and chemicals and use resources more efficiently.

Another important feature is **real-time data collection**. Sensors installed on machines can measure soil moisture, temperature, and crop conditions. This data is processed by software systems and supports better decision-making. Farmers can use this information to adjust field operations according to actual conditions.

Autonomous and semi-autonomous machines are also becoming increasingly important. These machines use technologies such as GPS, sensors, and automated control systems to perform field operations with minimal human intervention. For example, autonomous tractors can follow predefined routes and operate accurately across a field.

However, precision agriculture also presents challenges. The implementation of smart farming technologies requires significant investment, technical knowledge, and operator training. Farmers need to understand how to use digital systems and interpret data correctly.

Overall, precision agriculture and smart farming equipment can improve **efficiency, productivity, resource management, and sustainability**. Their main advantage is the ability to make agricultural operations more accurate and data-driven.

TASK 4. READING COMPREHENSION

A. True / False

1. Precision agriculture uses digital technologies to optimize farming.
2. GPS systems are not used in smart farming.
3. Sensors can collect information about soil and crop conditions.
4. VRT changes input application rates according to field conditions.
5. Real-time data can support decision-making.
6. Autonomous machines always require direct human control.
7. Smart farming can reduce resource waste.
8. Precision agriculture does not require technical knowledge.

B. Multiple Choice

1. What is the main goal of precision agriculture?

- A) Increase manual labor
- B) Optimize agricultural production
- C) Eliminate agricultural machinery
- D) Increase resource consumption

2. What do sensors collect?

- A) Only machine speed
- B) Soil and crop data
- C) Grain for storage
- D) Fuel

3. What does VRT adjust?

- A) Input application rates
- B) Tractor color
- C) Grain storage temperature
- D) Machine weight

4. What does data analytics support?

- A) Manual harvesting
- B) Decision-making
- C) Fuel production
- D) Crop storage

5. What is an advantage of autonomous machines?

- A) More manual work
- B) Minimal human intervention
- C) Higher resource waste
- D) Lower accuracy

6. What is one challenge of precision agriculture?

- A) Lack of technology
- B) No need for training
- C) Significant investment and technical knowledge
- D) Reduced productivity

C. Answer the Questions

1. What is precision agriculture?
2. What technologies are used in smart farming equipment?
3. How does VRT work?
4. What information can sensors collect?
5. How does real-time data support farmers?
6. What are the advantages of autonomous machines?
7. What challenges can farmers face when implementing precision agriculture?

PART II. PROFESSIONAL COMMUNICATION & OUTPUT

TASK 5. VOCABULARY IN CONTEXT

A. Complete the Sentences

Use the words from the box. **Word Bank:**

sensors, GPS, VRT, data analytics, soil variability, crop yield, autonomous machines, efficiency

1. _____ collect information about soil and crop conditions.
2. _____ helps agricultural machines navigate fields accurately.
3. _____ adjusts input application rates according to field conditions.
4. _____ helps farmers analyze field data.
5. _____ means differences in soil conditions across a field.
6. Precision agriculture can increase _____.
7. _____ can perform operations with minimal human intervention.
8. Smart farming technologies can improve operational _____.

B. Choose the Right Technology and explain your choice.

Use the construction: **I would recommend**_____ **because it helps**_____.

1. A farmer wants to navigate a tractor accurately across a large field.

GPS

2. A farmer needs information about soil moisture.

Sensors

3. Different parts of the field require different fertilizer rates.

VRT

4. A farmer needs to analyze large amounts of field data.

Data analytics

5. A farm wants to reduce direct operator control.

Autonomous machinery

6. A farmer wants to monitor crop productivity in different areas.

Yield monitoring / sensors

TASK 6. PROFESSIONAL COMMUNICATION

A. Read and translate Sample Professional Dialogue

Choosing Smart Farming Technologies

Farm Manager: We want to improve efficiency on our farm. Which precision agriculture technologies would you recommend?

Agricultural Engineer: First, I would recommend GPS-guided machinery and sensors. They can help you monitor field conditions and improve accuracy.

Farm Manager: We have different soil conditions across the field. Can technology help with that?

Engineer: Yes. I suggest using Variable Rate Technology. It can adjust fertilizer application rates according to soil variability.

Farm Manager: What about data? We collect a lot of information, but we do not always know how to use it.

Engineer: Data analytics can help. It processes field data and supports better decision-making.

Farm Manager: We also want to reduce the operator's workload.

Engineer: In that case, you should consider automated or semi-autonomous equipment. These systems can perform some operations with minimal human intervention.

Farm Manager: What is the main challenge?

Engineer: The initial investment and operator training. However, these technologies can improve efficiency and reduce resource waste in the long term.

Farm Manager: So, we should start with GPS, sensors, and VRT?

Engineer: Yes. That would be a suitable first step for your farm.

B. Useful Language: Technical Consultation

ASKING ABOUT REQUIREMENTS

- What are your main farming operations?
- What are the field conditions?
- Do you have significant soil variability?

- What problems do you want to solve?
- How important is resource efficiency?
- Do you want to reduce operator workload?

ANALYZING

- The system is designed to...
- This technology allows the machine to...
- It is suitable for...
- The main function is to...
- This system uses data from...
- It can adjust...

RECOMMENDING

- I would recommend...
- A suitable option would be...
- You should consider...
- I suggest using...
- It would be better to choose...

JUSTIFYING

- The main advantage is...
- This can improve...
- This helps reduce...
- This allows farmers to...
- This is particularly useful when...
- The main reason is that...

C. Controlled Practice

Step 1. Match the Function

1. What problems do you want to solve?
2. This technology adjusts input application rates.
3. I would recommend using sensors.
4. This can reduce resource waste.

a) Recommendation

b) Asking about requirements

c) Justification

d) Analysis

Step 2. Complete the Phrases

1. I would _____ GPS-guided machinery.
2. You should _____ using sensors.
3. This technology can _____ efficiency.
4. VRT can _____ resource waste.
5. A suitable _____ would be VRT.
6. The main _____ is better resource management.

Step 3. Build Professional Sentences

1. sensors / monitor / field conditions
2. GPS / improve / navigation
3. VRT / adjust / input rates
4. data analytics / support / decision-making
5. autonomous machines / reduce / manual intervention

D. PROFESSIONAL COMMUNICATION CHALLENGE

Situation

A farm has:

- large fields;
- different soil conditions;
- high fertilizer costs;
- problems with resource waste;
- a shortage of skilled operators.

The farm manager wants to introduce **precision agriculture technologies**.

Student A – Agricultural Engineer

Ask about the farm's requirements and recommend suitable technologies.

You should discuss:

- GPS;
- sensors;
- VRT;
- data analytics;
- automated/autonomous equipment.

Student B – Farm Manager

Explain the farm's problems and ask:

- How much will the technology improve efficiency?
- Can it reduce fertilizer waste?
- What data will sensors collect?
- Will operators need training?
- Is the investment justified?

Student's Support. Follow the scheme:

ASK

What are the problems?

↓

ANALYZE

Which technology solves each problem?

↓

RECOMMEND

Choose suitable technologies.

↓

JUSTIFY

Explain benefits and challenges.

↓

DECIDE

Make a final recommendation.

Model Answer

I would recommend starting with GPS and sensors because they will provide accurate field data. Since the soil conditions vary across the field, VRT would also be useful. It can adjust fertilizer application rates and reduce waste. Data analytics can help the farm manager make better decisions. Finally, automated equipment can reduce operator workload. The main challenge is the initial investment and staff training, but the long-term improvement in efficiency can justify the cost.

TASK 7. SPEAKING PRACTICE

A. Situation-Based Speaking

Precision Farming Solution for a Modern Farm

You are an agricultural engineer.

A farm wants to:

- improve productivity;
- reduce fertilizer waste;
- monitor soil conditions;
- make better decisions;
- reduce operator workload.

Your Task

Recommend **three precision agriculture technologies**.

Explain:

1. What technology you recommend.
2. What it does.
3. Why the farm needs it.
4. What benefit it provides.
5. What challenge the farm may face.

Student's Support

Possible combinations:

GPS + sensors + VRT

or

GPS + data analytics + autonomous machinery

or

Sensors + VRT + automated control

Model Answer

I would recommend three technologies: GPS, sensors, and VRT. GPS will improve machine navigation and reduce overlap. Sensors will collect information about soil and crop conditions. VRT will adjust fertilizer application according to field variability. Together, these technologies can reduce resource waste and improve efficiency. The main challenge is the cost of implementation and the need for operator training.

B. Mini-Presentation

Topic: Precision Agriculture and Smart Farming Equipment

Prepare a **2–3-minute presentation**.

Structure

1. Introduction

What is precision agriculture?

2. Main Technologies

GPS → sensors → data analytics → VRT → automation

3. How They Work Together

Data → analysis → decision → action

4. Benefits

Efficiency → productivity → resource management → sustainability

5. Challenges

Investment → technical knowledge → training

6. Conclusion

Why is smart farming important?

Useful Presentation Language

- Precision agriculture is...
- One important technology is...
- Sensors are used to...
- VRT allows farmers to...
- The collected data...
- As a result...
- This helps to...
- One major advantage is...
- However, implementation requires...
- In conclusion...

Model Presentation

Precision Agriculture and Smart Farming Equipment

Precision agriculture is a modern approach that uses digital technologies to improve agricultural production. It helps farmers increase productivity, reduce costs, and use resources more efficiently.

Several technologies play an important role in precision farming. GPS systems provide accurate navigation, while sensors collect information about soil and crop conditions. Data analytics processes this information and supports decision-making. Another important technology is VRT, which adjusts input application rates according to field conditions.

These technologies work together. Sensors collect data, digital systems analyze it, and farmers or machines use the information to adjust field operations. As a result, resource waste can be reduced and efficiency can be improved.

However, smart farming requires investment, technical knowledge, and operator training. In conclusion, precision agriculture makes farming more accurate, efficient, and sustainable.

TASK 8. PROFESSIONAL WRITING

A. Summary

Task

Write an **80–100-word summary** of the text **Precision Agriculture and Smart Farming Equipment**.

Use the structure:

definition → technologies → applications → benefits → challenges

Useful Language

- The text deals with...
- Precision agriculture is...
- Modern equipment uses...
- These technologies allow...
- VRT helps...
- Autonomous machines...
- However...
- Overall...

Model Summary

The text deals with precision agriculture and smart farming equipment. Precision agriculture uses digital technologies to improve productivity, efficiency, and resource management. Modern agricultural machines use GPS, sensors, data analytics, and automated control systems. VRT adjusts input application rates according to field conditions, while sensors collect real-time data about soil and crops. Autonomous machines can perform field operations with minimal human

intervention. These technologies reduce resource waste and improve decision-making. However, their implementation requires significant investment, technical knowledge, and operator training. Overall, smart farming supports more accurate, efficient, and sustainable agricultural production.

B. Technical Report

Topic: Smart Farming Technologies for a Modern Farm

Write a 120–150-word technical report.

Include:

1. farm requirements;
2. recommended technologies;
3. their functions;
4. expected benefits;
5. possible challenges;
6. final recommendation.

Technical Report Template

TECHNICAL REPORT

Subject: Smart Farming Technologies for a Modern Farm

1. Farm Requirements

The farm needs to _____.

2. Recommended Technologies

I recommend using _____.

3. Main Functions

GPS can _____.

Sensors can _____.

VRT can _____.

4. Expected Benefits

These technologies can _____.

They can also _____.

5. Challenges

The main challenges are _____.

6. Conclusion

Overall, I recommend _____ because _____.

Model TECHNICAL REPORT

Subject: Smart Farming Technologies for a Modern Farm

The farm operates large fields with significant variation in soil conditions. The main objectives are to improve efficiency, reduce fertilizer waste, and make better decisions based on field data.

I recommend implementing GPS-guided machinery, sensors, and Variable Rate Technology. GPS can improve machine navigation and reduce overlap. Sensors can collect real-time information about soil moisture, temperature, and crop conditions. VRT can adjust fertilizer application rates according to field variability.

These technologies can improve resource management, reduce waste, and increase operational efficiency. However, implementation requires significant investment and operator training.

Overall, the recommended technologies can provide long-term benefits and support more accurate and sustainable farming.

UNIT 10. DIAGNOSTICS AND MONITORING SYSTEMS IN FARM MACHINERY

PART I. READING & LANGUAGE

TASK 1. GET READY TO READ

A. Think and Discuss

1. What kinds of problems can occur in farm machinery?
2. Why is early fault detection important?
3. What machine parameters can sensors monitor?
4. How can monitoring systems help operators?
5. What is predictive maintenance?
6. How can telematics improve machinery management?

B. Look and Predict

Which words are most likely to appear in the text?

- diagnostics system
- sensor
- fault detection
- predictive maintenance
- downtime
- telematics
- grain tank
- fuel consumption
- remote monitoring
- system alerts
- threshing drum
- data analysis

C. Think Like an Engineer

Complete the chain.

Technology / System	What does it do?	Why is it useful?
Sensors	collect machine data	detect abnormal conditions
Monitoring system	_____	_____
Diagnostics system	_____	_____
Predictive maintenance	_____	_____
Telematics	_____	_____

TASK 2. KEY VOCABULARY

A. Core Vocabulary

English Term	Ukrainian Equivalent
diagnostics system	система діагностики
monitoring system	система моніторингу
fault detection	виявлення несправностей
predictive maintenance	прогнозне технічне обслуговування
equipment failure	відмова обладнання
onboard computer	бортовий комп'ютер
sensor data	дані датчиків

English Term	Ukrainian Equivalent
vibration	вібрація
fuel consumption	витрата палива
engine load	навантаження двигуна
operational parameters	робочі параметри
downtime	простої
wear	зношування
telematics	телематика
remote monitoring	дистанційний моніторинг
data analysis	аналіз даних
system alerts	сигнали системи
maintenance scheduling	планування обслуговування
abnormal conditions	аномальні умови
performance optimization	оптимізація роботи

B. Professional Collocations

Match the words.

1	fault	a	load
2	predictive	b	monitoring
3	equipment	c	scheduling
4	fuel	d	failure
5	engine	e	consumption
6	remote	f	detection
7	maintenance	g	alerts
8	system	h	maintenance

C. Complete the Professional Phrases

Use:

detect · monitor · reduce · schedule · collect · improve · provide · analyze

1. Sensors _____ machine data.
2. Monitoring systems _____ machine performance.
3. Diagnostics systems _____ faults.
4. Data analytics _____ sensor information.
5. Predictive maintenance helps _____ maintenance.
6. Telematics can _____ remote access to data.
7. These systems can _____ downtime.
8. Monitoring systems _____ operational efficiency.

D. Think in Systems

Put the processes in the correct order: **maintenance decision · sensor data · machine condition · data analysis · fault detection · system alert**

TASK 3. READ THE TEXT

Diagnostics and Monitoring Systems in Farm Machinery

Modern agricultural machinery is increasingly equipped with advanced diagnostics and monitoring systems that improve performance, reliability, and maintenance efficiency. These systems allow operators and engineers to detect faults, monitor machine conditions, and prevent equipment failure.

Diagnostics systems are designed to identify technical problems in machinery components such as engines, hydraulic systems, and transmission units. They use onboard computers and sensors to collect data on temperature, pressure, vibration, and fuel consumption. This data is analyzed in real time to detect abnormal operating conditions.

Monitoring systems provide continuous information about machine performance and working parameters. For example, they track engine load, fuel efficiency, and operational speed. This helps operators optimize machine performance and reduce unnecessary wear.

One of the key advantages of modern diagnostics systems is predictive maintenance. Instead of repairing machinery after a breakdown, farmers can schedule maintenance based on data analysis. This approach reduces downtime and lowers repair costs.

Telematics systems also play an important role. They allow remote monitoring of machinery through wireless communication technologies. Farmers and technicians can access machine data via mobile devices or computer platforms, which improves decision-making and operational control.

Despite these advantages, diagnostics systems require proper training and technical knowledge. Operators must understand how to interpret data and respond to system alerts correctly.

In conclusion, diagnostics and monitoring systems are essential for modern farm machinery, as they increase efficiency, reduce failures, and support sustainable agricultural practices.

TASK 4. READING COMPREHENSION

A. True / False

1. Diagnostics systems are used only after machine failure.
2. Sensors collect data about machine conditions.
3. Monitoring systems provide continuous performance information.
4. Predictive maintenance increases downtime.
5. Telematics allows remote access to machine data.
6. Diagnostics systems eliminate the need for operator training.
7. Monitoring systems can help optimize machine performance.
8. Predictive maintenance can reduce repair costs.

B. Multiple Choice

1. What is the main purpose of diagnostics systems?
A. To increase fuel consumption
B. To detect faults and monitor machine condition
C. To replace operators
D. To store crops
2. Monitoring systems help operators:
A. track machine performance
B. remove sensors
C. stop all machinery
D. increase wear
3. Predictive maintenance is based mainly on:
A. random decisions
B. machine age only

- C. data analysis
- D. manual work only
- 4. Telematics provides:
 - A. remote monitoring
 - B. mechanical transmission
 - C. crop storage
 - D. seed metering
- 5. One major advantage of diagnostics systems is:
 - A. increased downtime
 - B. early fault detection
 - C. higher fuel consumption
 - D. reduced productivity
- 6. A major challenge is:
 - A. lack of machinery
 - B. need for technical knowledge and training
 - C. absence of sensors
 - D. inability to collect data

C. Answer the Questions

1. What data can sensors collect?
2. How do monitoring systems help operators?
3. What is predictive maintenance?
4. Why is early fault detection important?
5. How does telematics work?
6. What are the main benefits of diagnostics systems?
7. What knowledge do operators need?

PART II. PROFESSIONAL COMMUNICATION & OUTPUT

TASK 5. VOCABULARY IN CONTEXT

A. Complete the sentences

Use:

sensors · diagnostics system · predictive maintenance · downtime · telematics · system alerts · fuel consumption · remote monitoring

1. _____ collect information about machine conditions.
2. A _____ can detect technical problems.
3. _____ helps schedule maintenance before failure.
4. Early fault detection can reduce _____.
5. _____ allows access to machine data from a distance.
6. Operators receive _____ when parameters exceed normal limits.
7. Monitoring systems can track _____.
8. _____ improves decision-making and operational control.

TASK 6. PROFESSIONAL COMMUNICATION

A. Read and translate Sample Professional Dialogue

Preventing Unexpected Machinery Failures

Farm Operator: We have had several unexpected tractor breakdowns this season. We need to reduce downtime.

Agricultural Engineer: I would recommend implementing a diagnostics and monitoring system.

Farm Operator: What information can the system provide?

Agricultural Engineer: Sensors can collect data on temperature, pressure, vibration and fuel consumption. The system can analyze this data in real time.

Farm Operator: Can it detect a problem before the machine fails?

Agricultural Engineer: Yes. It can identify abnormal conditions and generate system alerts.

Farm Operator: How can this improve maintenance?

Agricultural Engineer: You can use predictive maintenance. Instead of waiting for a breakdown, you can schedule maintenance based on data analysis.

Farm Operator: What about remote monitoring?

Agricultural Engineer: Telematics allows technicians and farm managers to access machine data remotely.

Farm Operator: That sounds useful, but will our operators need special training?

Agricultural Engineer: Yes, some training is necessary. Operators need to understand the data and respond to system alerts correctly.

Farm Operator: Then I think we should introduce the system gradually, starting with our tractors.

B. USEFUL LANGUAGE

IDENTIFYING THE PROBLEM

- We have experienced several...
- The main problem is...
- We need to reduce...
- We are concerned about...

ASKING ABOUT REQUIREMENTS

- What problems are you experiencing?
- What data do you need?
- How often does the machine fail?
- Which components require monitoring?
- How important is remote monitoring?

ANALYZING

- The system is designed to...
- The main function is to...
- It collects data on...
- This allows the operator to...
- The system can detect...

RECOMMENDING

- I would recommend...
- A suitable option would be...

- You should consider...
- I suggest implementing...
- It would be better to...

JUSTIFYING

- The main advantage is...
- This can reduce...
- This helps prevent...
- This allows you to...
- This is particularly useful because...

DECIDING

- I think we should...
- That sounds suitable.
- Let's start with...
- We will implement...
- We need to consider...

C. CONTROLLED PRACTICE

Step 1. Match the function

1. What problems are you experiencing?
2. The system collects real-time data.
3. I would recommend predictive maintenance.
4. This can significantly reduce downtime.

a. Recommend

b. Ask

c. Justify

d. Analyze

Step 2. Complete the phrases

1. I would _____ implementing a monitoring system.
2. The system is designed to _____ faults.
3. This can _____ downtime.
4. The main _____ is early fault detection.
5. You should _____ predictive maintenance.
6. The system can _____ real-time data.

Step 3. Build professional sentences

Use the prompts.

1. sensors / collect / machine data
2. diagnostics / detect / faults
3. monitoring / track / performance
4. predictive maintenance / reduce / downtime
5. telematics / provide / remote access

★ D. PROFESSIONAL COMMUNICATION CHALLENGE

Situation: A Farm with Frequent Machinery Failures

A farm has a fleet of tractors and other agricultural machines.

The farm has several problems:

- unexpected machinery failures;
- high downtime;
- increasing repair costs;

- insufficient information about machine condition;
- operators sometimes notice problems too late.

The farm manager wants to improve maintenance but is not sure which solution to introduce.

Available solutions:

A. Basic monitoring system

Provides information about machine performance.

B. Diagnostics system with sensors

Collects data and detects abnormal conditions.

C. Predictive maintenance system

Uses data analysis to schedule maintenance before failure.

D. Telematics

Provides remote access to machine data.

Student A — Agricultural Engineer

Your task:

1. identify the farm's main problem;
2. ask the manager about requirements;
3. analyze the situation;
4. recommend **one or more solutions**;
5. explain the advantages;
6. discuss possible training requirements;
7. make a final recommendation.

You should use:

- at least **5 professional terms**;
- at least **5 Useful Language phrases**;
- at least **2 reasons** for your recommendation.

Student B — Farm Manager

You have to:

1. explain the current problems;
2. answer the engineer's questions;
3. ask about:
 - cost/effectiveness;
 - downtime;
 - training;
 - remote monitoring;
4. express one concern;
5. make the final decision.

STUDENT'S LOGICAL SUPPORT

Не намагайтеся одразу говорити англійською «з нуля». Рухайтесь за схемою:

STEP 1 — IDENTIFY

Our main problem is...

STEP 2 — ASK

What information do we need?

Which machines have the most problems?

STEP 3 — ANALYZE

The system can...

It collects...

This allows us to...

STEP 4 — RECOMMEND

I would recommend...

STEP 5 — JUSTIFY

The main advantage is...

This can reduce...

This is useful because...

STEP 6 — DECIDE

I think we should...

MODEL ANSWER

Engineer: What is the main problem with your machinery?

Manager: We have frequent breakdowns and high downtime. Operators often notice problems too late.

Engineer: What information about machine condition do you currently have?

Manager: We have basic monitoring, but we need more detailed data.

Engineer: In this case, I would recommend a diagnostics system with sensors and predictive maintenance.

Manager: What would be the main advantage?

Engineer: Sensors can collect data on temperature, pressure, vibration and fuel consumption. The system can detect abnormal conditions early.

Manager: And how can predictive maintenance help us?

Engineer: It allows you to schedule maintenance before a serious failure occurs. This can reduce downtime and repair costs.

Manager: What about remote monitoring?

Engineer: You should also consider telematics if remote access to machine data is important.

Manager: Will our operators need training?

Engineer: Yes, some training will be necessary, but it will help them interpret data and respond to system alerts correctly.

Manager: Then I think we should start with diagnostics and predictive maintenance and add telematics later.

Engineer: I agree. This would be a suitable solution for your current problems.

TASK 7. SPEAKING PRACTICE

A. Situation-Based Speaking

Choosing a Monitoring Strategy

A farm wants to:

- reduce unexpected failures;
- reduce downtime;
- control fuel consumption;
- monitor engine performance;
- improve maintenance planning.

Your task

Recommend a monitoring strategy.

Include:

1. the farm's problem;
2. the required data;
3. suitable technology;
4. its main function;
5. two advantages;
6. one possible challenge;
7. your final recommendation.

Student's Support

Use:

The main problem is...

The farm needs information about...

I would recommend...

The system is designed to...

The main advantage is...

However, it requires...

Overall, I would recommend...

Model Answer

I would recommend a diagnostics and monitoring system with sensors. The main problem is unexpected machinery failure and high downtime. Sensors can collect data on temperature, pressure, vibration and fuel consumption. The system can detect abnormal conditions early. The main advantages are reduced downtime and better maintenance planning. However, operators need technical training. Overall, this solution can improve reliability and operational efficiency.

B. MINI-PRESENTATION**Topic:**

Diagnostics and Monitoring Systems in Modern Farm Machinery

2–3 minutes

Structure**1. Introduction**

What are diagnostics and monitoring systems?

2. Main functions

What do they monitor?

3. Technologies

Sensors, onboard computers, telematics.

4. Predictive maintenance

How does it work?

5. Benefits

Downtime, repair costs, reliability, efficiency.

6. Challenges

Training, technical knowledge, implementation.

7. Conclusion

Why are these systems important?

TASK 8. PROFESSIONAL WRITING

A. Summary

Write 80–100 words.

Include:

- purpose of diagnostics and monitoring;
- sensor data;
- fault detection;
- predictive maintenance;
- telematics;
- benefits;
- training.

Student's Support

Use this structure:

Diagnostics systems → collect data → detect faults → predictive maintenance → reduce downtime → telematics → training

Model Summary

Diagnostics and monitoring systems are important components of modern farm machinery. They use sensors and onboard computers to collect and analyze data about machine conditions and performance. These systems can detect faults and abnormal operating conditions at an early stage. Predictive maintenance allows farmers to schedule service before a serious failure occurs, reducing downtime and repair costs. Telematics provides remote access to machine data and supports better decision-making. However, operators need technical knowledge and training to interpret data and respond to system alerts correctly. Overall, these technologies improve reliability, efficiency and maintenance planning.

B. TECHNICAL REPORT

Topic: A Monitoring and Maintenance Strategy for a Modern Farm

120–150 words

Your report should include:

1. **Current problem**
2. **Required information**
3. **Recommended technologies**
4. **Functions**
5. **Expected benefits**
6. **Possible challenges**
7. **Final recommendation**

Technical Report Template

Introduction:

The farm currently experiences _____.

Problem:

The main problems are _____.

Recommended solution:

I recommend implementing _____.

Function:

The system can _____.

Benefits:

This solution can reduce _____ and improve _____.

Challenges:

However, the implementation requires _____.

Conclusion:

Overall, _____.

Model Technical Report**A Monitoring and Maintenance Strategy for a Modern Farm**

The farm currently experiences unexpected machinery failures, high downtime and increasing repair costs. The main problem is the lack of detailed information about machine condition.

I recommend implementing a diagnostics and monitoring system with sensors. The sensors can collect data on temperature, pressure, vibration and fuel consumption. This information can be analyzed to detect abnormal conditions and identify potential faults at an early stage.

Predictive maintenance should also be introduced because it allows maintenance to be scheduled before a serious failure occurs. Telematics can provide remote access to machine data and improve operational control.

These technologies can reduce downtime and repair costs and improve machinery reliability. However, operators will require technical training. Overall, this strategy can significantly improve maintenance efficiency and machine performance.

🔧 FINAL UNIT CHECK**Professional Self-Check**

I can...	✓
explain what a diagnostics system does	☐
describe the role of sensors	☐
explain what predictive maintenance is	☐
explain how telematics works	☐
identify a machinery problem	☐
ask questions about technical requirements	☐
recommend a monitoring solution	☐
justify my recommendation	☐
discuss possible challenges	☐
make a final professional decision	☐

Використання авторських матеріалів:

Джерело	Основне використання в посібнику
Smith & Wilkes	Units 1–8: загальна будова і класифікація машин
Srivastava et al.	Units 3–4: інженерні принципи роботи машин
Sahay	Units 5–7: трактори, силові установки, системи
Senthilkumar et al.	Units 6–8: комбайни, сівалки, плуги
FAO, Kienzle et al.	Units 5–8: загальна механізація, технічне обслуговування, утримання
Balafoutis et al.	Unit 9: точне землеробство, технологія диференційованого внесення, глобальна навігаційна супутникова система (precision agriculture, VRT, GNSS, data)
Mansoor et al.	Units 9–10: сенсори, комп'ютерна діагностика, моніторинг; прогностична аналітика (sensors, IoT, monitoring, predictive analytics)
FAO Agricultural Mechanization	Сучасний контекст: цифрове сільське господарство, розумна техніка (digital agriculture, smart machinery)

Список використаних джерел

1. Smith, H. P., & Wilkes, L. H. *Farm Machinery and Equipment*. McGraw-Hill.
2. Srivastava, A. K., Goering, C. E., Rohrbach, R. P., & Buckmaster, D. R. (2006). *Engineering Principles of Agricultural Machines*. 2nd ed. ASABE.
3. Sahay, J. (2010). *Elements of Agricultural Engineering*. Standard Publishers Distributors, New Delhi.
4. Senthilkumar, T., Kavitha, R., & Duraisamy, V. M. (2023). *A Textbook of Farm Machinery and Equipment: Principles and Practice*. Brillion Publishing.
5. Kienzle, J., Ashburner, J. E., & Sims, B. G. (2013). *Mechanization for Rural Development: A Review of Patterns and Progress from Around the World*. FAO, Integrated Crop Management Series No. 20.
6. Balafoutis, A. T., Beck, B., Fountas, S., et al. (2017). *Smart Farming Technologies – Description, Taxonomy and Economic Impact*. In *Smart Farming Technologies for Sustainable Agricultural Production*. Springer.
7. Mansoor, S., Iqbal, S., Popescu, S. M., et al. (2025). *Integration of Smart Sensors and IoT in Precision Agriculture: Trends, Challenges and Future Prospectives*. *Frontiers in Plant Science*, 16.
8. FAO. *Agricultural Mechanization*. https://www.fao.org/interactive/agricultural-mechanization/en/?utm_source=chatgpt.com

Зміст

Вступ	3
UNIT 1. Classification and Main Types of Agricultural Machinery	7
UNIT 2. Design Principles of Tractors and Power Units	17
UNIT 3. Internal Combustion Engines in Agricultural Equipment	27
UNIT 4. Hydraulic and Pneumatic Systems in Agricultural Machinery	38
UNIT 5. Tractor Transmission Systems: Mechanical, Hydrostatic, and CVT	46
UNIT 6. Design and Operation of Soil Tillage Equipment	55
UNIT 7. Seeding and Planting Equipment Technologies	64
UNIT 8. Harvesting Machinery: Combines and Specialized Harvesters	75
UNIT 9. Precision Agriculture and Smart Farming Equipment	86
UNIT 10. Diagnostics and Monitoring Systems in Farm Machinery	96
Список використаних джерел	107

Затверджено на засіданні Вченої ради
Центральноукраїнського національного
технічного університету

Протокол №_1_ від 28.09.2026 р.

Формат А4. Ум. друк. арк. 5

ЦНТУ, м. Кропивницький, пр. Університетський, 8