МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
ЗАПОРІЗЬКИЙ НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ

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ПРОФЕСІЙНО-ОРІЄНТОВАНИЙ ПРАКТИКУМ ІНОЗЕМНОЮ МОВОЮ

Навчально-методичний посібник для здобувачів ступеня вищої освіти магістра
спеціальності «Теплоенергетика»
освітньо-професійної програми «Теплоенергетика»

Затверджено
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Мосієвич Л. В. Професійно-орієнтований практикум іноземною мовою : навчально-методичний посібник для здобувачів ступеня вищої освіти магістра спеціальності «Теплоенергетика», освітньо-професійної програми «Теплоенергетика». Запоріжжя : Запорізький національний університет, 2023. 110 с.

Навчально-методичний посібник призначений для здобувачів ступеня вищої освіти магістра спеціальності «Теплоенергетика» освітньо-професійної програми «Теплоенергетика» для використання під час аудиторних занять.

Основною метою видання є формування англомовної професійно-комунікативної компетенції. До змісту включено теми, спрямовані на формування комунікативної компетенції в читанні та говорінні, розвиток умінь писемного мовлення, збагачення термінологічного словникового запасу.

У посібнику подано в систематизованому вигляді програмний матеріал дисципліни «Професійно-орієнтований практикум іноземною мовою». У виданні представлено теоретичний та практичний матеріал з 12 тем, об’єднаних у 4 розділи: Fundamentals of professional communication, Academic communication, Traditional sources of energy, Alternative sources of energy. Структура розділів уніфікована і включає теоретичний матеріал, автентичні тексти професійно-навчальної спрямованості, комплекс мовних і мовленнєвих вправ та завдання, що сприятимуть розширенню активного тематичного словника й формуванню комунікативних умінь писемного та усного мовлення.

Видання спрямоване на формування у майбутніх інженерів з теплоенергетики практичних навичок володіння англійською мовою в обсязі, необхідному для роботи з науковою літературою за фахом; навичок усного спілкування в професійній сфері в контексті окресленої тематики.

Рецензент

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Відповідальний за випуск

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ЗМІСТ

ВСТУП

Відповідно до робочої програми дисципліни «Професійно-орієнтований практикум іноземною мовою » є обов'язковою дисципліною у навчальному плані підготовки здобувачів ступеня вищої освіти магістра спеціальності Теплоенергетика» освітньо-професійної програми «Теплоенергетика» для студентів першого року навчання. Основним *завданням* курсу є формування навичок ефективної комунікації англійською мовою в академічному, науковому, професійному середовищі.

У результаті вивчення навчальної дисципліни студент повинен набути таких результатів навчання (знання, уміння тощо) та компетентностей: *загальні компетентності* (знання та розуміння предметної області та розуміння професійної діяльності; вміння виявляти, ставити та вирішувати проблеми; здатність спілкуватися з представниками інших професійних груп різного рівня; здатність діяти соціально відповідально та свідомо); *спеціальні компетентності* (здатність здійснювати інноваційну діяльність в теплоенергетиці); *програмні результати навчання* (вільно спілкуватися державною мовою з професійних питань, обговорювати результати виробничої, наукової та інноваційної діяльності з фахівцями та нефахівцями; дотримуватись вимог вітчизняного і міжнародного законодавства і практик міжнародної діяльності у сфері теплоенергетики; розуміння професійних і етичних стандартів діяльності, застосування їх під час діяльності у сфері теплоенергетики; ефективно співпрацювати з колегами, беручі відповідальність за певний напрям і свій внесок до спільних результатів діяльності, а також власний розвиток і розвиток колективу).

Для досягнення компетентностей студент повинен **знати:**

- базову фахову термінологію іноземною мовою;
- основні фахові міжнародні видання та науково-метричні бази даних із галузі енергетики;
- можливості використання їх інформативного потенціалу для проведення досліджень;
- правила складання наукових статей, анотацій, доповідей іноземною мовою;
- правила складання CV іноземною мовою;

уміти:

- володіти й вільно оперувати фаховою іноземною термінологією;
- користуватися сучасними міжнародними академічними виданнями та спеціалізованими науково-метричними базами даних із галузі енергетики;
- користуватися сучасними спеціалізованими словниками з різних галузей науки і техніки;

- володіти електронними засобами перекладу як у режимі on-line, так і спеціалізованими програмними продуктами (Lingvo тощо);
- складати анотації та резюме статей іноземною мовою;
- писати наукові статті іноземною мовою;
- складати особисте резюме та CV;
- складати анотації до кваліфікаційних робіт та наукових статей іноземною мовою;
- розробляти презентації до доповідей і виступити на науковій конференції;
- здійснювати інноваційну діяльність в енергетиці;
- розуміти професійні і етичні стандарти діяльності, застосовувати їх під час діяльності у сфері енергетики.

У виданні представлено теоретичний та практичний матеріал з 12 уроків, об'єднаних у 4 розділи: Fundamentals of professional communication, Academic communication, Traditional sources of energy, Alternative sources of energy. Тексти висвітлюють загальні та сучасні проблематичні питання енергетичної галузі. Структура кожного уроку уніфікована і включає:

- теоретичний матеріал (що висвітлює проблеми науково-технічного перекладу, бізнес комунікації, складання технічної документації, граматичних труднощів технічних текстів, написання наукових статей, анотацій, створення презентацій, опису діаграм, графіків). Після кожного теоретичного блоку студентам пропонуються питання для самоперевірки у тестовому форматі;
- практичний матеріал, мета якого полягає в опрацюванні теоретичних знань. Практичні завдання спрямовані на активізацію певного лексичного, граматичного матеріалу та розвиток іншомовної професійної компетентності у говорінні та письмі.

Поєднання теоретичного та практичного матеріалу уможливлює працювати як індивідуально, так і самостійно.

Також, студентам запропоновано приклад підсумкового тесту з дисципліни, який є зразком залікового тесту на платформі Moodle. Тест акумулює знання і навички з вивченої дисципліни.

В якості додатка до видання включено англо-український словник термінів з теплоенергетики, необхідних для розуміння текстів видання. Окрім того, додаток містить список наукових кліше для написання анотацій до фахових статей та власне статей. Викладення матеріалу ґрунтується на принципах методики CLIL.

CHAPTER 1. FUNDAMENTALS OF PROFESSIONAL COMMUNICATION

UNIT 1. CAREER

THEORETICAL PART. FUNDAMENTALS OF TECHNICAL TRANSLATION

Read and check your understanding.

A technical translation is a type of translation that involves the translation of technical content from one language to another. Technical content includes documents, manuals, instructions, patents, software, and other technical materials that require specialized knowledge in the subject matter.

Accuracy is crucial in technical translations, as even a small error can have serious consequences in technical fields such as engineering, medicine, and law. While quality and accuracy are always a priority in any translation project, they take on an even greater role when it comes to technical translations. This is because small inaccuracies can have serious consequences: fines, lawsuits, public embarrassment, or even patent rejection—with the subsequent inability of the company to continue operating in that market.

In other words, with technical translation, compliance and corporate responsibility are tightly linked to the quality of the technical translations that the company produces. Every specialty in technical translation has its own prerequisites and specialized terminology and requires a highly qualified, experienced team of linguists who are familiar with the field.

In the case of intellectual property rights (IPR)—which includes patents, copyrights, trademarks, trade secrets, licensing, and unfair competition—for example, translators need to master a very specific and highly regulated language. They also require interdisciplinary knowledge since they have to be familiar with aspects of technology, business, economy, and law.

Technical translation involves translating technical documents, such as user manuals, technical reports, and instruction manuals. These documents often contain highly technical and specialized terminology that requires an in-depth understanding of the subject matter. As such, technical translators are often highly skilled and specialized professionals with expertise in a particular field.

The use of technical translation in technical education has numerous benefits. It helps students access information previously unavailable to them due to language barriers. This, in turn, increases the quality and relevance of the education they receive, making them better prepared for the global workforce.

Requirements for technical translation:

Accuracy: Technical translation requires precision and accuracy to ensure the translated document conveys the same meaning as the source text. Technical translations must be reliable and trustworthy, as any translation error could lead to misunderstandings, errors, or accidents.

Quality: Technical translation requires specialized knowledge, vocabulary, and experience. A professional technical translator is trained to understand the nuances of technical language and can provide accurate and high-quality translations.
Speed: Technical translation projects are time-sensitive and require a quick turnaround. A professional translator with technical expertise can work efficiently to deliver translations promptly.
Compliance: Technical translation projects require compliance with industry standards, regulations, and legal requirements. A professional translator with technical expertise can ensure compliance with all relevant standards and regulations.

ChatGPT for technical translation.

ChatGPT is a general-purpose online language model that is not only designed for machine translation. Although the developers of ChatGPT claim that this technology can be particularly useful in industries where accuracy and precision are critical elements, there is still doubt about its efficacy.
Industries that are highly regulated, such as the medicine and law industry uses complex terminology and content. They must also adhere to strict formatting guidelines. As the guidelines can vary globally, it can cause changes in the entire layout of the content. As a result, the content often needs extensive adaptation to suit foreign audiences and markets.

This is the reason why translations of highly regulated industries are challenging to get right. ChatGPT may be a powerful AI tool but it does not have the capacity and knowledge to make all the required adaptations. Additionally, the stakes for these highly regulated industries are high, as any mistake can possibly have legal and financial repercussions. Perhaps this is why it is suitable to trust professional translators for these industries instead of relying on the ChatGPT tool.

ChatGPT is an online tool that has wide uses in terms of delivering accurate and efficient results. While it can have huge benefits for certain industries such as technology, its efficacy may be questionable for the translation industry. Although speedy translations are easier to obtain with the help of ChatGPT, these translations may lack context. Nevertheless, with the combination of both human translation and ChatGPT, it can be ensured that the translations are accurate and professional.

Heat Power terminology.

Heat power terminology has some peculiarities that are specific to the field. Here are some examples:

Units of measurement: Heat power terminology often uses specific units of measurement, such as BTU (British Thermal Units), Joules, Watts, and Kilowatts, to express thermal energy and heat transfer.
Technical jargon: Heat power terminology includes technical jargon and specialized vocabulary that may be unfamiliar to those outside the field. For example, terms like "enthalpy," "entropy," "latent heat," and "specific heat" are commonly used in heat power engineering.

Specific application: Heat power terminology is often specific to certain applications or contexts, such as power generation, industrial processes, or heating and cooling systems.
Interdisciplinary nature: Heat power terminology involves concepts and principles from other disciplines, such as thermodynamics, fluid mechanics, and materials science, making it an interdisciplinary field.
Precision: Heat power terminology requires precision and accuracy due to the potential safety and economic consequences of errors. Therefore, it is important to use terminology that is consistent with industry standards and regulations.

Structural features of i Heat Power terms

As noted by Karaban V.I. [5, p. 243], in order to correctly translate a term, it is important to know its word formation and morphological structure, according to which terms are divided into:
a) simple: *gear - шестерня, examination - експертиза*. The main feature of simple one-word terms is their compactness, as they consist of only one component.
b) derivative: suffixal *amplifier - підсилювач*; prefixal *overheating - перегрівання*; suffixal-prefixal *inflammation - загорання*.
c) compound, or term phrases: *safe distance - безпечна відстань, production risk - виробничий ризик, fuel rods - стрижні пали*. Term phrases actively represent the English terminology system in thermal energy.

Compounds may consist of: N+N *conductor's valve*, Adj.+N *vertical component*, Participle I+ N *rectifying tube*, Participle II +N *fixed-in stabilizer*.

SELF-ASSESSMENT

1) What is technical translation?
   a) Translating technical documents from one language to another
   b) Translating literary works from one language to another
   c) Translating legal documents from one language to another
2) What are some of the challenges of technical translation?
   a) Understanding technical terms and concepts in the source language
   b) Finding the equivalent technical terms in the target language
   c) Maintaining consistency of terminology throughout the translation
3) What is localization in technical translation?
   a) Adapting a product or service to a specific locale or target market
   b) Translating technical documents for a specific industry
   c) Providing on-site interpretation services for technical conferences
4) Which of the following industries require technical translation?
   a) Medical and pharmaceutical
   b) Information technology
   c) Legal and financial
5) Which of the following translation tools can be used for technical translation?
   a) Translation memory software

b) Machine translation software
c) Terminology management tools

6) What is a technical glossary?
a) A list of technical terms and their definitions
b) A glossary of common phrases in a language
c) A list of idioms and colloquial expressions in a language

7) What is a style guide in technical translation?
a) A set of rules for writing and formatting technical documents
b) A guide to translation quality assurance and best practices
c) A guide to using specific translation tools and software

8) What is the role of a technical translator?
a) Translating technical documents accurately and effectively
b) Understanding technical terms and concepts in the source language
c) Maintaining consistency of terminology throughout the translation

9) Which of the following factors can affect the quality of a technical translation?
a) The qualifications and experience of the translator
b) The use of appropriate translation tools and software
c) The amount of time and resources allocated for the translation project

10) What is back translation in technical translation?
a) Translating a document from the target language back to the source language
b) Translating a document multiple times using different translators
c) Checking the accuracy and consistency of a translation by having it translated back to the source language.

PRACTICAL PART

I.Preparation

Before reading study the following vocabulary:

employee/employer
a full-time/part-time job
job interview
to apply for a job
vacancy

to fire somebody, to sack somebody
to give somebody notice
unemployment
flexible timetable
salary
to work in shifts
to work overtime

II. Reading Text

Strategies to Build a Successful Career

Having a successful career will offer you a lot of benefits and real profitable opportunities. As we live in a world governed by social status and money, working your way up to the top will definitely improve your quality of life. There are many possible reasons for which an individual would desire success.

1. Identify Your Goals

You need to identify what are your biggest rational wishes. Then, start going deeper and make an in-depth introspection in which you should think about the connection between your inner desires and your rational goals.

They have to match. Otherwise, you will not be truly fulfilled with your professional life. Identifying your goals takes some time and effort, but it is a truly important process in any successful person's journey.

2. Build a Professional Resume

By taking care of this aspect, you are making sure that you'll never be caught off guard. Opportunities are everywhere, and you should always be ready with a quality resume. I believe that letting professionals deal with your resume is a productive choice.

3. Become Aware of Your Strengths

Awareness is an essential key to personal improvement. By being aware of your inner thoughts, your strengths, your desires, and your disadvantages, you can adapt your life to whatever conditions you' re being put through. You'll also get many benefits as you can leverage your knowledge and wisdom for the best purposes.

No matter your strengths and disadvantages, you should choose a career path that advantages your traits and qualities.

4. Assume Full Responsibility for Your Life

One difference between mediocre and successful professionals: responsibility. Even though you know the concept, you may not apply it every day. Whenever something bad happens, you need to assume it.

Start assuming responsibility for all of your actions and never blame anyone for your mistakes. That's the worst thing someone can do. Do not take things personally, and be calm.

5. Always Raise Your Standards

Here's another critical factor that differentiates the successful from the non-successful. Your standards influence the way you think, believe, and behave. If your standards are high, you'll never be satisfied with less than you can accomplish. People with high standards are most of the time more successful than the average.

Every two or three months take a moment to reflect upon your standards and values. Try to improve them bit by bit up until you realize that you've become the best version of yourself.

6. Brand Yourself

Branding is very important nowadays. Big companies are spending hundreds of millions in order to establish themselves as the "big dogs" in the marketplace. It is an old business strategy used by almost every professional company. Your branding is your image in the marketplace.

Professional employees should brand their names and services and constantly improve it. You can do that by starting a blog, creating a professional social media profile, or simply by providing awesome services.

7. Network -- A LOT

Networking is all about opportunities and connections. When you meet new people, you basically get a chance to use their skills to your advantage. Of course, you must also give back something: your services, your knowledge, your money. Successful people always network and create those life-lasting profitable relationships.

Start by creating social media profiles on LinkedIn, Twitter, and Facebook. These three specific networks are the best choices when it comes to this type of activity.

✍ After-reading tasks

1. Insert the appropriate word or word combination from Vocabulary:

There are as many kinds of careers as there are people. They vary greatly in the type of work involved and in the ways they (1) _____ a person's life.

The kind of career you have can (2) _____ your life in many ways. For example, it can (3) _____ where you live and the friends you make. It can reflect how much education you have and can determine the (4) _____ of money you earn. Your career can also affect the way you feel about yourself and the way other people act toward you. By making wise decisions (5) _____ your career, you can help yourself build the life you want.

To make wise career decisions and plans, you need as much information as possible. The more you know about yourself and career (6) _____, the better able you will be to choose a (7) _____ career.

Learning about oneself. People differ in what they want from a career. Many people desire a high income. Some hope for fame. Others want (8) _____. Still others want to serve people and make the world a better place.

Before you begin to (9) _____ career fields, you should determine (a) your values; (b) your interests; and (c) your aptitudes (abilities). Most people are happiest in jobs that (10) _____ their values, interests, and aptitudes.

Each person has many values, which vary in strength. For example, money is the strongest value for some people — that is, wealth is more important to them than anything else. As a result, they (11) _____ their thoughts, behaviour, and emotions on the goal of earning a high income. Other values include devotion to religion, taking risks, spending time with family, and helping others. People should

understand their values prior to making a career decision. You can develop an understanding of your values by asking yourself what is most important to you and by examining your beliefs. For example, is it important to you to work as a member of a team? Or would you rather be in charge or work alone? If working alone or being in charge is important to you, independence is probably one of your (12) _____ values.

	A	B	C	D
1	move	influence	persuade	guide
2	move	interest	disturb	affect
3	control	choose	determine	discover
4	amount	mass	volume	supply
5	in relevant to	concerning	respect	in a case
6	hours	moments	occasions	opportunities
7	satisfying	delightful	comfortable	suitable
8	accident	experience	adventure	incident
9	research	examine	inspect	explore
10	fit	agree	change	belong
11	move	meet	focus	follow
12	best	primary	elementary	primitive

2. Answer the questions:

1) Do you agree with all strategies for building a successful career?
2) What categories of people are a part-time job suitable for?
3) Is the unemployment level high in Ukraine?
4) What steps should you take to apply for a job?
5) Why is it difficult/easy to run a firm?
6) What are the most important criteria for a successful job?

3. Quiz:

1. Abilities relating to dealing with persons on the job
   a) Interpersonal
   b) Teamwork skills
   c) Networking
   d) Punctuality

2. A meeting between an employer and a job applicant
   a) board meeting
   b) interview
   c) on the job training
   d) negotiation
3. A person working for someone else
   a) employer
   b) employee
   c) co-worker
   d) trainee
4. A form in which you supply information about youself that will help an employer make a hiring decision
   a) References
   b) Summary
   c) CV
5. Someone who hires another person
   a) Employee
   b) Employer
   c) HR
   d) Job personnel
6. Making use of all your personal connections to achieve your career goals
   a) Teamwork
   b) Collaboration
   c) Negotiation
   d) Promotion
7. People who know an applicant well and can provide information about that person professionally
   a) Parents
   b) References
   c) Acquaintances
   d) Colleagues
8. Someone who applies for a job
   a) Candidate
   b) Applicant
   c) Employee
   d) Job seeker
9. Being able to easily accept new challenges
   a) Flexible
   b) Integrity
   c) Creativity
   d) Aptitude
10. An arrangement in which someone learns an art, trade, or job under another
   a) Courses
   b) apprenticeship

c) training
d) negotiation

4. **Discussing the topic "Job satisfaction"**
Work in pairs or groups. Arrange "job satisfaction features" in the order of importance. Make use of the relevant features and appropriate expressions for discussion:

Being able to learn new things
Earning plenty of money
Being part of a team
Meeting people through work
Having pleasant colleagues
Being praised by my superiors or bosses
A pleasant working environment
Using a foreign language
Financial independence
Good chances of promotion
Professional growth
Being a boss/exercising power
Status of my organization

The most important thing for me is…
The second important thing for me is….
I don't consider this aspect of my future job very important because…..
I'm afraid you are mistaken/wrong when you say that….
I think your opinion is absolute nonsense because….
It matters very little for me….
It matters very little in my job….
…. is less significant than….
…. is more significant/ more important than….
I don't attach too much importance to…

6. Write your own CV based on the sample

STEVEN TERRY

Sales Staff

CONTACTS

Male

May 19, 1992

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OBJECTIVE

Take advantages of sales skills & experience and understanding of market to become a professional Sales Staff and bring a lot value to Customers. From that, I will contribute to development of TOPCV Company.

SKILLS

Language: English, Japanese, Chinese

Computer: Word, Excel, Powerpoint

INTERESTS

I like soccer, music..

EDUCATION

Oct 2010 - May 2014

TOPCV University, Major: Corporate Administration

GPA: 3.6/4

Oct 2010 - May 2014

TOPCV University, Major: Corporate Administration

GPA: 3.6/4

WORK EXPERIENCE

June 2014 - Present

TOPCV JSC, Sales Staff

- Write and upload product advertising post via Facebook, Forum...
- Introduce, consult products and answer customers' queries via phone and email.

Nov 2013 - Jun 2014

TOPCV Shop, Part-time Sales Staff

- Sell goods for Foreigners and Vietnamese at the Shop
- Advertise products on media publications such as: banner, posters,leaflets...
- Make reports of sales every day.

ACTIVITIES

Jan 2014 - Feb 2014

TOPCV - EDUCATION TALK 2014, Member of US Ambassador

- Organize monthly events, network with US alumni
- Share how to hunt scholarships and US student's life experiences to all students who have received offers from US universities

HONORS & AWARDS

2013-2014: TOPCV Scholarship in 2nd semester 2012-2013 and 1st semester 2013-2014

REFERENCES

Mr: Jack Harison - Director of TOPCV JSC

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Unit 2. SOFT SKILLS

THEORETICAL PART
TRANSLATION PECULIARITIES OF HEAT POWER TERMS

Read and check your understanding.

The same word in the source language can have different translations in English, for example, *граничнодопустиме значення шкідливого чинника* can be translated as *threshold value of harmful factor* or *permissible concentration*; *виробниче приміщення* can be translated as *industrial facilities*, while *виробниче середовище* can be translated as *work environment*. Such synonymy in English translation is mainly represented by doublets - semantically identical units.

Many Ukrainian terms formed by stem compounding in English translation are two-component terms: *вогнестійкість* is translated as *fire resistance*, *вогнезахист* as *fire protection*, *теплопровідність* as *thermal conductivity*, and т*еплообмінники* as *heat exchangers*. However, *турбокомпресор* in English translation has an equivalent stem compounding - *Turbocharge*r.

It should be noted that there are syntactic features of term translation. Government is a syntactic relationship between words in which the dependent word has the case required by the main word. The peculiarity of government in English terms is that it is non-prepositional. As a rule, prepositions are used in Ukrainian. For example, *шкода від пожежі* can be translated as *fire harm*, and *вимоги до систем вентиляції* as *ventilation system requirements*.

Transformations. Transformations are used when the terms in the source text have a different structural-functional order in the target text. Among lexical, grammatical, and stylistic translation transformations in translating terms related to heat power engineering, grammatical transformations predominate:

substitution of singular with plural: *техніка безпеки – safety measures; виробничий травматизм – industrial injuries*;

change of a part of speech: *холодільний цикл - Refrigeration cycle, державний стандарт – the state standard*;

change in word order: *equipment vendor – постачальник обладнання; energy consumption – споживання енергії;*

addition: *energy audit scope – характер та обсяг робіт з енергетичного аудиту; energy audit reporting – представлення звіту за результатами енергоаудиту; maintenance work – роботи з технічного обслуговування;*

It should be noted that as a result of addition, Ukrainian terms usually become multi-component terms in English.

omission: *протипожежний стан об'єкта – status of fire; евакуація людей під час пожежі – evacuation during a fire*.

Calque. This is a technique where the component parts of a word are translated by the corresponding elements in the target language. Calque can only be applied when the translation equivalent does not violate the norms of usage and word

combination in the Ukrainian language. Calque is not always a simple mechanical operation aimed at transferring the source form into thetarget form. For example: *перегріта пара - Superheated steam, третій закон термодинаміки - The third law of thermodynamics*.

Translation of neologisms in Heat Power terminology.

When translating neologisms in heat power terminology, it's important to understand the origin and context of the term in order to find an appropriate translation. Here are some strategies for translating neologisms in this field:

Look for similar terms: Sometimes, neologisms in one language are simply adaptations or variations of existing terms in another language. In these cases, it's useful to look for similar terms in the target language and use them as a starting point for translation.

Use descriptive translations: Neologisms often describe new technologies, processes or concepts that do not have an established translation in the target language. In these cases, a descriptive translation that conveys the meaning of the term may be appropriate. For example, "thermogenetics" could be translated as "the study of heat transfer in biological systems."

Consult with experts: Experts in the heat power field may have knowledge of neologisms that are specific to their area of expertise. Consultation with these experts can help identify appropriate translations and ensure accuracy.

Translate the meaning, not the word: In some cases, neologisms in one language cannot be directly translated into another language. Instead, it may be necessary to translate the meaning of the term, using a combination of descriptive language and established terminology in the target language.

Consider the audience: The translation of neologisms may vary depending on the intended audience. For example, a translation aimed at an academic audience may require more technical language than a translation aimed at a general audience.

Here are some neologisms that have emerged in the heat power industry:

Thermogenetics: A branch of thermodynamics that deals with the study of heat transfer in biological systems, such as the human body.

Pyrorecovery: The process of recovering energy from waste materials through combustion.

Thermoeconomics: The study of the relationship between energy, economics, and the environment.

Solarthermalism: The use of solar energy to generate heat for industrial processes.

SELF-ASSESSMENT

1. What transformation is used in translation *Laval nozzle – насадка Лаваля*?
   a) Change of a part of speech
   b) change in word order
   c) substitution of singular with plural
2. What transformation is used in translation *load breaking isolator – вимикач навантаження?*

a) Omission
b) Addition
c) Calque

3. What transformation is used in translation *measuring relay – вимірювальне електричне реле?*
   a) Omission
   b) Calque
   c) Addition
4. What transformation is used in translation *standby mode – режим очікування*?
   a) change in word order
   b) substitution of singular with plural
   c) Calque
5. What transformation is used in translation *enthalpy – ентальпія*?
   a) Transcription
   b) Calque
   c) substitution

PRACTICAL PART

I. Preparation

Before reading study the following vocabulary:

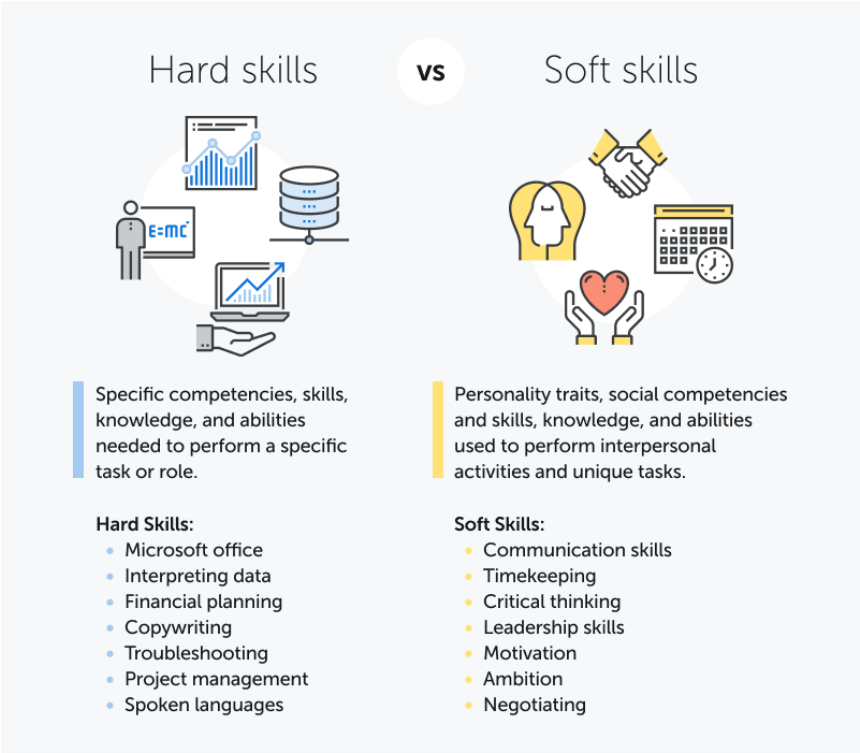
to perform
to define
abilities
negotiating
troubleshooting
measurable
specific tasks
requirements
accurate
to highlight
to elaborate

II. Reading Text

Hard skills vs. Soft skills

When you are looking for new recruits or promoting from within there will be a set of skills your roles require. Some skills people will have as part of their nature, while others need to be taught.

The hard skills can be defined as part of the role specification. And soft skills are defined as the person specification.



What are Hard Skills?

Hard skills are specific competencies, skills, knowledge, and abilities needed to perform a specific task or role. They can be learned through education and professional development. Usually, they are technical (but not always) and easily measurable.

Hard skills can be demonstrated through educational certificates or practical demonstrations.

For example, software development requires knowledge of some programming language and can be used for a variety of tasks, but the main goal is to write a computer program. The proficiency level can be easily measured.

Another example, design (of course it can be different - interior design, web design, etc.) but in general it is a specific skill set needed to perform exact tasks.

Microsoft suite knowledge, another example of hard skills, you can learn how to use Microsoft Word and Excel, and most often it will be needed for specific tasks.

So, each role will have different skill set requirements but they will be needed to perform a specific task.

Soft skills are personality traits, social competencies and skills, knowledge, and abilities used to perform interpersonal activities and unique tasks. Sometimes they are also called *human* skills.

Usually, they are more closely linked to people's personality traits they are born with and social skills. But they also can be trained and developed through practice and professional development.

Unfortunately, it is not that easy to gauge if someone has the right soft skills as there is less information to draw upon. This is especially true when hiring new employees as their soft skills will need to be assessed by getting to know them.

There are specific techniques and tests that can be used to measure soft skills, but note the results will be quite vague and not accurate. Only real-life situations will display how good people are in this area.

Certain soft skills you would ideally like all of your employees to have are punctuality and collaboration. Other skills might only be necessary for specific roles like leadership, communication, strategic thinking, and problem-solving.

Soft skills don't come with certification but they are easily identified while working with someone. People with leadership skills will naturally take ownership and step up to lead. Those who are excellent timekeepers will always be on time or be forthcoming about potential lateness.

How to highlight your skills throughout the interview process

Once you make it to the interview phase, you will have an opportunity to display your soft skills and elaborate more on your hard skills. You may be asked to display your hard skills with a test or portfolio.

You can highlight key soft skills by:

Showing up on time or early to the interview (punctuality or dependability)
Maintaining eye contact (active listening)
Speaking clearly when prompted (effective communication)
Answering questions about your resume and experience honestly (integrity)
Asking follow-up questions (active listening)

You can highlight your hard skills by:

Elaborating on your experience and training
Providing a portfolio (digital or physical)
Effectively answering technical questions related to the work
Asking follow-up questions related to the work
Effectively working through skills tests (if required at the interview)

(From: https://www.valamis.com/hub/hard-skills-vs-soft-skills)

✍ After-text exercises

1.Tick the sentences true/false:

1) Hard skills may be easy to observe, quantify, and measure.
2) Hard skills are not generally listed in the job postings or job descriptions.
3) Hard skills are often learned in schools, Universities, and from books.
4) Soft skills are the Non-Technical Skills necessary for success in the workplace.
5) Soft skills are not typically associated with the behaviors and personality traits of an individual.

2. Insert the appropriate word or word combination from Vocabulary:

1) Hard skills are technical (but not always) and easily ….
2) We need someone who is practiced at … business deals.
3) He's very good at … because he knows these computers as well as anybody.
4) The report … the need for improved safety.

5) He refused … on why he had resigned.
6) The figures they have used are just not …
7) We usually ask interviewees … a few simple tasks on the computer just to test their aptitude.
8) One of the …of the job is fluency in two or more languages.

3. Answer the questions:

1) What soft skills do you have?
2) What soft skills would you like to have?
3) Is it possible for a person to have all of them?
4) What soft skills should an engineer have?
5) What steps should be taken to develop soft skills?
6) What is troubleshooting
7) Evaluate your hard skills.

4. Speak about the differences between hard and soft skills.

5. Translate the sentences paying attention to terms

- The heat transfer coefficient of the material is an important parameter to consider when designing the system.
- The thermal conductivity of the insulation material affects the overall energy efficiency of the building.
- The expansion joint allows for thermal expansion and contraction of the piping system.
- The specific heat capacity of the fluid affects its ability to store heat energy.
- The enthalpy of the steam is a key parameter in determining its energy content.
- The heat flux through the wall can be calculated using Fourier's law.
- The heat exchanger transfers heat from one fluid to another in a controlled manner.
- Heat recovery systems can significantly improve the energy efficiency of a process.
- A heat pump uses mechanical work to transfer heat from a lower temperature source to a higher temperature sink.
- Insulation is a key component in minimizing heat loss and reducing energy consumption.

6. **Translate the neologisms in Heat Power terminology:**

- Thermo-hydrogenation: A process that uses heat to convert biomass or other organic matter into hydrogen gas.

- Cryogeneration: The production of energy from low-temperature sources, such as liquefied natural gas.
- Geothermurgy: The use of geothermal energy to generate power or heat.
- Waste-to-energy (WTE): The process of generating energy from waste materials, such as municipal solid waste or agricultural waste.
- Micro-cogeneration: The simultaneous generation of heat and electricity in small-scale power plants.
- Exergy recovery: The process of recovering usable energy from waste heat or other forms of low-grade energy.

UNIT 3. MY SPECIALTY

THEORETICAL PART

TRANSLATION OF MULTICOMPONENT TERMS

Read and check your understanding.

Multicomponent terms have great importance in any scientific or technical texts because they have a clear scientific definition, possess stability and semantic integrity of the concept being represented. Multicomponent terms include multi-word expressions with three or more components. For example, "*магнетичний динамічний генератор"* (magnetic dynamic generator) can be translated as "*magnetic hydrodynamic (MHD) generator*" and "*правила пожежної небезпеки*" can be translated as "*fire safety rules*."

Multicomponent terms in English consist of a base component (BC), one or several left modifiers (LM), and one or several prepositional modifiers (PM) that specify and modify the meaning of a term. English multicomponent terms with typical left deployment have dependent components that are located to left of the base component, while for Ukrainian multicomponent terms, the opposite is true with typical right deployment. This fact should be taken into account when translating multicomponent terms.

In general, the structural scheme of a terminological group in the target language (TL) can be presented in the following form:

LMn←LM2←LM1←**BC**

For example, a multi-component term "*акт про нещасний випадок на виробництві*" (literally "act about an accident at the production") is translated as "*occupational accident-related act*". The main component in the source language, "акт" (act), becomes the last component in the translated term, then the sequence of translated components is unfolded from left to right. Another example: "*охорона праці працівників*" (literally "workers' labor protection") - is translated as "*workers health care*".

Here are some examples of English-Ukrainian term translations from the right to the left: "*radiant heat flux" - "потік теплового випромінювання", "energy transmission channel" - "канал передачі енергії", "combustion chamber pressure" - "тиск в камері згорання".*

Thus, translating a multi-component term consisting of four, five, or more components means:

- establishing inter-component connections in the terminological phrase;
- identifying the main component - the headword of the term-phrase and translating it;
- translating all isolated basic terms within the multi-component term that are semantically related to the main component, based on context and taking into account the specific terminology of the corresponding science;

- performing the actual translation of the multi-component term (usually translating from right to left, starting with the main component, and coordinating the previously translated basic units with each other);
- verifying the accuracy of the translation using dictionaries, reference literature, or internet search engines to ensure that such a term actually exists in the professional construction environment.

To sum it up, the main way of creating multi-component terms is syntactic, i.e. non-prepositional. For English multi-component terms with typical left deployment, dependent components are located to the left of the main component, while for Ukrainian multi-component terms, on the contrary, right deployment is typical.

SELF-ASSESSMENT

1. What is a multicomponent term?
   a) A term that consists of multiple words
   b) A term that consists of multiple components that have specific meanings and are used in specific contexts
   c) A term that has multiple translations in different languages
2. What is the main method of creating multicomponent terms?
   a) Semantic derivation
   b) Syntactic derivation
   c) Borrowing from other languages
3. What is the typical word order for English multicomponent terms?
   a) Left-to-right
   b) Right-to-left
   c) It depends on the type of term
4. What is the main component of a multicomponent term?
   a) The first component
   b) The middle component
   c) The head component that gives the term its meaning
5. What is the process of translating a multicomponent term?
   a) Breaking it down into its individual components and translating each one separately
   b) Translating the term as a whole, without considering its components
   c) Identifying the core component and translating it, while also considering the meanings of the other components in the specific context
6. What is the importance of considering the word order in multicomponent terms during translation?
   a) It is not important and can be ignored
   b) It is important for maintaining the correct syntax and grammar in the target language
   c) It is important for determining the correct meanings of the individual components in the source language

7. What are some strategies for verifying the accuracy of a translated multicomponent term?
   a) Consulting dictionaries and reference materials
   b) Checking the translation with a native speaker of the target language
   c) Searching for the term in online databases and specialized resources
8. What is the most common direction for translating multicomponent terms?
   a) Left-to-right
   b) Right-to-left
   c) It depends on the type of term and the language pair involved
9. What is the difference between a multicomponent term and a compound word?
   a) There is no difference, they are synonyms
   b) A multicomponent term is a technical or specialized term, while a compound word is a more general term
   c) A compound word is a type of multicomponent term that is commonly used in everyday language
10. What is the purpose of using multicomponent terms in technical or specialized fields?
   a) To create confusion and obscure meaning
   b) To simplify communication and provide a precise, unambiguous vocabulary
   c) To make communication more colorful and interesting

PRACTICAL PART

I.Preparation

Before reading study the following vocabulary:

contribution
renewable
availability
to deteriorate
assets
to deplete
to take into account
competitiveness
opportunity
appropriate
mutual exchange
graduates
facilities
state-of-the-art

II. Reading Text

Heat power engineering Bachelor's degree programme in Ukraine

Heat power engineering is the most important part of the national Ukraine's economy. It provides the functioning of all national economy sectors, the consolidation of Ukraine's subjects, makes a decisive contribution to the formation of the main financial and economic indicators of the country and ensures Ukraine's energy security.

During the students' training in the educational program "Heat power engineering" the main emphasis is paid on the formation and development of professional skills in heat power engineering, i.e. the ability to solve complex special and practical problems in professional engagement: the formation and use of heat energy, special non-conventional and renewable energy sources, control over heating and power processes and systems, organizational and legal aspects of heat power management.

The educational program focuses on training professionals who have deep knowledge and are able to solve: the availability of investment resources for the industry appeal; the unsatisfactory condition of the energy sector, which continues to deteriorate due to the technical aging of fixed assets, most of which have already depleted their resources and need immediate modernization or replacement; lack of investment for fixed assets modernization of thermal energy.

The program is created taking into account the development of scientific trends and industrial areas of the field, heat power engineer's tasks and duties in institutions, organizations or research institutes, to increase the competitiveness of graduates in the labor market and their professional and scientific growth.

Program Benefits:

- The program encourages students to participate in research studies, write academic papers and take part in international conferences, forums, seminars, contests and academic competitions in the specialty.
- The high level of specialists' practical training is provided by the developed international cooperation in scientific and educational fields.
- Lifelong training to improve professional and other activities.
- Opportunity to continue training at the next level of higher education (master's degree), including the cross-entry system in specialties of any field, that is not prohibited by law, in case of successful passing appropriate entrance exams.
- Cooperation with leading Ukrainian institutions of higher education for the organization of mutual exchange of students, teachers and administrative staff according to the cooperation agreement.

Main disciplines of professional training

Boiler Installations of Industrial Enterprises; Heat Supply Sources of Industrial Enterprises; Heating Energy Distribution and Heat System Use; Operation and Adjustment of Thermal Power Equipment; Heat Distribution Networks and their Equipment; Basics of Energy Conservation; Heating Processes and Installations;

Ventilation Systems in Heat Power Engineering; Transportation and Use Systems of Combustible Gases in Heat Power Engineering; Gas Networks and Equipment of Gas Networks; Hydraulic and Aerodynamic Machines; Dust Collection and Industrial Wastes Remediation; Alternative and Renewable Energy Sources; Fuel and Combustion Theory; Heat Power Systems of Industrial Enterprises; Steam and Steam Turbines.

Positions that graduates can hold

A characteristic feature of the educational-professional program "Heat Power Engineering" is its interdisciplinary nature, which allows graduates to master skills in various fields of professional engagements. It will enable young professionals to be competitive and adapt to the dynamic conditions of the labor market, to join the ranks of professional heat engineers, and to hold relevant positions according to the National Classification of Ukraine «Occupational Classification»;

- 3115 - Heating engineer;
- 3113 - Technician for operation of solar power systems, energy technician;
- 3117 - Technician for operation of gas facilities objects;
- 3112 - Technician of sanitary systems, technician-designer;
- 3119 - Technician - heating engineer;
- 3111 - Specialist in energy management in buildings;
- 2147.2 - Ventilation engineer, gas facility objects operation engineer

Joint Nordic Master's degree programme
Innovative Sustainable Energy Engineering

Study track focus and goal:

This track meets the challenges set by global warming and depletion of fossil fuel resources by providing world class education in advanced technologies and systems

for efficient, clean and competitive conversion, distribution and use of electricity, heating and cooling.

Training is provided in the use of optimization and modelling tools for design and planning on the technical plant level, including state-of-the-art technologies, at the same time that necessary knowledge on energy systems is given in order to gain perspective. After completion, the student will be well poised for a career within a large number of sectors in industry which utilizes energy, as well as academia. The enormous transformations needed in the energy system in the future, will make such knowledge highly valuable.

Learning outcomes:

Students become skilled in analysis, optimization and design of combined heat and power plants and industrial heat processes, acquiring also state-of-the-art knowledge on technologies for fuel conversion with reduced or zero CO_2 emissions (biomass and waste conversion, Carbon Capture and Storage technologies).

- By acquiring complementary knowledge on an energy systems level, students are trained to approach problem-solving in an interdisciplinary way.
- Students are prepared for a professional career within the energy industry and power generation companies.

✍ After-text exercises

1. Insert the appropriate word or word combination from Vocabulary:

1) **…** technology means the highest level of development, as of a device, technique, or scientific field achieved at a particular time.
2) It is not true there is a crisis in the country's scientific or technological …
3) Is this an… occasion to discuss finance?
4) The hotel offers exceptional sporting… , including a 50 metre swimming pool.
5) A company's …can consist of cash, investments, specialist knowledge, or copyright material.
6) If we continue to …. the earth's natural resources, we will cause serious damage to the environment.

2. Match the words with their definitions:

1. completion	a) to become worse as time passes
2. to deplete	b) to receive an academic degree or diploma
3. entrance	c) relating to, characterized by, or based on competition
4. mutual	d) the act or process of completing
5. competitive	e) to lessen markedly in quantity, content, power, or value
6. to graduate	f) admission
7. to deteriorate	g) of or relating to a plan whereby the members of an organization share in the profits and expenses

3. Answer the questions:

1) What benefits do the students of this program have?
2) Why does that specialty have its interdisciplinary nature?
3) What positions can graduates hold?
4) How many disciplines are taught within Bachelor's degree program?
5) What is the aim of this educational program?
6) Is that profession essential in Ukraine? Why?
7) Why did you decide to become an engineer?

4. Write down multicomponent terms from Glossary (Appendix A) and the Text and complete the table:

multicomponent terms translated from right to left	multicomponent terms translated from left to right
1.	
2.	
3.	

5. Speak upon the topic My Specialty according to the template:

- Introduction (introduce your profession, explain why you chose it);
- Skills and Knowledge (describe the specific skills and knowledge required for your specialty);
- Work environment (explain the typical work environment, discuss any challenges or rewards associated with working in your fields);
- Career Paths (outline the various career paths, discuss any trends in the industry that may impact career prospects);
- Conclusion (summarize your thoughts on your specialty and its importance).

CHAPTER 2. ACADEMIC COMMUNICATION

UNIT 4. WRITING PAPERS, ABSTRACTS, SUMMARIES, ANNOTATIONS, CONFERENCE PROCEEDINGS

THEORETICAL PART

Read and check your understanding.

Academic papers, abstracts, annotations, etc. belong to formal style.

Formal style includes:

- impersonal not colloquial or chatty language
- only facts
- not irrelevant details
- use of reporting verbs and passive voice
- no use of short forms

The structure of an **academic paper** can vary depending on the specific discipline, journal or publication guidelines, and the nature of the research. However, a typical structure may include the following sections:

Title page: Includes the title of the paper, the authors' names and affiliations, and the date of publication.

Abstract: Provides a brief summary of the research, including the research question, methods, results, and conclusions.

Introduction: Introduces the topic and research question, provides background information and context, and outlines the purpose and objectives of the study.

Literature Review: Reviews the relevant literature related to the research question, and synthesizes the previous research to establish a theoretical framework or research gap that the current study addresses.

Methods: Describes the research design, participants or subjects, data collection procedures, and analysis methods.

Results: Presents the findings of the study, usually with the aid of tables, graphs, and figures.

Discussion: Interpretation of the results, analysis of the data, and comparison to previous research.

Conclusion: Summarizes the main findings of the study, identifies the implications and contributions of the research, and suggests avenues for future research.

References: Lists all the sources cited in the paper according to the required citation style.

Appendices (optional): Includes additional material that supports the study, such as questionnaires, transcripts, or additional figures and tables.

You can find common phrases used in academic papers in Appendix B.

Annotation is a shorten version of the paper written for people who may never read the full version. There are 2 types: descriptive and informative. *Descriptive annotation*: present tense. Generalized vocabulary and phrases.
Informative annotation: past tense. Precise specific language including numbers.

Annotation structure:
1. Introduction (explanation)\explanation of the title.
2. Discussing the characteristic features of the problem (the aim of the research).
3. Methods and materials describing method equipment and conditions of the experiments.
4. Results (main findings).
5. Pros and cons (recommendations).
6. Conclusion.

Clinches for annotation writing
The object (purpose) of this paper is to present (to discuss, to describe, to show, to develop) …
The paper (article) discusses some problems relating to (deals with some aspects of, considers the problem of, presents the basic theory of, and provides information on) …
The objective of this article is …
The work is divided into … major parts.
The first part deals with …
Then follows a discussion on …
Then the author goes on to the problem of …
The next part presents (describes, discusses) …
After discussing the author turns to …
The final part states …
The conclusion is that the problem is …
According to the author …
The author concludes that …
In summing up the author …
Evaluating the situation the conclusion can be drawn that …
In my opinion (to my mind, I think) …
The paper is interesting (not interesting), of importance, valuable (invaluable), upto-
date (out-of-date), useful (useless) …
It gives (doesn't give) me more technical terms …
It enlarges (doesn't enlarge) the scope in the sphere of …

An abstract is a 150- to 250-word paragraph that provides readers with a quick overview of your essay or report and its organization. It should express your thesis (or central idea) and your key points; it should also suggest any implications or applications of the research you discuss in the paper

Typically, an abstract for paper or presentation is one or two paragraphs long (120 – 500 words). Abstracts usually spend

- 25% of their space on the purpose and importance of the research (Introduction)
- 25% of their space on what you did (Methods)
- 35% of their space on what you found (Results)
- 15% of their space on the implications of the research

Sample of an abstract:

Purpose	This paper analyzes how novices and experts can safely adapt and transfer their skills to new technology in the medical domain.
Methods	To answer this question, we compared the performance of 12 novices (medical students) with the performance of 12 laparoscopic surgeons (using a 2D view) and 4 robotic surgeons, using a new robotic system that allows 2D and 3D view.
Results	Our results showed a trivial effect of expertise (surgeons generally performed better than novices). Results also revealed that experts have adaptive transfer capacities and are able to transfer their skills independently of the human-machine system. However, the expert's performance may be disturbed by changes in their usual environment.
Implications	From a safety perspective, this study emphasizes the need to take into account the impact of these environmental changes along with the expert's adaptive capacities.

A summary is the information from a text or an article. The summary contains an essential information of the literary sources. Writing summary one must understand the main ideas of any reading paper. The information of the original literary sources should be compressed. Summary is written for people who have already read the whole thing.

Steps for writing a summary.

1. Identify the main idea.
2. Decide what you are going to leave out. Include the most essential details.
3. At the beginning include some sentences stating the subject matter of the summary, where the original text came from, and the original author's name.
4. State the author's opinion and not your own.
5. Make sure your verb tenses are appropriate.
6. Make the summary short, not more than 1/3 of the original text.

Guidelines for writing a summary.

1. Read the whole original text quickly to gain an impression of the content and its relevance to your work.
2. Highlight the main points in every paragraph as you read.
3. Make notes of your own on these points.

4. Put away the original and rewrite your notes in your own words in complete sentences.
5. Begin your summary with the statement of the main idea at the start.
6. Using your notes write out supporting points in well-connected sentences.
7. Reread your work to check that you have concluded all the information than you need.

Pattern for writing a summary.

Definition

The main idea is…..(to+V); according to the writer, a_____is.

Description

According to the writer, a___has (characteristics).

Classification

(Two) types of_____were discussed in the lecture.

Chronology

The writer explained the sequence of events for_____.

Comparison

The writer compared_____with_____.

Contrast

The writer contrasted_____with_____.

Cause and effect

The writer explains why_____.

Problem and Solution

The writer presents several solutions for the problem of._____.

Abstract	**Summary**	**Annotation**
Is a shortened version of the paper written for people who never read the full version.	Restates the main findings and conclusions of a paper and is written for people who have already read the whole thing.	What is it about; goals.

Conference Proceedings

Conference proceedings are the publications of papers presented at a conference. A conference may require that papers missing the publication deadline for the proceedings cannot be presented at the conference. Proceedings usually contain four kinds of information:

• purpose or rationale of study (why they did it)
• methodology (how they did it)
• results (what they found)

• conclusion (what it means) It is not easy to include all the information in just a few words.

Start by writing a summary that includes whatever you think is important, and then gradually prune it down to size by removing unnecessary words, while retaining the necessary concepts. Some rules:

- Scientific writing must be accurate. Although writing instructors may tell you not to use the same word twice in a sentence, it is okay for scientific writing.
- Make sure you say what you mean.
- Be careful with commonly confused words.

For example: *Temperature has an effect on the reaction. ≠ Temperature affects the reaction.*

I used solutions in various concentrations. ≠ I used solutions in varying concentrations.

Less food (can't count numbers of food), but: Fewer animals (can count animals) A large amount of food (can't count them), but: A large number of animals.

The erythrocytes, which are in the blood, contain hemoglobin. ≠ The erythrocytes that are in the blood contain hemoglobin. (Wrong. This sentence implies that there are erythrocytes elsewhere that don't contain hemoglobin.)

- Write in a formal style, but at a level appropriate for your audience.
- Use verbs instead of abstract nouns (Instead of: take into consideration – Write: consider)
- Use strong verbs instead of 'to be' (Instead of: The enzyme was found to be the active agent in catalyzing... – Write: The enzyme catalyzed...)
- Use short words and short sentences. A sentence made of more than 40 words should probably be rewritten as two sentences.
- Check your grammar, spelling and punctuation. Use a spellchecker, but be aware that they do not catch all mistakes. Don't use commas.

SELF-ASSESSMENT

1. What is the typical order of sections in an academic paper?
   a) Introduction, methods, results, discussion, conclusion, references
   b) Introduction, literature review, methods, results, discussion, conclusion, references
   c) Introduction, background, methods, results, discussion, conclusion, references
2. What is the purpose of the introduction section in an academic paper?
   a) To provide a summary of the methods used in the study
   b) To discuss the significance of the research
   c) To present the results of the study
3. What is the literature review section of an academic paper?
   a) A summary of the data collected during the study
   b) A discussion of the methods used in the study

c) A review of the relevant research and theories related to the study

4. What is the purpose of the results section in an academic paper?
   a) To discuss the implications of the research
   b) To present the data collected during the study
   c) To provide a summary of the research question and methods used
5. What is the conclusion section of an academic paper?
   a) A summary of the study's results and their implications
   b) A discussion of potential future research
   c) An explanation of the methods used in the study

PRACTICAL PART

I.Preparation

1. Answer the questions:

1. What do you mean the word “annotation”?
2. What does the concise annotation?
3. What types of annotation do you know?
4. What stages of annotation do you know?
5. What is the recommended volume of annotation?

II.Reading text

2. Read the text, entitle and write the annotation.

The internal combustion engine (ICE) is an engine in which the combustion of a fuel occurs with an oxidizer (usually air) in a combustion chamber. In an internal combustion engine the expansion of the high temperature and pressure gases, that are produced by the combustion, directly apply force to a movable component of the engine, such as the pistons or turbine blades and by moving it over a distance, generate useful mechanical energy. The term *internal combustion engine* usually refers to an engine in which combustion is intermittent, such as the more familiar four-stroke and two-stroke piston engines, along with variants, such as the Wankel rotary engine. A second class of internal combustion engines use continuous combustion: gas turbines, jet engines and most rocket engines, each of which are internal combustion engines on the same principle as previously described. A large number of different designs for ICEs have been developed and built, with a variety of different strengths and weaknesses. While there have been and still are many stationary applications, the real strength of internal combustion engines is in mobile applications and they completely dominate as a power supply for cars, aircraft, and boats, from the smallest to the biggest.

3. As you know any scientific article consists of a certain structure and starts with an abstract. Look through the abstracts and try to identify their composition

and purpose.

Abstract example (1)

Numerical simulation was performed of the motion of a viscous incompressible no isothermal fluid (heat carrier) in an open rectangular cavity under conditions of forced convection and conjugate heat exchange. The effect of the jet dynamic parameter (Reynolds number) and fluid flow conditions on the character of motion and heat exchange of viscous incompressible no isothermal fluids in rectangular cavities is studied. A hydrodynamic pattern of viscous flow in an open cavity under forced convection conditions (in the conjugate and no conjugate formulations of the problem) is obtained. The effect of parameters of the model on the character of motion is studied. Temperature profiles for the solid and fluid phases are obtained. The effect of parameters of the model on the character of temperature distribution in both phases is studied.

Simulation, viscous, conjugate heat exchange, rectangular cavity, temperature distribution

Abstract example (2)

The scientific text is about superconductivity. The performance of wires made from yttrium, barium, copper and oxygen is getting tantalizing close to what is needed to compete with conventional conductors. A new generation of wires has been produced by the scientists of the USA (CA). This product is available on the market and the operational principle is higher than the former. The production arises on a lot of discourses in the scientific world. The performance of the wires of new generation is competitive with conventional conductors.

Superconductivity, wires, produce, scientist, conductors

✍ After-text exercises

1. Read the abstract of the article "What is energy efficiency?": what are the peculiarities of a scientific style?

Abstract

This paper critically reviews the range of energy efficiency indicators that can be used, particularly at the policy level. Traditional thermodynamic indicators of energy efficiency were found to be of limited use, as they give insufficient attention to required end use services. The specific limitations and appropriate uses of physical-thermodynamic, economic-thermodynamic and pure economic indicators of energy efficiency are also considered. The paper concludes with a discussion of the persistent methodological problems and issues which are encountered when attempting to operationalize all of the energy efficiency indicators. These include the role of value judgements in the construction of energy efficiency indicators, the energy quality problem, the boundary problem, the joint production problem and the question of isolating the underlying technical energy efficiency trend from the

aggregate indicator. (https://www.sciencedirect.com/science/article/abs/pii/0301421596000171)

2. Find any Ukrainian article in your field and write an abstract in English based on the given sample (also see Appendix)

1. The article (paper, book, etc.) deals with…	1. Ця стаття (робота, книга тощо) стосується…
2. As the title implies the article describes…	2. Згідно з назвою, у статті розглядається…
3. It is specially noted…	3. Особливо варто відмітити…
4. Basic information on … is presented.	4. Надається основна інформація про …
5. The text gives a valuable information on…	5. Текст надає цінну інформацію щодо …
6. The paper consists of …parts (chapters). The paper contains the following parts: ……	6. Робота складається з … частин (розділів). Робота складається з наступних частин:…
7. The article is of great help to …	7. Ця стаття стане у нагоді…
8. The article is of interest to…	8. Ця стаття становить інтерес для…
9. It (the article) gives a detailed analysis of …, contains the data on…	9. Стаття дає детальний аналіз…, містить дані про…
10. Special attention is given (paid) to…	10. Особлива увага приділяється…
11. It should be stressed (emphasized) that…	11. Варто зазначити (підкреслити), що …
12. The method proposed …	12. Запропонований метод...

UNIT 5. ANALYZING DIAGRAMS, CHARTS

THEORETICAL PART

Read and check your understanding.

Analyzing charts and diagrams involves a few key steps:

Title and Labels: Start by reading the title of the chart or diagram and any labels on the x and y axes. This will give you an idea of what the data is about and how it's organized.

Data Range: Look at the range of values on the x and y axes. This will help you understand the scale of the data and what values are being represented.

Data Points: Analyze the data points or bars on the chart or diagram. Look for trends or patterns in the data, such as increases or decreases over time, or differences between groups.

Interpretation: Once you have analyzed the data, interpret the findings. What does the data suggest? Are there any interesting or unexpected patterns? Are there any outliers or anomalies that need further investigation?

Conclusion: Draw conclusions based on your analysis and interpretation. Summarize the main points and highlight any important insights that can be gained from the chart or diagram. Remember, it's important to consider the context of the data and any limitations or biases that may be present in the chart or diagram. Always approach data analysis with a critical eye and be open to alternative interpretations

Tips for writing:

1. Organize the report into logical paragraphs with flexible use of linking.
2. Avoid repeating words in the question. Instead, use other words with the same or similar meanings.
3. Use accurate data to support sentences in the body paragraphs.
4. Don’t try to explain the chart, you just have to describe what happened, not say why it happened.

Referring to/Describing figures, graphs, tables, diagrams, charts

Fig. 2 shows/presents/depicts/outlines/illustrates/represents…..
Fig. 3 gives an example of…..
Such cases are depicted in the following figures.
This is illustrated in Fig. 5.
….. is/are shown/given in Figs. 3 and 4.
….. can be found in Fig. 8.
Consider Fig. 2, which plots …..versus/against…..
As can be seen from Figs. 5 and 3, …..
As shown in Fig. 1, …..

As follows from the figures shown above, …..
From this figure it can be seen that …..
For the resulting plot, see Fig. 2.
For visual representation of the dependence the reader is referred to Tables V and VI.
Table II summarizes …..
The graph/diagram suggests/indicates that…..

How to begin a description

- Let me show you this bar graph…
- Let's turn to this diagram…
- I'd like you to look at this map…
- If you look at this graph, you will notice…
- Let's have a look at this pie chart…
- If you look at this line chart, you will understand…
- To illustrate my point, let's look at some charts…

How to describe diagrams and other visuals: naming the parts

To describe diagrams or any other type of graphs as clearly as possible, you should name each visual element. For example:

- The vertical axis shows…
- The horizontal axis represents…
- This curve illustrates…
- The solid line shows…
- The shaded area describes…
- This colored segment is for…
- The red bar…

How to describe bar graphs

To express the movement of the line, you should use appropriate *verbs, adjectives, and adverbs* depending on the kind of action you need to show. For this, you should use the following vocabulary:

Verbs: rise, increase, grow, go up to, climb, boom, peak, fall, decline, decrease, drop, dip, go down, reduce, level up, remain stable, no change, remain steady, stay constant, stay, maintain the same level, crash, collapse, plunge, plummet.

Adjectives: sharp, rapid, huge, dramatic, substantial, considerable, significant, slight, small, minimal, massive.

Adverbs: dramatically, rapidly, hugely, massive, sharply, steeply, considerably, substantially, significantly, slightly, minimally, markedly.

There is also a list of **adverbs** to describe the *speed of a change:* rapidly, quickly, swiftly, suddenly, steadily, gradually, slowly.

Starting	Presentation type	Verb	Description
The given / the supplied / the presented / the shown / the provided /	diagram / table / figure / illustration / graph / chart / flow chart / picture / presentation / pie chart / bar graph / column graph / line graph / table data / data / information / pictorial / process diagram / map / pie chart and table / bar graph and pie chart ...	shows / represents / depicts / enumerates / illustrates / presents / gives / provides / delineates / outlines / describes / delineates / expresses / outlines / denotes / compares / shows contrast / indicates / figures / gives data on / gives information on / presents information about / shows data about / demonstrates / outlines / summarizes ...	the comparison of … the differences … the changes ... the number of … information on … data on … the proportion of … the amount of … information on ... data about ... comparative data ... the trend of ... the percentages of ...

VOCABULARY FOR THE INTRODUCTION PART:

Examples:

1. The bar graph and the table data depict the water use in different sectors in five regions.

2. The bar graph enumerates the money spent on different research projects while the column graph demonstrates the sources of the amount spent over a decade, commencing from 1981.

3. The line graph delineates the proportion of male and female employees in three different sectors in Australia between 2010 and 2015.

GENERAL STATEMENT PART:

The General statement is the first sentence (or two) you write in your reporting. It should always deal with:

What + Where + When. *Example*: The diagrams present information on the percentages of teachers who has expressed their views on different problems they face when dealing with children in three Australian schools from 2001 to 2005.

What = the percentages of teachers ...

Where = three Australian schools ...

When = from 2001 to 2005 ...

VOCABULARY FOR THE GENERAL TREND PART:

In general, In common, Generally speaking, Overall, It is obvious, As is observed, As a general trend, As can be seen, As an overall trend, As is presented, It can be clearly seen that, At the first glance, it is clear, At the onset, it is clear that, A glance at the graphs reveals that ...

Example:

1. In general, the employment opportunity has increased till 1970 and has dropped down afterwards.

2. As is observed, the figures for imprisonment in the five mentioned countries show no overall pattern of increase or decrease rather shows the considerable fluctuation from country to country.

3. Generally speaking, USA had a far more standard life than all the other 4 mentioned countries.

VOCABULARY TO START THE REPORT BODY:

Just after you finish writing your 'Introduction' (i.e. General Statement + General overview / trend), you are expected to start a new paragraph to describe the main features of the diagrams. This second paragraph is called the 'Body Paragraph / Report Body". You can have a single body paragraph / report body or up to 3, (not more than 3 in any case) depending on the number of graphs provided in the question and the type of these graphs. There are certain phrases you can use to start your body paragraph and following is a list of such phrases:

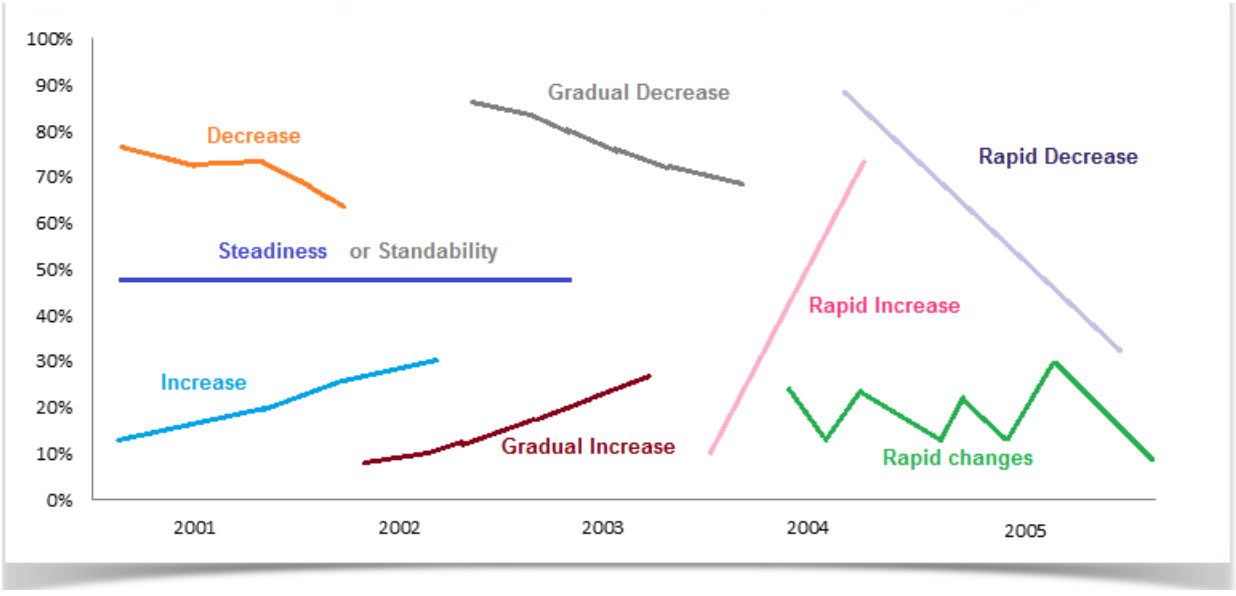
1. As is presented in the diagram(s) / graph(s) / pie chart(s) / table ...
2. As (is) shown in the illustration ...
3. As can be seen in the ...
4. As the diagrams suggest ... 5. According to the ...
6. Categorically speaking ...
7. Getting back to the details ...
8. Now, turning to the details ...

9. The table data clearly shows that ...
10. The diagram reveals that ...
11. The data suggest that ...
12. The graph gives figure ...
13. It is interesting to note that ...
14. It is apparently seen that...
15. It is conspicuous that ...
16. It is explicitly observed that ...

VOCABULARY TO SHOW THE CHANGES:

Trends	Verb form	Noun form
Increase	rise / increase / go up / uplift / rocket(ed) / climb / upsurge / soar / shot up	a rise / an increase / an upward trend / a growth /

	/ improve / jump / leap / move upward / skyrocket / soar / surge	a leap / a jump / an improvement / a climb
Decrease	fall / decrease / decline / plummet / plunge / drop / reduce / collapse / deteriorate / dip / dive / go down / take a nosedive / slum / slide / go into free-fall	a fall / a decrease / a reduction / a downward trends / a downward tendency / a decline / a drop / a slide / a collapse / a downfall
Steadiness	unchanged / level out / remain constant / remain steady / plateau / remain the same / remain stable / remain static	a steadiness / a plateau / a stability / a static



Examples:

1. The overall sale of the company has increased by 20% at the end of the year.
2. The expenditure of the office remained constant for the last 6 months but the profit rose by almost 25%.
3. There was a 15% drop in the student enrollment of the University.
4. The population of the country remained almost the same as it was 2 years ago.
5. The population of these two cities increase significantly in the last two decades and it is predicted that it will remain stable in the next 5 years.

PRACTICAL PART

✍ After-text exercises

1.Match the sentences or phrases with the same meaning in brackets:

1) The graphs show the trends in … ……
2) In general, … ……
3) The biggest increase in sales was in 2002. ……
4) There was a steady rise in sales. ……
5) Sales saw growth in 2002. ……
6) The highest sales come from 2002. ……

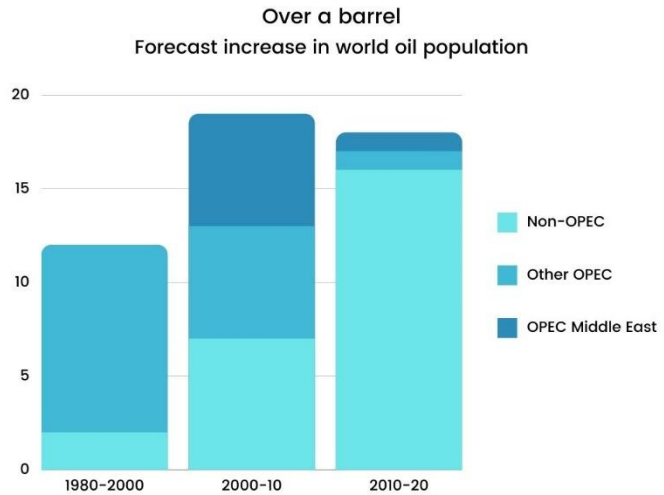
(*Sales grew in 2002. Sales rose steadily. Sales increased the most in 2002. The charts illustrate the changes in ... Overall, ... 2002 had the highest sales*)

2. **Write the preposition to fill the gap (during, from, of, to, at, by, in, over):**

1) The charts illustrate the percentage of the population who owned their homes ……1995 to 2015.
2) Overall, home ownership increased …… the first eight years of the period.
3) The younger people were, …… less likely they were to own their homes.
4) The most significant increase ... home ownership came from people aged 75 and over.
5) From 2005, home ownership fell most for people aged 18 …… 29.
6) The percentage of people owning their homes started ……around 64% in 1995.
7) The total percentage of people who owned their homes rose …… 69% in 2004.
8) Home ownership fell again …… 69% to 64% by 2015.

3. Describe the chart:

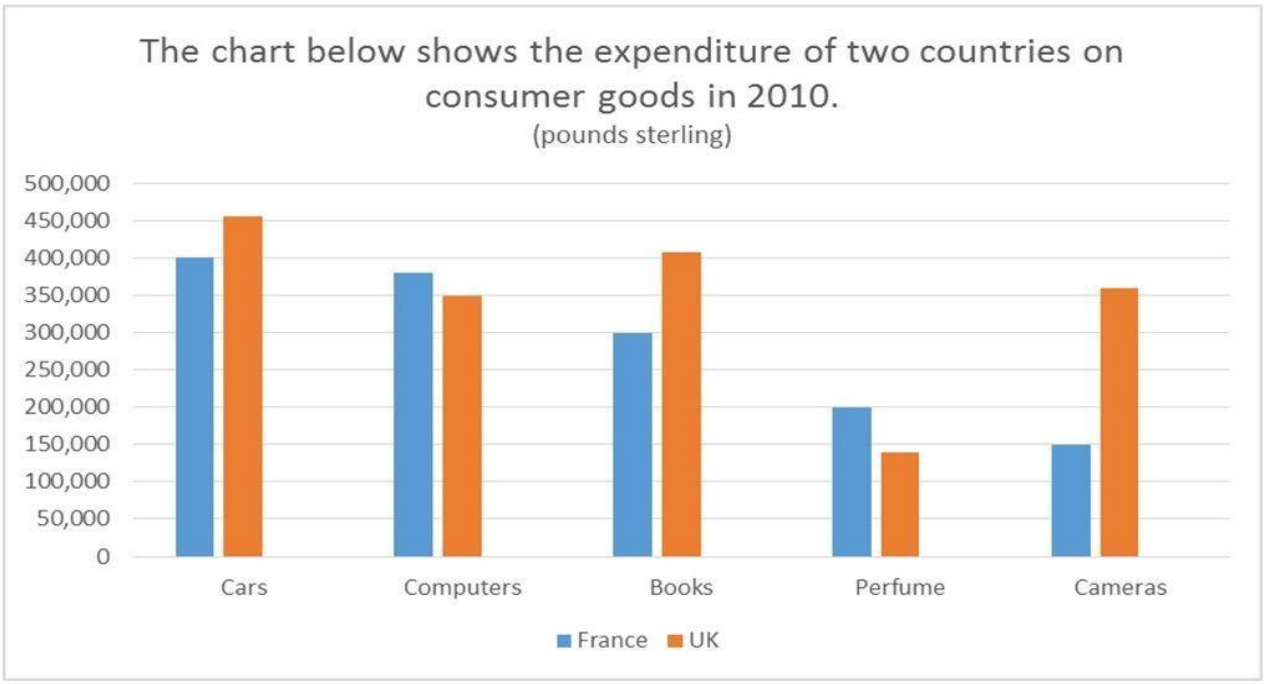
The bar chart below shows the production of the world's oil in OPEC and non-OPEC countries. Write a short report describing the information shown below. Write at least 150 words.



Report Plan

Paraphrase: shows>offering the data overview of; production of the world's oil in OPEC and non-OPEC countries>production of oil in OPEC and non-OPEC countries across the world
Overview: The graph offers data overview of past, present, and future production of oil in OPEC and non-OPEC countries.
Paragraph 2: (1) Talk about the conditions between the time period of 1980 and 2000. Give figures.
Paragraph 3: (1) Talk about future expectations. Give figures.

4.Read the example of how to analyze the chart:



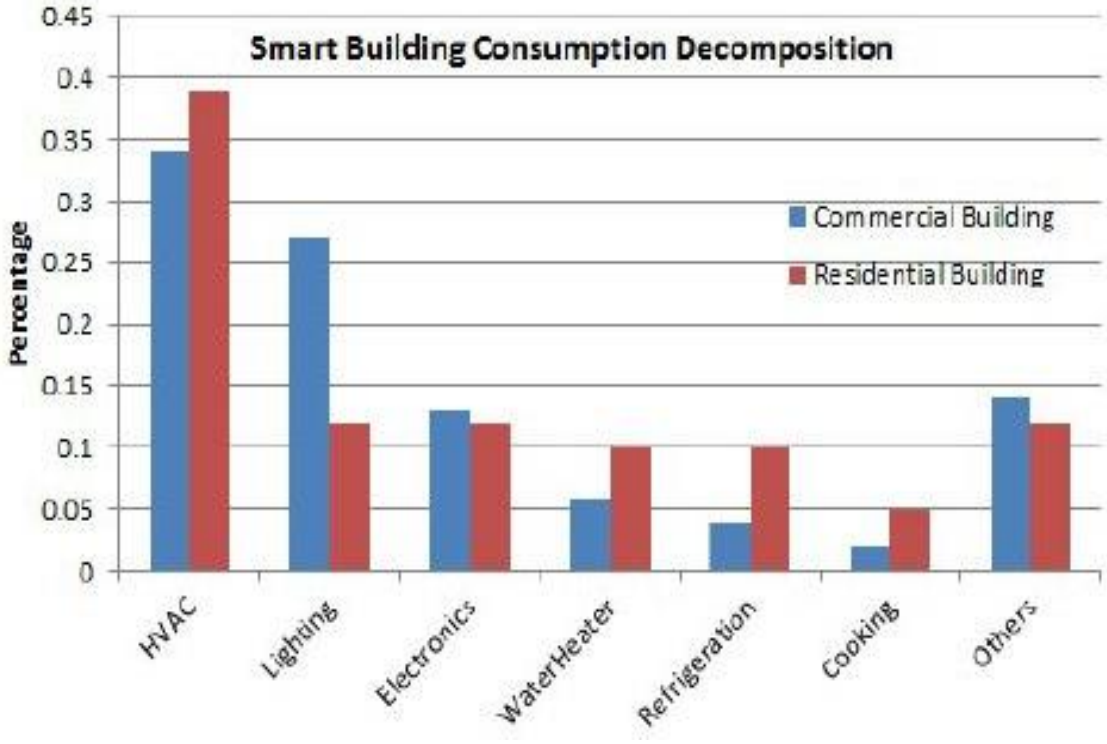
Bar Chart sample answer

The chart illustrates the amount of money spent on five consumer goods (cars, computers, books, perfume and cameras) in France and the UK in 2010. Units are measured in pounds sterling.
Overall, the UK spent more money on consumer goods than France in the period given. Both the British and the French spent most of their money on cars whereas the least amount of money was spent on perfume in the UK compared to cameras in France. Furthermore, the most significant difference in expenditure between the two countries was on cameras.
In terms of cars, people in the UK spent about £450,000 on this as opposed to the

French at £400,000. Similarly, the British expenditure was higher on books than the French (around £400,000 and £300,000 respectively). In the UK, expenditure on cameras (just over £350,000) was over double that of France, which was only £150,000.
On the other hand, the amount of money paid out on the remaining goods was higher in France. Above £350,000 was spent by the French on computers which were slightly more than the British who spent exactly £350,000. Neither of the countries spent much on perfume which accounted for £200,000 of expenditure in France but under £150,000 in the UK.

5.Describe the chart:

The bar chart below shows electricity consumption in both commercial and residential buildings.



CHAPTER 3. TRADITIONAL SOURCES OF ENERGY

UNIT 6. THERMAL ENERGY

THEORETICAL PART
WRITING PRESENTATIONS

Read and check your understanding.

Here are some tips on how to make a proper presentation:

Know your audience: Before creating your presentation, you should consider who your audience is, what their interests are, and what they hope to learn from your presentation. This will help you tailor your presentation to meet their needs.

Set clear goals: Determine what you want to achieve with your presentation and set clear goals. This will help you focus your presentation and ensure that your message is clear and concise.

Use a clear structure: Organize your presentation into a clear structure, using headings and subheadings to group related information together. This will help your audience follow your message and understand the key points.

Use visuals: Use visuals such as images, charts, and graphs to help illustrate your points and make your presentation more engaging. Ensure that your visuals are high-quality and relevant to your message.

Practice your delivery: Practice delivering your presentation multiple times to become familiar with the content and build your confidence. Time yourself to make sure you stay within the allotted time frame.

Engage your audience: Engage your audience with interactive elements such as questions, polls, or group discussions. This will help keep their attention and make your presentation more memorable.

Collect feedback: After your presentation, collect feedback from your audience to improve your future presentations. Consider what worked well and what could be improved upon for next time.

Useful phrases for presentations:

Introduction

- Good morning/afternoon everyone and welcome to my presentation. First of all, let me thank you all for coming here today.
- Let me start by saying a few words about my own background.
- As you can see on the screen, our topic today is.....
- My talk is particularly relevant to those of you who....
- This talk is designed to act as a **springboard** for discussion.
- This morning/ afternoon I'm going to take a look at the recent developments in.....

Presentation structure

- In my presentation I'll focus on three major issues.
- This presentation is structured as follows....
- The subject can be looked at under the following headings.....
- We can break this area down into the following fields....

Timing

- It will take about X minutes to cover these issues.

Handouts

- Does everybody have a **handout** / copy of my report?
- I'll be handing out copies of the slides at the end of my talk.
- I can email the PowerPoint presentation to anyone who would like it.
- Don't worry about taking notes, I've put all the relevant statistics on a **handout** for you

Questions

- If you have any questions, I am happy to answer them
- If you don't mind, I'd like to leave questions until the end of my talk /there will be time for a **Q&A** session at the end...

Sequencing phrases

- My first point concerns...
- First of all, I'd like to give you an overview of....
- Next, I'll focus on.....and then we'll consider....
- Then I'll go on to highlight what I see as the main points of....
- Finally, I'd like to address the problem of.....
- Finally, I'd like to raise briefly the issue of....

Highlighting information

7. I'd like to put the situation into some kind of perspective
8. I'd like to discuss in more depth the implications of....
9. I'd like to make more detailed recommendations regarding....
10. I'd like you to think about the significance of this figure here
11. Whichever way you look at it, the underlying trend is clear

Conclusion

- I’d just like to finish with the words of a famous scientist/ politician/ author.....
- Now let’s go out and create opportunities for...!

SELF-ASSESSMENT

1) What is the purpose of a presentation?
   a) To inform or persuade an audience
   b) To entertain an audience
   c) To sell a product or service
2) What are the key elements of a successful presentation?
   a) Clear and concise message, engaging visuals, and effective delivery
   b) Complex and technical information, large amounts of text, and monotone delivery c) Humorous anecdotes, flashy animations, and excessive use of jargon
3) What is the recommended amount of text on a slide?
   a) 5-7 words
   b) 10-12 words
   c) As many words as necessary to convey the message
4) What is the rule of thirds in slide design?
   a) Dividing the slide into three equal parts horizontally and vertically
   b) Placing important elements on or near the intersecting points of imaginary lines dividing the slide into thirds
   c) Using three different font styles or sizes on each slide
5) What is the recommended font size for text on slides?
   a) 12-14 points
   b) 16-18 points
   c) 20-22 points
6) What is the recommended length of a presentation?
   a) 30-45 minutes
   b) 60-90 minutes
   c) As long as necessary to convey the message
7) What are some common presentation delivery techniques?
   a) Using a conversational tone, maintaining eye contact with the audience, and using gestures to emphasize key points
   b) Speaking in a monotone voice, reading directly from the slides, and avoiding eye contact with the audience
   c) Speaking loudly and quickly, using slang or profanity to engage the audience, and pacing back and forth across the stage
8) What is the purpose of rehearsing a presentation?
   a) To ensure a smooth and confident delivery
   b) To memorize the entire presentation word-for-word
   c) To save time and avoid making changes to the presentation
9) What is the recommended format for presenting numerical data?
   a) Using graphs or charts to visualize the data

b) Presenting the data in a table format
c) Describing the data in detail using text

10) What is the recommended way to end a presentation?
a) Summarizing the main points and leaving the audience with a memorable message
b) Abruptly ending the presentation without a conclusion
c) Repeating the introduction and thanking the audience for their time

PRACTICAL PART

I.Preparation

Before reading study the following vocabulary:

hazardous
consumption
emissions
replenish
fossil fuels
storage sights
effluent treatments
wastewater
internal
target

II. Reading Text №1

Thermal energy

The energy sources that once exhausted, do not replenish themselves within a specific period are called conventional or non-renewable energy sources like coal, gas, and oil. For a long time, these energy sources have been used extensively to meet the energy demands. As the rate of consumption is much greater than the rate of formation, these sources of energy have been depleted and do not replenish. Conventional sources of energy emit hazardous emissions that not only damage the earth's atmosphere also deteriorate the health conditions of the livings.

Thermal energy is a type of power produced by atomic and molecular particle movement within a substance**.** It was first discovered in 1847 by English physicist and mathematician James Prescott Joule, after whom the unit of energy and Joule's Law are named.

Thermal energy is one of six basic forms of energy. They are:

- Chemical energy
- Nuclear energy
- Radiant energy
- Mechanical energy

- Electrical energy
- Thermal energy

The terms thermal energy and heat energy are often used interchangeably as they both involve power created by heat. However, thermal energy refers to the stored or total internal energy of a system‘s temperature, while heat represents thermal energy transfer. Thermal energy shows promising solutions to a growing need for power because of its ability to store energy to be used later.

Thermal energy sources are fossil fuels like natural gas, coal and oil, as well as solar heat, heat pump electric heat, and geothermal heat. Though thermal energy has relatively few negative impacts on the environment, a few issues need to be tended to before being considered a truly green source of power.

Thermal energy can produce pollution. This pollution is often in the form of escaped chemicals or water released in thermal power plants or storage sights.

Air and water pollution may also be linked to geothermal fields. For example, steam may emit heat waste that might affect cloud formations and weather patterns.

The release of hot or cold water by these thermal energy sources into natural bodies of water such as ponds, streams, and rivers can create a temperature difference and hinder the ecosystem.

Prevention of thermal water pollution can be targeted by monitoring water temperatures and changing them closer to the water’s natural temperature.

Effluent treatments can also prevent thermal pollution. Effluent treatments require that wastewater be stored in ponds or reinjected into wells.

(From: https://justenergy.com/blog/thermal-energy-what-it-is-how-it-works-environmental-impact/)

✍ After-text exercises

1.Insert the appropriate word or word combination from the text:

1) Thermal energy has relatively few …. impacts on the environment.
… treatments can also prevent thermal pollution.
2) Thermal energy shows promising solutions to a growing need for power because of its ability …energy to be used later.
3) Prevention of thermal water pollution can be targeted by … water temperatures and changing them closer to the water’s natural temperature.
4) Conventional sources of energy emit …emissions.
5) These sources of energy have been … and do not replenish.
6) … may also be linked to geothermal fields.

2.Fill in the table:

Advantages of traditional sources of energy	Disadvantages of traditional sources of energy
1.	
2.	
3.	

3.Answer the questions:

1) What are traditional sources of energy?
2) What are basic forms of thermal energy?
3) What are thermal energy sources?
4) In what way can thermal energy produce pollution?
5) How can we prevent thermal water pollution?
6) Does thermal energy have many negative impacts?
7) What is the biggest challenge facing the power thermal industry today?

4.Speak upon the advantages and disadvantages of traditional sources of energy

III. Reading Text №2

A HEAT PUMP SYSTEM

In HVAC applications, a heat pump normally refers to a vapor compression refrigeration device that includes a reversing valve and optimized heat exchangers so that the direction of heat flow may be reversed. The reversing valve switches the direction of refrigerant through the cycle and therefore the heat pump may deliver either heating or cooling to a building. In the cooler climates the default setting of the reversing valve is heating. The default setting in warmer climates is cooling. Because the two heat exchangers, the condenser and evaporator, must swap functions, they are optimized to perform adequately in both modes. As such, the efficiency of a reversible heat pump is typically slightly less than two separately-optimized machines. In plumbing applications, a heat pump is sometimes used to heat or preheat water for swimming pools or domestic water heaters. In somewhat rare applications, both the heat extraction and addition capabilities of a single heat pump can be useful and typically results in very effective use of the input energy. For example, when an air cooling need can be matched to a water heating load, a single heat pump can serve two useful purposes. Unfortunately, these situations are rare because the demand profiles for heating and cooling are often significantly different.

✍ **After-text exercises**

1. Fill in the gaps putting down the words from the brackets in a proper form.

1. A heat pump is a machine or device that ___ heat from one location (the 'source') to another. (move)
2. A heat pump normally ___ to a vapor compression device. (refer)
3. A heat engine ___ energy to flow from a hot 'source' to a cold heat 'sink'. (allow)
4. The refrigerant then ___ to the compressor and the cycle is repeated.(return)
5. The reversing valve _____ the direction of refrigerant through the cycle.(switch)
6. The condensed refrigerant then ___ through a pressure-lowering device (pass)

2. Tick the sentences true (T) or false (F).

1. A heat pump is a machine or device that moves heat from one location (the 'source') to another location.
2. Most heat pump technology doesn’t move heat from a low temperature heat source to a higher temperature heat sink.
3. Heat pumps can be thought of as a heat engine which isn’t operating in reverse.
4. One common type of heat pump works by exploiting the chemical properties of an evaporating and condescending fluid.
5. In heating, ventilation and cooling applications, a heat pump normally refers to a vapor compression device.
6. Most commonly, heat pumps draw heat from the air or from the ground.
7. According to the second law of thermodynamics heat cannot spontaneously flow from a colder location to a hotter area; work is required to achieve this.
8. A heat pump requires work to move thermal energy from a cold source to a warmer heat sink.
9. The heat pump uses a certain amount of work to move the heat.

3. Answer the questions.

1. What is the heat pump?
2. Give the construction of the heat pump.
3. What sphere is it widely used?
4. What is the operation of the heat pump?
5. What laws of thermodynamics are widely used in the pump operational system?
6. What other types of pumps do you know? Give their classification.

4. Make a presentation on thermal energy.

UNIT 7. HOW DOES A THERMAL PLANT WORK

THERETICAL PART
GRAMMAR PECULIARITIES OF TECHNICAL TEXTS

Read and check your understanding.

Technical texts have their own set of grammar peculiarities that distinguish them from other types of texts. Some of these peculiarities include:

Passive voice: Technical texts tend to use the passive voice more often than other types of texts. This is because technical writing is often focused on processes and procedures rather than on people or actions. E.g. "The experiment was conducted under controlled conditions to ensure accuracy."

Gerund. The gerund is a verb form that functions as a noun and is created by adding "ing" to the base form of the verb. In technical texts, gerunds are commonly used to describe ongoing actions, processes, or activities. E.g. "The software automates the process of converting raw data into visualizations." Gerunds can also be used to describe actions that are happening simultaneously. For example, "The machine is constantly monitoring the temperature and adjusting accordingly" uses "monitoring" as a gerund to describe an action that is happening simultaneously with the action of adjusting the temperature.

Additionally, gerunds can be used to create lists of actions or to group similar actions together. For example, "The design process includes researching customer needs, creating prototypes, and testing functionality" uses gerunds to group together the various actions involved in the design process.

Present tense: Technical texts often use the present tense to describe processes and procedures that are ongoing or repeated.

Specialized vocabulary: Technical texts rely heavily on specialized vocabulary, which may include technical terms, acronyms, and jargon. These terms may not be familiar to the general reader, but are necessary for communicating technical information effectively.

Sentence structure: Technical texts tend to use longer and more complex sentences than other types of texts. This is because technical writing often requires precise and detailed explanations of complex concepts.

Abbreviations: Technical texts often use abbreviations to save space and simplify language. However, it's important to define abbreviations when they are first introduced to ensure that readers understand their meaning. *BTU - British Thermal Unit, CHP - Combined Heat and Power, CCPP - Combined Cycle Power Plant, EOR - Enhanced Oil Recovery, GT - Gas Turbine, HRSG - Heat Recovery Steam Generator, LHV - Lower Heating Value, NGCC - Natural Gas Combined Cycle, O&M - Operations and Maintenance, PC - Pulverized Coal, SCR - Selective Catalytic Reduction, ST - Steam Turbine, TIC - Total Installed Cost, VOC - Volatile Organic Compounds.*

Numerical information: Technical texts often contain numerical information, which must be presented clearly and accurately. This may include measurements, statistics, and other quantitative data. Here are some common numerical terms and measurements used in heat power terminology: *BTU - British Thermal Unit - A measure of heat energy equivalent to the amount of energy needed to raise the temperature of one pound of water by one degree Fahrenheit; MW - Megawatt - A unit of power equal to one million watts; GJ - Gigajoule - A unit of energy equivalent to one billion joules; kg/s - Kilograms per second - A unit of mass flow rate, commonly used to express the flow rate of fluids or gases, % - Percent - A unit of proportion, equal to one part in 100; Efficiency - A measure of how much of the input energy is converted into useful output energy, expressed as a percentage; Heat rate - The amount of heat energy required to generate one unit of electricity, typically measured in BTUs per kilowatt-hour (BTU/kWh), Pressure - The force exerted per unit area, commonly measured in pounds per square inch (psi) or kilopascals (kPa); Temperature - The degree of hotness or coldness of a substance, commonly measured in degrees Celsius (°C) or Fahrenheit (°F), Flow rate - The amount of fluid or gas that passes through a given area in a given amount of time, commonly measured in cubic meters per second (m^3/s) or cubic feet per minute (CFM).*

Standardized formats: Technical texts may follow standardized formats, such as the format for a scientific research paper or the format for an engineering report. These formats help to organize information and make it easier to understand.

SELF-ASSESSMENT

1) Which sentence is correctly written in passive voice?
   a) The company designs new products every year.
   b) New products are designed by the company every year.
2) Which sentence is correct?
   a) You can improve performance by updating the codebase
   b) You can improve performance to update the codebase
3) What statement is correct?
   a) Use slash notation in technical texts to express combined units. For example, "m/s" for meters per second
   b) Don’t use slash notation in technical texts to express combined units. For example, "m/s" for meters per second
4) What sentence is correct:
   a) A process can be improved by changing a technology.
   b) One can improve a process to change a technology.
5) Technical texts tend to use shorter sentences.
   a) true
   b) false

PRACTICAL PART

I.Preparation

Before reading study the following vocabulary:
inlet/outlet
airfoil shape
condenser heat exchangers
traffic pumping
pulverized coal
flue gas
down-comer
air draft
stack
precipitator
capacity
heat rejection
pollutants

II. Watching video

Watch video «How does a thermal power plant work» (https://www.youtube.com/watch?v=IdPTuwKEfmA) and do the exercises:

✍ **After-video exercises**

1. Match the words with their definitions:

1. Stack	a)Coal that has been crushed to a fine dust in a grinding mill
2. Airfoil shape	b)The air coming out of a chimney after combustion in the burner it is venting
3. Down-comer	c) an apparatus for causing precipitation, especially a device for removing dust from a gas.
4.Pulverized coal	d) the exhaust pipe of an internal combustion engine
5. Precipitator	e) the cross-sectional shape of an object whose motion through a gas is capable of generating significant lift, such as a wing, a sail, or the blades of propeller, rotor, or turbine
6. Flue gas	f) a pipe for leading the hot gases from the top of a blast furnace downward to the dust collectors and flue system

2. **Match the verbs with their definitions:**

1. to come or go back (as to a former condition, period, or subject)	to reject
2. to cause (someone or something) to do something	to decrease
3. to alter the physical or chemical nature or properties of especially in manufacturing	to remove
4. to increase, to raise	to convert
5. to get rid of	to boost
6. to grow progressively less (as in size, amount, number, or intensity)	to revert
7. to refuse to accept, consider	to induce

3. **Fill in the blanks with verbs in Passive (***is added, is provided, is burnt, is separated, can be repeated, has been converted, is limited, is mixed, is supplied*):
   a) For this purpose heat …. to the exit of the pump with the help of a boiler.
   b) Pulverized coal … inside a boiler (is burnt).
   c) The pure steam … at a steam drum.
   d) The cycle …. over and over again.
   e) Super heating … to the threshold.
   f) Hot steam from a turbine … into a feed water.
   g) The cold liquid … at a condenser with the help of a cooling tower.

4. **Find 3 examples of Gerund with prepositions** (before… ing, by … ing) **and 10 examples of Passive (**is provided, can be fed back ….) **in a video. Make up your own sentences with these verbs used in Gerund and Passive.**

5. **Translate the given multicomponent terms, find more examples of multicomponent terms in that field in Glossary and explain the way of their translation:** condenser heat exchangers, water tube boiler, Turbine inlet temperature, turbine rotor blades.

6. **Match the technologies with their description:**

1. Recovery of blast furnace gas	a) these produce heat (their principal role) simultaneously with electricity (their secondary role) in a single installation and employing a single fuel.
2. Gas turbines and turbojets	b) electricity production can also be obtained by recovering and recycling gases from iron and steel production (blast-furnace gas, coking

	plant gas, steel plant gas), using a traditional boiler (a comparable technology to traditional thermal power plants) or in a heat recovery boiler in a combined cycle gas plant.
3. Cogeneration units	c) mostly used to supplement the electricity production of other thermal plants, gas turbine and turbojet units can take over very rapidly in the event of a failure of other power plants or of unexpected peaks in consumption.

7. **Speak upon the topic «How does a thermal power plant work». Your topic may be based on the points as follows:**

What is a Thermal Power Plant?
How do You Generate Electricity with a Thermal Power Plant?
Types of Thermal Power Plants
Diesel Power Plants
Steam Turbine Power Plants
Gas Turbine Power Plants
Advantages of Thermal Power Plants
Disadvantages of Thermal Power Plants

UNIT 8. HYDROPOWER

THEORETICAL PART

MAKING CONTRACTS

Read and check your understanding.

A contract is a binding and enforceable legal agreement between two or more parties. Important features of every contract include:

Basic information: Legal names and/or business names of the involved parties, their addresses, and a description of the property or service being exchanged for money or other consideration.

Agreement: This is a statement of the terms of the contract, such as the rights and responsibilities of all involved parties. If the contract records a loan, this section might cover the payment terms.

Specific considerations: This is a more detailed description of the property and/or terms, like the condition of the item, what the parties will and will not be responsible for, and what, if any, warranty or guarantees exist.

Dates: Every agreement notes the date of sale, dates for any warranties in effect, and due dates for payment installments, if any.

Null and void: This section explains how the contract can be nullified if there is a breach of contract.

Writing a contract requires careful consideration of legal language and specific requirements. Here are some general steps to follow when writing a contract:

Identify the parties involved: Begin by identifying the parties involved in the contract, including their full legal names and addresses. This will ensure that the contract is binding and enforceable.

Define the terms and conditions: Clearly define the terms and conditions of the agreement. This includes the scope of work or services to be provided, payment terms, deadlines, and any other relevant details. Be sure to use clear and concise language.

Include legal language: Contracts typically include legal language, such as indemnification clauses, limitations of liability, and dispute resolution provisions. Consult with a lawyer to ensure that these clauses are appropriate and enforceable.

Include signatures and dates: Once the contract is complete, have all parties sign and date it. This ensures that everyone has agreed to the terms and conditions.

Keep a copy for your records: Be sure to keep a copy of the contract for your records. This can be important if any disputes arise in the future.

It's important to note that contract writing can be complex and vary based on the specific industry and legal requirements. It's recommended to consult with a lawyer or legal professional when drafting contracts to ensure that they are legally binding and enforceable.

Sample contract

Brighton, England **April 10, 2009**	**Брайтон, Англія** **10 квітня, 2009 р.**
Continental Equipment Plc, Brighton, England, hereinafter referred to as "the Seller", on the one part, and TST Systems Ltd., Kyiv, Ukraine, , hereinafter referred to as "the Buyer", on the other part, have concluded the present Contract as follows:	Компанія Continental Equipment Plc, Брайтон, Англія, яка надалі іменується „Продавець", з однієї сторони, і компанія ТСТ Системз Лтд.Ю Київ, Україна, яка надалі іменується „Покупець", з іншої сторони, уклали цей контракт про наступне:
I. *Subject of the Contract* 1.1. The Seller has sold and the Buyer has bought the machinery, equipment, materials, and services ("Equipment") as listed in Appendix 1 being an integral part of this Contract.	I. *Предмет Контракту* 1.1. Продавець продав, а Покупець купив машини, облад-нання, матеріали і послуги ("Обладнання"), перераховані у Додатку 1, який є невід'ємною частиною цього Контракту.
2. Prices and Total Value of the Contract 2.1. The Total Contract Value is as follows: Equipment and engineering FOB U.K. port + documentation £ ____ Supervision, start-up and training £ ____ Spare and wear parts £ ____ Freight £ ____ Total price CIF Odessa £ ____ Discount £ ____ Total Contract Value £ ____	*2. Ціни і загальна сума Контракту* 2.1. Загальна сума Контракту складає: Обладнання і техніка на умовах FOB (порт Великобританії) +документація £ ____ Супровід, запуск і підготовка персонал £ ____ Запасні і зношувані деталі £ ____ Фрахт судна £ ____ Загальна сума на умовах CIF Одеса £ ____ Знижка £ ____ Загальна сума Контракту £ ____
2.2. The prices are understood to be CIF Odessa including cost of packing, marking, loading on board a ship, stowing and fastening the equipment in the hold, and the cost of the materials used for this purpose.	2.2. Ціни розраховуються на умовах CIF Одеса, включаючи вартість упаковки, маркування, завантаження на борт судна, розміщення і кріплення в трюмі, а також вартість матеріалів, які використовуються для цієї мети.
2.3. The prices are firm for the duration of the Contract and shall not be subject to any revision except on account of any mutually agreed changes or modifications to equipment specification and/or quantities listed in Appendix 1 to this Contract.	2.3. Ціни залишаються незмінними протягом всього строку дії Контракту і можуть бути переглянуті лише у випадку взаємно погоджених змін у специфікації обладнання або його модифікації, а також змін кількості його складових частин, вказаних у Додатку 1 до цього Контракту.
3. Time of Delivery 3.1. The Equipment specified in Appendix 1 of the present Contract is to be delivered within two (2) months from the date of opening the Letter of Credit specified in Clause 4.1 of this Contract.	*3. Срок поставки* 3.1. Обладнання, перераховане у Додатку 1 до даного Контракту, повинно бути поставлене протягом двох (2) місяців з моменту відкриття акредитиву, вказаного у п.4.1 даного Контракту.
3.2. The delivery date is understood to be the date of the clean Bill of Lading issued in the name of the	3.2. Датою поставки Обладнання вважається дата видачі чистого коносамента із вказівкою імені Покупця

Buyer, destination Odessa, Ukraine.

4. Terms of Payment

4.3. Within thirty (30) days from the date of signing this Contract, the Buyer is to open in favour of the Seller an irrevocable confirmed Letter of Credit with CityBank, London, for hundred per cent (100%) of the total contract value. The Letter of Credit is to be valid for three (3) months.

4.2. Payment from this Letter of Credit at the rate of hundred per cent (100%) of the total contract value is to be effected in GB pounds against the following shipping documents:

4.2.1. Original Bill of Lading issued in the name of the Buyer, destination Odessa, Ukraine.

4.2.2. Shipping Specification.
4.2.3. Certificate of Quality.
4.2.4. Certificate of Origin.
4.2.5. Packing List.
4.2.6. Insurance Policy.

5. Technical Documentation

5.1. Within five (5) days from the delivery date the Seller shall send two (2) sets of the technical documents as listed in Appendix 2 to the address of the Buyer.

5.2. All instructions on the drawings are to be in English, with all the instructions contained in Items 1,2,3, and 4 of Appendix 2 translated into Ukrainian.

6. Guarantee of the Quality of the Equipment.

6.1. The guarantee period is twelve (12) months from the date of the start-up of the Equipment, that is reflected in an appropriate Act signed by the representatives of the Parties to the present Contract, but not more than eighteen (18) months from the date of delivery of the Equipment.

6.2. If the Equipment proves to he defective or faulty during the guarantee period, the Seller has at its expense at the choice of both Parties either to remedy the defects or to replace the faulty equipment with new equipment of good quality which is to be delivered without delay to the port of delivery.

7. Packing

7.1. The Equipment is to be shipped in export sea packing suitable for the type of equipment delivered. Packing should also be suitable for transshipment in transit and reasonable long storage of the Equipment.

7.2. Each container is not to exceed the following dimensions: length - 2,500 mm, width = 2,500 mm, height = 2,500 mm.

7.3. The Seller is responsible to the Buyer for any damage to the Equipment resulting from inadequate packing of the equipment.

8. Marking

8 1. Ail the containers are to be marked on three (3) sides. Each container should bear the following markings made in indelible paint (in Ukrainian and

і кінцевого порту призначення - Одеса, Україна.

4. Умови оплати

4.1. Протягом тридцяти (30) днів з моменту підписаній цього Контракту Покупець повинен відкрити у CityBank (Лондон) на ім'я Продавця безвідкличний підтверджений акредитив на сто відсотків (100%) від загальної суми Контракту. Акредитив дійсний протягом трьох (3) місяців.

4.2. Платіж за цим акредитивом у розмірі ста відсотків (100%) від загальної суми Кон-тракту здійснюється в анг-лійських фунтах проти пред' явлення наступних відвантажу-вальних документів:

4.2.1. Оригіналу коносамент та, виписаного на ім'я Покупця, із вказівкою кінцевого порту призначення Одеса (Україна).
4.2.2. Відвантажувальної специфікації.
4.2.3. Сертифікату якості.
4.2.4. Сертифікату походження товару.
4.2.5. Пакувального списку.
4.2.6. Страхового поліса.

5. Технічна документація

5.1. Протягом п'яти (5) днів з моменту поставки Продавець повинен надіслати на адресу Покупця два (2) комплекти технічних документів, перерахованих у Додатку 2.

5.2. Усі пояснення на кресленях повинні бути зроблені англійською мовою. Повинні бути також надані переклади українською мовою усіх пояснень на кресленнях, що входять у п.п.1, 2, 3 і 4 Додатку 2.

6 Гарантія якості Обладнання

6 1. Гарантійний строк складає дванадцять (12) місяців з моменту запуску Обладнання, що фіксується у відповідному Акті, підписаному уповноваженими представниками сторін, які укладають цей Контраст, але не більше вісімнадцяті (18) місяців з дати поставки Обладнання.

6.2. Якщо Обладнання вийде з ладу протягом гарантійного строку, Продавець повинен за власний рахунок і за вибором обоє сторін або усунути наявні дефекти, або замінити облад-нанія, яке вийшло з ладу, новим обладнанням відповідної якості, яке повинно бути без затримки доставлене У порт прзначення.

7. Пакування

7.1. Обладнання має бути поставлене у морській експортній упаковці, призначеній для транспортування обладнаній даного типу. Упаковка повинна також бути придат-ною для транзитних переве-зень і для зберігання Облад-нанія протягом розумного стрску.

7.2. Кожний контейнер за розмірами не повинен перевищувати наступні габарити: довжина — 2 500 мм, ширина -2 500 мм, висота — 2 500 мм.

7.3. Продавець несе відпові дальність перед Покупцем за будь-які пошкодження Об ладнання, що сталися через йо го неправильне пакування.

8. Маркування

8.1. Всі контейнери мар-куються з трьох (3) сторін. На кожному контейнері повинні бути нанесені незмивною фарбою наступні написи (ук раїнською і

English):

Contract No.
Seller: Continental Equipment Plc (Address)
Buyer: TST Systems Ltd. (Address)
Railway Station of Destination: Kyiv
Container No.:
*Gross weight:*____kg
*Net weight:*____kg
Case dimensions in cm (length x width x height)

8.2. If a case requires special handling it should bear additional marks: "Fragile", "Top" or "This side up", etc.

9. Shipping Instructions and Notifications

9.1. Within twenty-four (24) hours after shipment, the Seller is to inform the Buyer by fax regarding the date of shipment, the Bill of Lading number, number of containers, their weight, the vessel name.

10. Insurance

10.1. The Seller is to take care of and cover expenses for insurance of the Equipment under the Contract from the moment of its dispatch up to the moment of its arrival at the port of Odessa.

11. Sanctions

11.1. In the event of delay in delivery of the Equipment the Seller is to pay the Buyer a penalty at the rate of 1.0% of the total contract value for every week of delay. However, the total amount of penalty for delay in delivery is not to exceed 10% of the total contract value.

11.2. While calculating penalty for delay, the amount of days comprising over half of a calendar week is considered to be a full week.

12. Force Majeure

12.1. The Parties are released from their responsibility for partial or complete non-execution of their liabilities under the Contract should this non-execution be caused by the force majeure circumstances including, but not limited to: fire, flood, earthquake, and if these circumstances have had a direct damaging effect on the execution of the present Contract.

12.2. The Party which is unable to fulfil its obligations under this Contract is to inform the other Party within ten (10) days from the beginning of force majeure circumstances.

13. Arbitration

13.1. The Seller and the Buyer will take all possible measures to settle amicably any disputes or differences which may arise out of the present Contract or in connection with it.

13.2. If the Parties do not come to an agreement, all the disputes and differences are to be submitted for Arbitration in Stockholm, Sweden, in accordance

англійською мовами):

Контракт №
Продавець: Continental Equipment Plc (Адреса)
Покупець: TST Systems Ltd. (Адреса)
З/д станція призначення: Київ
Контейнер № :
*Вага брутто:*____кг
Вага нетто: ____кг
Розміри контейнера у см (довжина х ширина х висота)

8.2. Якщо контейнер потребує спеціального поводження, то на ньому повинно бути нанесене додаткове маркування: "Крихкий", "Вверх", або "Тут верх" тощо.

9. Інструкції і повідомлення про відвантаження

9.1. Протягом двадцяти чотирьох (24) годин після відвантаження обладнання Продавець повинен повідомити Покупця факсом про дату відвантаження, номер коносаменту, кількість контейнерів, їх вагу, назву судна.

10. Страхування

10.1 Продавець здійснює страхування Обладнання, що поставляється у відповідності до цього Контракту, і покриває усі пов'язані з цим витрати з моменту відвантаження Обладнання і до моменту прибуття його у порт Одеси.

11. Санкції

11.1 У випадку затримки поставки Обладнання Продавець повинен виплатити Покупцеві пеню у розмірі 1% від загальної суми Контракту за кожний тиждень затримки поставки. При цьому, загальна сума пені за затримку поставки Обладнання не повинна перевищувати 10% від загальної суми Контракту.

11.2. Під час розрахунку пені за затримку поставки Облад-нання кількість днів, що перевищує половину календарного тижня, вважається повним тижнем затримки.

12. Форс-мажор

12.1. Сторони звільняються від відповідальності за повне або часткове невиконання своїх обов'язків за цим Кон-тарктом, якщо таке невиконання було викликано форсмажорними обставинами, які включають, але не обмежу- ються такими, причинами, ЯК| пожежа, повінь, землетрус, її якщо дані обставини малий безпосередній вплив на можливість виконання цих зо-бов'язань.

12.2. Сторона, яка не може виконати своїх зобов'язань за даним Контрактом, повинна протягом десяти (10) днів після початку дії форс-мажорних обставин повідомити іншу сторо-ну про їх наявність.

13. Арбітраж

13.1. Покупець і Продавець вживають усі можливі заходи для врегулювання спорів розбіжностей, які можуть виникнути під час виконання цього Контракту або у зв'язку з його виконанням.

13.2. Якщо сторони не мо-жуть дійти згоди, усі спори і розбіжності передаються на розгляд до арбітражного

with the rules and regulations of the Chamber of Commerce in Stockholm and applying the substantive laws of Sweden.	суду у Стокгольмі (Швеція) згідно з правилами і положеннями Торгової Палати Стокгольму і із застосуванням відповідних законів Швеції.
14. Other Terms 14.1. The Seller upon written consent of the Buyer shall be permitted to substitute equipment of comparable quality and conforming to the technical requirements for any item of equipment that may not be available for one reason or another. 14.2. Any changes, amendments or supplements to the terms and conditions of this Contract shall be valid only if set forth in a written document duly signed by authorized representatives of both Parties to the present Contract. 14.3. After the Contract has been signed all the preliminary agreements, discussions and correspondence between the Parties concerning this Contract are to be considered null and void if conflicting with this Contract. 14.4. The Contract becomes effective and comes into full force from the date of signing.	*14. Інші умови* 14.1. За наявності письмової згоди Покупця Продавець може здійснити заміну тих чи інших частин Обладнання, яких з тієї чи іншої причини нема в наявності, на інше обладнання порівняної якості, яке задовольняє технічним вимогам. 14.2. Будь-які зміни, поправки і доповнення до умов цього Контракту вважаються дійсними тільки у тому випадку, якщо вони зроблені письмово і належним чином підписані уповноваженими представниками сторін. 14.3. Після підписання Контракту всі попередні угоди, домовленості та листування між сторонами, які уклали цей Контракт, стають недійсними, якщо вони суперечать положенням цього Контракту. 14.4. Контракт набуває чинності і вступає в силу з датийого підписання.
15. Legal Addresses of the Parties SELLER (ПРОДАВЕЦЬ): Continental Equipment Plc 9 North Road Brighton BN1 5JF England for and on behalf of the Seller (від імені та за дорученням Продавця) Alfred Rogers Chairman (Президент)	*15. Юридична адреса сторін* ПОКУПЕЦЬ (BUYER): TST Systems Ltd. P.O.Box 171 Kyiv 253100 Ukraine від імені та за дорученням Покупця (for and on behalf of the Buyer) Віктор Клименко Коммерційний директор (Commercial Director)

SELF-ASSESSMENT

1) What is the purpose of including legal language in a contract?
   a) To make the contract longer and more formal
   b) To make the contract legally binding and enforceable
   c) To make the contract more difficult to understand
2) When writing a contract, what should be included in the terms and conditions section?
   a) The names of the parties involved
   b) Payment terms
   c) The scope of work or services to be provided d) All of the above
3) Why is it important to use clear and concise language in a contract?
   a) To make the contract more formal
   b) To make the contract easier to read and understand
   c) To make the contract more legally binding
4) What is the purpose of having all parties sign and date a contract?
   a) To make the contract legally binding and enforceable
   b) To make the contract more formal
   c) To make the contract longer
5) When drafting a contract, what should you do if you are unsure about the legal language or requirements?

a) Include the legal language you think is appropriate
b) Consult with a lawyer or legal professional
c) Ignore the legal requirements and write the contract as you see fit

PRACTICAL PART

I.Preparation

Before reading study the following vocabulary:

diversion
accounts
facilities
affordable
elevation difference
duration
lifespan
reliable form
flood control

II. Reading Text

WHAT IS HYDROPOWER?

Hydropower, or hydroelectric power, is one of the oldest and largest sources of renewable energy, which uses the natural flow of moving water to generate electricity. Hydropower currently accounts for 37% of total U.S. renewable electricity generation and about 7% of total U.S. electricity generation.

While most people might associate the energy source with the Hoover Dam—a huge facility harnessing the power of an entire river behind its wall—hydropower facilities come in all sizes. Some may be very large, but they can be tiny, too, taking advantage of water flows in municipal water facilities or irrigation ditches. They can even be "damless," with diversions or run-of-river facilities that channel part of a stream through a powerhouse before the water rejoins the main river. Whatever the method, hydropower is much easier to obtain and more widely used than most people realize.

Hydropower technologies generate power by using the elevation difference, created by a dam or diversion structure, of water flowing in on one side and out, far below, on the other.

Hydropower is an affordable source of electricity that costs less than most. Since hydropower relies only on the energy from moving water, states that get the majority of their electricity from hydropower, like Idaho, Washington, and Oregon, have lower energy bills than the rest of the country.

Compared to other electricity sources, hydropower also has relatively low costs throughout the duration of a full project lifetime in terms of maintenance, operations, and fuel . Like any major energy source, significant upfront costs are unavoidable,

but hydropower's longer lifespan spreads these costs out over time. Additionally, the equipment used at hydropower facilities often operates for longer periods of time without needing replacements or repairs, saving money in the long term.

The installation costs for large hydropower facilities consist mostly of civil construction works (such as the building of the dams, tunnels, and other necessary infrastructure) and electromechanical equipment costs (electricity-generating machinery). Since hydropower is a site-specific technology, these costs can be minimized at the planning stage through proper selection of location and design.

The benefits of hydropower have been recognized and harnessed for thousands of years. In addition to being a clean and cost-effective form of energy, hydropower plants can provide power to the grid immediately, serving as a flexible and reliable form of backup power during major electricity outages or disruptions. Hydropower also produces a number of benefits outside of electricity generation, such as flood control, irrigation support, and water supply.

The history of hydropower dates back thousands of years. For example, the Greeks used water wheels to grind wheat into flour more than 2,000 years ago. The evolution of the modern hydropower turbine began in the mid-1700s when a French hydraulic and military engineer, Bernard Forest de Bélidor, wrote *Architecture Hydraulique*. Many key developments in hydropower technology occurred during the first half of the 19th century, and more recently, the past century has seen a number of hydroelectric advancements that have helped hydropower become an integral part of the renewable energy mix in the United States.

✍ After-text exercises

1.Match the words with their definitions:

1. facility	a) it is good value for the amount of money paid
2. maintenance	b) the agricultural process of applying controlled amounts of water to land to assist in the production of crops
3. outages	c) A building where electric power is generated.
4. cost-effective	d) any device that provides instantaneous, uninterruptible power.
5. reliable	e) the process of preserving a condition or situation or the state of being preserved
6. irrigation	f) something such as a place, building, or equipment used for a particular purpose or activity:
7. renewable	g) a system of wires through which electricity is connected to different power stations across a region

8. backup power	h) something that is reliable can be trusted or believed
9. grid	i) can be used and easily replaced
10.powerhouse	j) a period when a service, such as electricity, is not available:

2. **Fill in the blanks with the following words** (renewable, backup power cost-effective, facility, grid, maintenance):

1) A few countries generate all their electricity using … energy already.
2) The bank must be run in a … way.
3) The window had been replaced last week during routine ….
4) Electrical … vary in size and can cover whole countries or continents.
5) The resort has a wide range of ….. for young and old alike.
6) … is defined as any device that provides instantaneous, uninterruptible power.

3. Answer the questions:

1) Is hydropower an old or a new industry?
2) Why is it cost-effective?
3) What factors does it depend on?
4) Are the installation costs high or low?
5) What are the benefits of hydropower?
6) Why is it affordable source of electricity?
7) Prove that hydropower is a renewable source of energy?

4. Watch video Pumped Storage Hydropower and mark the sentences True/False: https://www.energy.gov/eere/water/pumped-storage-hydropower

1) PSH is a type of hydroelectric energy storage.
2) It is a configuration of two water reservoirs at different elevations that can generate power as water moves up from one to the other (discharge), passing through a turbine. PSH acts differently from a giant battery, because it can store power and then release it when needed.
3) PSH was first used in the United States in 1930.
4) PSH currently accounts for 95% of all utility-scale energy storage in the United States.
5) With closed-loop PSH, reservoirs are connected to an outside body of water.
6) Pumped-storage hydropower is the most dominant form of energy storage on the electric grid today.

5. Speak about advantages (*renewable and sustainable, low operating costs, long service life etc.*) and disadvantages (*high start-up cost, energy losses, climate dependent, impact on water quality, etc*.) of Pumped Storage Hydropower"

6. **Writing**. Fill in the gaps in the outline draft contract choosing from the words given below:
terms, arbitration matter, charges, pay penalty, delivery, contract, parties

DRAFT CONTRACT

Between Valeo Ltd., here in after referred to as "the Seller" and Mercury, here in after referred to as "the Buyer". The Seller undertakes to supply the Buyer with 12 000 pumps to 765 and to pay all and insurance.
The terms of … (1) and immediate payment of charges by confirmed and irrevocable ___... (2) are to be standard. A _... (3) clause will be included in the contract. It will be against the Buyer for … (4) payment.
In the event of non-payment, the Seller shall be entitled to … (5) for the goods. In case of a dispute between the… (6) to the contract the…(7) will be taken to independent…(8). All the … (9) of the contract must be complied with by both parties.

You have to write the text of the draft contract for the negotiations. The topic: purchasing contract, goods - technical equipment for Thermal power plant; you are the representative of the Buyer. Use the information from the methodological recommendations.

CHAPTER 4. ALTERNATIVE SOURCES OF ENERGY
UNIT 9. RENEWABLE ENERGY

THEORETICAL PART
EDITING OF MACHINE TRANSLATION

Read and check your understanding.

When a computer rather than a human performs an initial translation, editing and proofreading are crucial for revising and improving the text. Machine translation engines like Google and Bing are much better than they used to be, but they still produce inaccurate or confusing phrases, so an expert (who is often a translator trained in editing techniques) needs to edit the text to remove errors and correct word choice. This specific type of translation editing and proofreading is called machine translation post-editing, and it focuses on errors unique to machine-generated results.

Proofreaders work with almost-finalized drafts and cover the following topics:
major grammar mistakes
spelling and punctuation
word choice inconsistencies
typos and cut-and-paste errors
formatting problems

Handy tips:

1) Get rid of words that do not contribute to the meaning of a sentence, or words that over-complicate the structure.

Good example: He works on marketing projects.
Bad example: He is the man who works on marketing projects.

2) Keep your sentences short, with a simple grammatical structure. Where possible, break long sentences into two shorter ones
3) Avoid ambiguity, use the active voice

The active voice is a style of writing that cuts out vagueness and ambiguity. Again, if a human is unsure on the exact meaning of a phrase, then a machine translation engine is going to struggle, especially if your sentence has a double meaning.
Good example: I will always remember my first time using a machine translation engine.
Bad example: My first time using a machine translation engine will always be remembered.

4) Use the definite article, even when you don't want to

Try to specify nouns using "the", as a machine translation engine can struggle to distinguish between verbs and nouns. A lot of short nouns can also be verbs, for example 'skip', 'bank', 'lodge' – these can cause further confusion if used without a definite article. Instructions and user manuals often omit the definite article.
Good example: Build the engine. Train the engine. Use the engine.
Bad example: Build engine. Train engine. Use engine.

5) Avoid idioms/clichés/slang/colloquialisms/abbreviations

A machine translation engine may not convey the correct meaning of colloquial or idiomatic phrases and the meaning may not make sense to international users.
Good example: She didn't come into the office as she was not feeling well.
Bad example: She didn't come into the office as she was under the weather.

5) Avoid the preposition – of more than three times within a sentence. Instead, -of phrases convert into multicomponent terms.

SELF-ASSESSMENT

1. Which of the following is NOT a common error in machine translation?
   a) Missing words
   b) Incorrect verb tense
   c) Inconsistent terminology
   d) Perfect grammar and syntax
2. True or False: Machine translation is always 100% accurate.
   a) True
   b) False
3. Which of the following is a good strategy for proofreading machine translation?
   a) Reading the translation out loud
   b) Comparing the translation to the original text
   c) Using a spell-checker
   d) All of the above
4. Which of the following is NOT a benefit of machine translation?
   a) Speed
   b) Cost-effectiveness
   c) Accuracy
   d) Personalization
5. True or False: Machine translation is a replacement for human translators.
   a) True
   b) False

PRACTICAL PART

I.Preparation

Before reading study the following vocabulary:

replenished
conduction band
density variation
constitute
decrease
emissions
to rely on
capacity
commissioning
sustainable

II. Reading Text №1

Renewable energy

Those sources of energy that are replenished by a natural process after being used are renewable energy sources. These sources are solar energy, wind energy, geothermal energy, bioenergy (biomass, biogas, and biodiesel), geothermal energy, and hydro energy. Almost all these renewable energy sources exist because of the sun. Solar PV uses the solar irradiance to kick out the electrons from the valance band to the conduction band that constitutes the electric current. Wind energy exists owing to the bumpy heating of the earth's surface causing density variation.

Wind energy

The terms "wind energy" and "wind power" both describe the process by which the wind is used to generate mechanical power or electricity. This mechanical power can be used for specific tasks (such as grinding grain or pumping water) or a generator can convert this mechanical power into electricity.

A wind turbine turns wind energy into electricity using the aerodynamic force from the rotor blades, which work like an airplane wing or helicopter rotor blade. When wind flows across the blade, the air pressure on one side of the blade decreases. The difference in air pressure across the two sides of the blade creates both lift and drag. The force of the lift is stronger than the drag and this causes the rotor to spin. The rotor connects to the generator, either directly (if it's a direct drive turbine) or through a shaft and a series of gears (a gearbox) that speed up the rotation and allow for a physically smaller generator. This translation of aerodynamic force to rotation of a generator creates electricity.

Wind power is the most efficient technology to produce energy in a safe and environmentally sustainable manner: it is zero emissions, local, inexhaustible, competitive and it creates wealth and jobs.

Spain has been one of the leading, pioneering countries in exploiting the wind to produce electricity. Thirty years after installing the first wind turbine in the country, Spain became the first country in the world to rely on wind energy as the main source of electricity for an entire year (2013, with 20.9 % of total production). This also established Spain as an advanced country in terms of technological solutions that allow integration of wind energy into the grid.

Botiieve is the largest wind power plant in Ukraine with a total capacity of 200 MW, which is almost half of the total wind power capacity in the country. It is located in Zaporizhia Oblast. Its construction began in 2012 and was completed in 2014. The plant includes 65 WMs with a unit capacity of 3.075 MW. Projected average annual wind power generation is 686 million kW·h. At the time of commissioning, Botiieve WPP was one of the top five largest wind power plants in Central and Eastern Europe.

✍ After-text exercises

1. Insert the appropriate word or word combination from the text:

1) It would be tough to rely on 100% wind power. Instead, wind has to be … with other sources of energy.
2) The spinning blades turn … that connects to a generator Lots of electricity comes from spinning things – water or steam spinning a turbine, for example, that turns a shaft that goes to a … .
3) What wind speed is said to be necessary to make large wind energy systems economically …?
4) Wind power produces energy in a safe and environmentally …. manner.
5) Spain became the first country in the world …wind energy as the main source of electricity.

2. Answer the questions:

1) What is renewable energy?
2) What is the principle of wind energy?
3) Why is wind energy environmentally-friendly?
4) What country is a pioneer in exploiting the wind to produce electricity?
5) Is wind energy popular in Ukraine?
6) What are the disadvantages of wind energy?

3. Fill in the table:

Sources of renewable energy	**Type of energy**	**Principle**
sun	Solar energy	
wind		
water		
earth		

4. Speak upon wind power plants in Ukraine. Touch upon the key points:
location, capacity, investors, green auction, employment, development trends
(you may use the information source https://spain.mfa.gov.ua/storage/app/sites/72/uwea-2020.pdf).

5. Analyze the Google translation of titles of Master's theses and edit them

Title	Machine translation	Proofreading
Дослідження ефективності роботи теплонакопичувача	Study of the efficiency of the heat storage	
Дослідження доцільності використання теплової енергії водосховища Дніпровської ГЕС	Research of expediency of use of thermal energy of the reservoir of the Dnieper hydroelectric power station	

Дослідження впливу вологи на коефіцієнт теплопровідності ізоляційних матеріалів	Investigation of the influence of moisture on the thermal conductivity of insulating materials	

III.Reading text №2

Read the text, entitle it and every paragraph of the text.

1. Wind power is the fastest-growing energy source in the world. Siemens is rapidly expanding its manufacturing capacities in this exciting new business with powerful offshore wind parks, growing much faster than the market. With more than 6300 wind turbines around the world. Siemens helps to save up to 10 million tons of CO2 emissions per year. As the market leader in offshore wind energy, Siemens offers the largest serially produced, offshore wind turbines with rotor blades sweeping an area bigger than a football field.
2. The world's largest gas turbine the Siemens SGT5-8000H is also the most powerful. Its capacity of 340 megawatts roughly equals that of 13 jumbo jet engines. In combined cycle operation, plants powered with this new gas turbine will generate 530 MW - enough to supply three million people with energy. A higher than 60 percent efficiency rate in combined-cycle applications (an increase of two percentage points) sets a new benchmark for efficient power generation and results in a reduction of CO2 emissions by up to 40000 tons per year.
3. Superior technology for long-distance power transmission is key to generating the thousands of gigawatts of electricity required by our growing planet. But how can we efficiently transport it from remote power plants to populated areas, where it is needed? To overcome the limitations and energy losses of conventional alternating current (AC) transmission, Siemens built high-voltage directcurrent (HVDC) transmission links, which are a more economical and ecological means of transporting electric power over distances of 600 km or more.
4. Buildings account for nearly 40 percent of global energy consumption. To address this massive challenge, Siemens offers measures that help reduce energy costs by 20 - 40 percent on average. Through energy Siemens plans and installs new intelligent building systems that guarantee savings in cost, energy consumption and CO2 emissions. Under such a contract, Siemens identifies the potential for saving energy in a building through modernization and energy services. The investment pays for itself through the energy savings with no added costs incurred.

✍ **After-text exercises**

1. **Read the text and fill in the gaps with suitable word from the box.**
   Wind power, energy, expand, capacity, wind turbine, market leader, blade, wind Parks

1… is the fastest-growing …2 source in the world. Siemens is rapidly…3 its manufacturing …4 in this exciting new business with powerful offshore, …5 growing much faster than the market. With more than 6300…6 around the world, Siemens helps to save up to 10 million tons of CO2 emissions per year. As the …7 in offshore wind energy, Siemens offers the largest serially produced, offshore wind turbines with rotor …8 sweeping an area bigger than a football field.

2. Discuss with the partners the problem of energy efficiency.

The tough questions are: How will we cover the rising global demand for energy in the future? How will we supply energy in a way that is compatible with the climate and environment, reliable and also affordable? Energy efficiency will play a key role in meeting these challenges.

3. Role –play:

A. You are the representative of Siemens presenting on the operational meeting in the thermal engineering power company in Ukraine. You have to explain the colleagues of the turbine's specification and persuade them to conclude the contract.
B. Ukrainian partners have to choose a type of the turbine and prepare a list of the questions, concerning this topic.

Use the phrases below:

Technical specification, gas turbine, water turbine, design, dimensions, capacity, operation, application, environmental behavior, energy efficiency, production quality, spare parts, produce qualitative work, engineering design, economic efficiency, the correctness of operational process, analytical research of the different types of turbines.

UINIT 10. SOLAR ENERGY

THEORETICAL PART

WRITING A TECHNICAL REPORT

Read and check your understanding.

A technical report is described as a written scientific document that conveys information about technical research in an objective and fact-based manner. This technical report consists of the three key features of a research i.e process, progress, and results associated with it. Technical reports are used by industries to convey pertinent information to upper management. This information is then used to make crucial decisions that would impact the company in the future.

To make a report about technical solutions, you should follow these general steps:

Define the problem: Start by defining the problem or challenge that you are trying to solve. Explain why this problem is important and what impact it has on the organization.

Describe the technical solution: Explain the technical solution in detail, including the components, design, and functionality. Use diagrams or images to illustrate your point.

Discuss the benefits: Describe the benefits of the technical solution, including how it addresses the problem and what impact it will have on the organization. Use concrete examples to demonstrate these benefits.

Discuss potential risks: Highlight any potential risks associated with the technical solution, including any challenges that may arise during implementation or operation.

Provide a cost-benefit analysis: Outline the costs associated with implementing the technical solution and provide a cost-benefit analysis that demonstrates the value of the solution.

Conclude with a recommendation: Conclude the report with a clear recommendation for how the organization should proceed. Summarize the benefits and risks of the technical solution and provide a clear justification for your recommendation.

Include references and appendices: Provide references to any sources you have used in your report and include any additional information in appendices, such as technical specifications or cost estimates.

Reports are formal documents, but that doesn't mean you have to use overly complex words or grammar. Use simple words that you'd use in everyday conversation to get your meaning across, e.g. 'send' rather than 'dispatch' and 'finish' rather than 'draw to a conclusion'. If you choose more complex language, readers could be unnecessarily distracted by it. Writing in an impersonal style can also make sentences difficult to read, e.g. 'It was immediately apparent to the

writers...' If your company or university policy permits, use the more straightforward active voice: 'I recommend' or 'We recommend'.

SELF-ASSESSMENT

1. What is a technical report?
   a) A document that describes the process and results of technical research or experimentation.
   b) A document that outlines the financial and marketing strategies of a company.
   c) A document that summarizes the opinions of industry experts on a specific topic.
2. What are the key components of a technical report?
   a) Abstract, introduction, methodology, results, discussion, and conclusion.
   b) Executive summary, company history, financial statements, and recommendations.
   c) Title page, table of contents, and appendix.
3. What is the purpose of the introduction in a technical report?
   a) To provide background information on the problem being addressed.
   b) To summarize the results of the study.
   c) To present the recommendations and conclusions.
4. How should technical terms be presented in a technical report?
   a) In their original language.
   b) In a simplified form to make them more accessible to non-experts.
   c) With definitions or explanations to help readers understand their meaning.
5. What is the purpose of the conclusion in a technical report?
   a) To provide recommendations based on the results of the study.
   b) To restate the research question.
   c) To introduce new ideas or topics for future research.

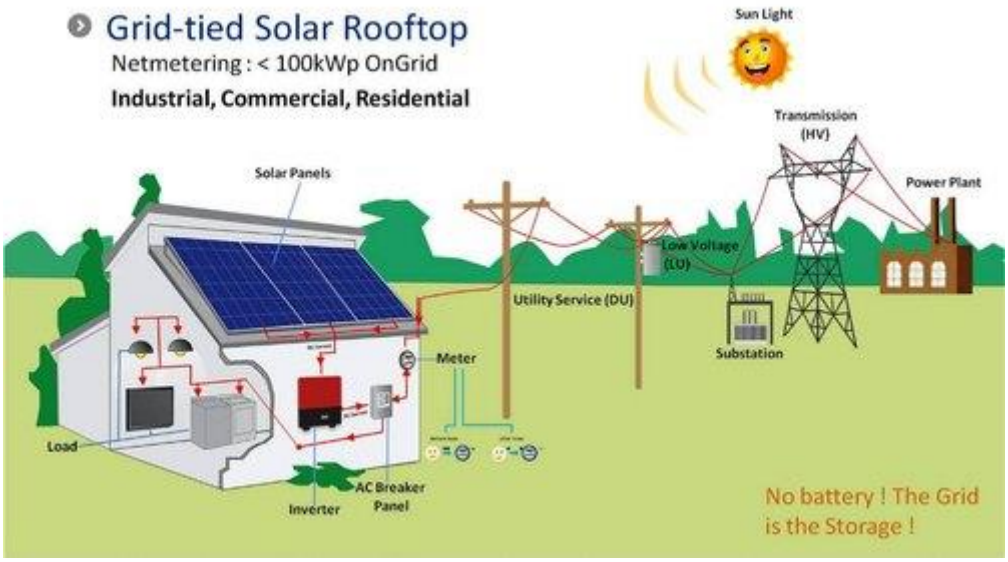
PRACTICAL PART

I.Preparation

Before reading study the following vocabulary:

to reflect
crucial
affordable
research
solar farm
powerful sources
to install
alternating
to feed into

II. Reading Text



The sun is one of the most powerful sources of natural energy on our planet and it has produced it for millions of years!

Solar energy is the sun's rays that reach the Earth. It has been said that one hour of sunlight gives enough energy to power the whole word for a whole year!

Solar energy can be converted into other forms of energy, such as heat and electricity. When converted to thermal (or heat) energy, solar energy can be used to heat water (for use in houses, offices, swimming pools, etc) and spaces (inside houses, greenhouses, etc). Solar energy can be converted to electricity in to ways: Solar cells change sunlight directly into electricity. They are used to power watches, calculators, radios, road signs, etc. Solar power stations catch the sun energy by using thousands of wide mirrors. The solar mirrors collect as much sunlight as possible and heat a fluid which produces steam. The steam is used to power the generator. Solar energy is everywhere the sun shines. It's by far the Earth's most available energy source. It's free. It's a renewable energy, which means it will never run out and is naturally reproduced. It creates neither air nor water pollution.

Big Plans for Solar Power

The Sahara, in North Africa, is the largest desert in the world. The sun in the Sahara is twice as it is southern Europe. Scientists say that just 0.3% of the light will be enough to build a huge solar farm in the desert.

The Vatican is the smallest country in the world but it's going solar in a big way. It intends to become the first solar-powered state in the world! Many roofs in the Vatican have already been covered with solar panels even Pope Benedict's home! The Green Pope said that the Vatican is going to build the largest solar power station in Europe!

Research is being done to place solar farms over the ocean (which make up 70% of the Earth surface) and build the first space-based solar power station.

There is a very bright future for solar energy to power our transportation needs. Solar-powered cars, buses, planes and ships are no longer a dream!

Solar energy systems come in all shapes and sizes. Residential systems are found on rooftops across the United States, and businesses are also opting to install solar panels. Utilities, too, are building large solar power plants to provide energy to all customers connected to the grid.

Concentrating solar-thermal power (CSP) systems use mirrors to reflect and concentrate sunlight onto receivers that collect solar energy and convert it to heat, which can then be used to produce electricity or stored for later use. It is used primarily in very large power plants.

The cost of solar panels depends on the number of panels and how/where they are installed, but generally, solar power is becoming more affordable every year. Solar power is the crucial future production method in the move to clean energy, and as economies of scale drive prices down, its importance will only increase. Photovoltaic cells in a solar panel turn sunlight into direct current electricity (DC). Then, an inverter converts the DC electricity into alternating current electricity (AC), and once this process has taken place, the electricity is used, fed into the grid or stored in a battery.

Solar energy industry is also growing in Ukraine. In 2018 new installed PV systems reached 211.0 MW compared to 2017 according to Global Market Outlook.

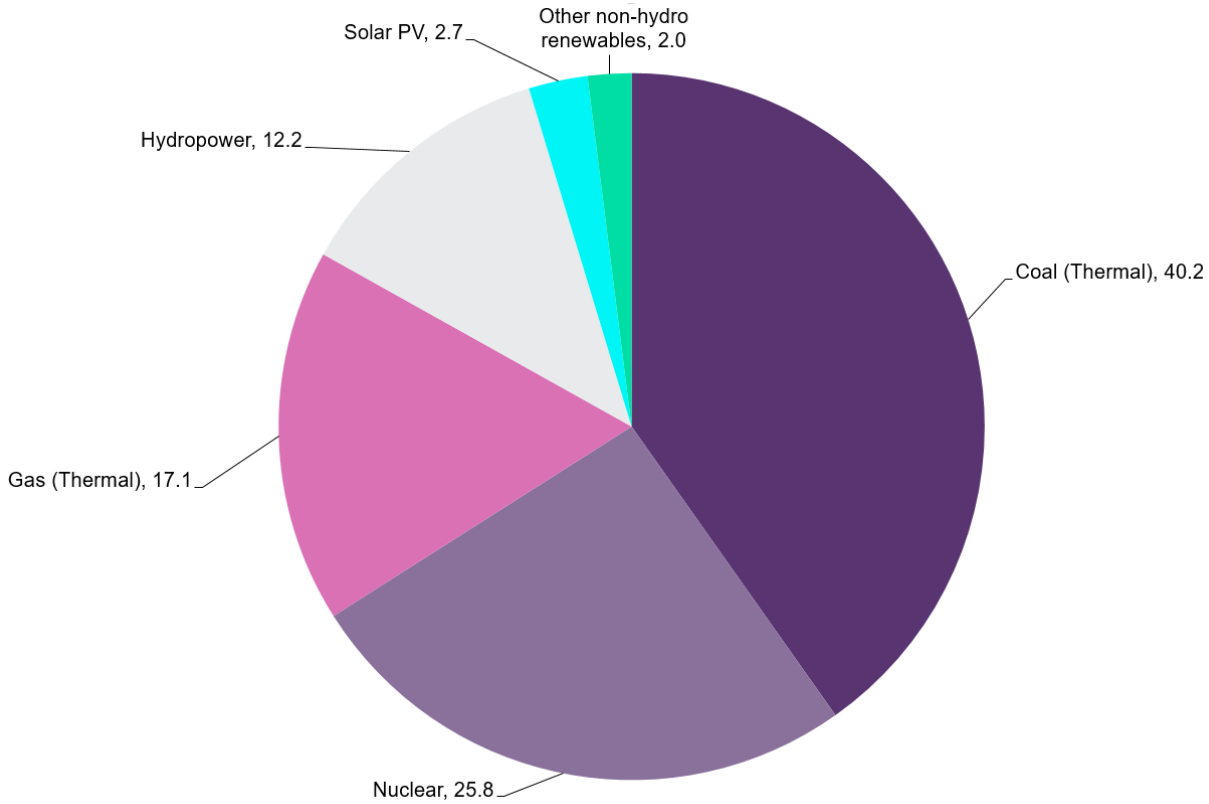
✍ After-text exercises

1. Answer the questions:

1) What is solar energy?
2) Why is Solar Power good for the planet?
3) How can it be used?
4) Is solar energy cost-effective or not?
5) What are the perspectives of solar energy in Ukraine?

2. Analyze the pie chart «Energy sources in Ukraine» using the pattern:

The pie charts show the energy production from .... major sources (..., ...) Overall, ... and ... are the major sources of energy for Ukraine, whereas .... .contributed the least.
The energy produced by ... is maximum at ...% , ... covered almost quarter of the energy usage chart with ...% and is the ... (first, second....) largest source of energy for Ukraine. ..... is just used ...% and remained the least used energy source.



3.Quiz «Renewable energy»:

1) A material that does not allow heat to pass through easily is a(n)
    b) Friction
    c) Conductor
    d) Insulator
    e) Magnet
2) Energy resources that, once used, can replenish themselves and can be used again and again are called:
    a) Non-renewable
    b) Renewable
    c) Finite
3) What is another term used to mean renewable?
    a) Sustainable
    b) Finite
    c) Infinite
4) Energy resources that, once used, cannot be replaced are called:
    a) Non-renewable
    b) Renewable
    c) Finite
5) What is another term used to mean non-renewable?
    a) Sustainable
    b) Finite

c) Infinite

6) Which of the energy sources listed is NOT a renewable source of energy?
   a) Solar
   b) Wind
   c) Oil
7) What type of energy source is formed from fossilised plants and is found sandwiched between other types of rock in the Earth?
   a) Oil
   b) Coal
   c) biomass
8) What is the name given to the source of energy created with the burning of decaying plant or animal waste?
   a) Geothermal
   b) Biomass
   c) Nuclear
9) Estimates from international government organisations suggest that if the world's demand for fossil fuels continues at its present rate, they may run out within some of our lifetimes. How long is the world's supply of oil meant to last for?
   a) 30 years
   b) 50 years
   c) 70 years
10) Which energy source is derived from the movement of sea water in and out of turbines to generate electricity?
   a) Wind
   b) Tidal
   c) Hydro-electric power
11) What does wind directly turn to generate electricity?
   a) Generator
   b) Motor
   c) Turbine
12) Which of these is a disadvantage of hydroelectric power?
   a) It is very reliable
   b) There are no fuel costs
   c) Dams destroy the habitats of estuary species

4. Speak about the pros of renewable energy (for economy, health, environment, labor market, etc.)

5. Writing. Write the technical report on wind turbine based on the report on solar panels.

Introduction: This report provides an overview of solar panels, their functionality, types, and advantages. The report discusses how solar panels work, the different types available, their benefits and limitations, as well as current and future applications.

Background: Solar panels, also known as photovoltaic panels, are devices that generate electricity by converting sunlight into electrical energy. They are made up of small units called solar cells, which are arranged together to form panels. The cells are made up of a semiconductor material, such as silicon, and when sunlight strikes them, it creates an electric field that allows electrons to flow, generating electricity.

Types of Solar Panels: There are three main types of solar panels: monocrystalline, polycrystalline, and thin-film. Monocrystalline panels are made from a single silicon crystal, resulting in higher efficiency but also higher cost. Polycrystalline panels are made from multiple silicon crystals, resulting in lower efficiency but also lower cost. Thin-film panels are made from a variety of materials and are less efficient but more flexible and lightweight.

Advantages of Solar Panels: One of the primary advantages of solar panels is that they are a renewable source of energy, meaning they do not produce harmful emissions or contribute to climate change. They also provide a reliable source of energy, as long as there is sufficient sunlight. Solar panels can be installed on rooftops, making them suitable for homes, businesses, and other buildings. Additionally, solar panels can reduce energy bills and provide energy independence.

Limitations of Solar Panels: One of the main limitations of solar panels is that their efficiency is affected by weather conditions and the availability of sunlight. They also require a significant initial investment, although the cost has decreased in recent years. The installation process can also be complex, requiring professional installation and ongoing maintenance.

Current and Future Applications: Solar panels are currently used in a variety of applications, from residential homes to large-scale power plants. In the future, solar panels are expected to become more efficient and affordable, leading to increased adoption in a variety of industries. Advances in technology, such as energy storage systems, may also make solar panels more practical for use in areas with limited sunlight.

Conclusion: In conclusion, solar panels are a promising source of renewable energy that can provide numerous benefits, including reduced energy bills and energy independence. Despite their limitations, advances in technology and decreasing costs are making solar panels a viable option for a variety of applications.

UNIT 11. ENERGY-SAVING SOLUTIONS

THEORETICAL PART
WRITING TECHNICAL CHARACTERISTICS

Read and check your understanding.

Writing technical characteristics of a device is an important aspect of technical documentation. Here are some steps to follow when writing technical characteristics: Identify the key components of the device: Before writing the technical characteristics, it is important to identify the key components of the device. This will help you to organize your information and ensure that you include all relevant details.

Determine the relevant technical parameters: The technical characteristics of a device typically include details about its physical dimensions, weight, power consumption, operating temperature range, and other technical parameters that are relevant to its performance.

Use clear and concise language: When writing technical characteristics, it is important to use clear and concise language. Avoid using jargon or technical terms that may not be familiar to your audience.

Use tables and diagrams: Tables and diagrams can be helpful for presenting technical information in a clear and organized way. Use them to summarize technical data and highlight key features of the device.

Include information about safety and regulatory compliance: If the device is subject to safety or regulatory requirements, be sure to include information about compliance with relevant standards or regulations.

Review and revise: Once you have written the technical characteristics, review and revise them to ensure that they are accurate, complete, and easy to understand.
Overall, the key to writing effective technical characteristics is to present technical information in a clear, concise, and organized way, while ensuring that all relevant details are included.

Technical characteristics of heat power equipment may include:

Efficiency: This refers to the ratio of the actual output of the equipment to its theoretical maximum output, expressed as a percentage.

Operating temperature and pressure: Heat power equipment may be designed to operate at specific temperature and pressure ranges, which can affect its performance and lifespan.

Fuel type and consumption: Heat power equipment may run on various types of fuel, such as natural gas, coal, or biomass, and the amount of fuel consumed can affect its efficiency and emissions.

Emissions: Heat power equipment may produce various types of emissions, such as CO2, NOx, and SOx, which can have environmental impacts.

Maintenance requirements: Heat power equipment may require regular maintenance and inspection to ensure proper operation and safety.

Power output: The amount of power that a heat power equipment can produce, typically measured in watts or kilowatts.
Heat input: The amount of heat energy that is supplied to a heat power equipment.
Temperature: The degree of hotness or coldness of a substance, often measured in Celsius or Fahrenheit.
Pressure: The force exerted by a fluid or gas, often measured in pounds per square inch (psi) or pascals (Pa).
Flow rate: The rate at which a fluid or gas flows through a heat power equipment, often measured in liters per minute (LPM) or cubic feet per minute (CFM).
Heat exchanger surface area: The total surface area of the heat exchanger tubes or plates used to transfer heat.
Combustion efficiency: The efficiency with which fuel is burned in a combustion-based heat power equipment.
Emissions: The pollutants or gases that are released as a result of combustion or other processes in a heat power equipment.
Load: The amount of energy that is being used by a heat power equipment at a given moment.
Turbine speed: The speed at which a turbine is rotating, often measured in revolutions per minute (RPM).
Turbine blades: The number and shape of the blades used in a turbine to convert heat energy into mechanical energy.
Generator type: The type of generator (e.g. synchronous, induction, etc.) used to convert mechanical energy into electrical energy.
Control systems: Heat power equipment may include various types of control systems, such as sensors, valves, and PLCs, which are used to regulate its operation.
Safety features: Heat power equipment may include safety features such as pressure relief valves, emergency shut-off switches, and alarms, which are designed to prevent accidents and protect personnel.
Dimensions and weight: Heat power equipment may come in various sizes and configurations, which can affect its installation and transportation requirements.
Certification and compliance: Heat power equipment may need to comply with various standards and regulations, such as those related to safety, emissions, and efficiency.
Material composition - The type of material used to construct the product or component, such as steel, aluminum, or plastic.
Power requirements - The amount of electrical power required to operate the product or system.
Speed - The maximum or average speed at which a product or system can operate.
Capacity - The maximum amount of material, energy, or data that a product or system can handle.
Durability - The ability of a product or component to withstand wear and tear over time.
Performance specifications - The specific technical details related to how a product or system operates, such as processing speed, accuracy, or output quality.

Environmental factors - The specific environmental conditions under which a product or system can operate, such as temperature, humidity, or pressure.
Safety features - The specific safety measures or mechanisms built into a product or system to prevent accidents or injury to users.

SELF-ASSESSMENT

1. What are technical characteristics of a device?
   A. A list of technical terms related to the device
   B. A detailed description of the device's features and specifications
   C. A brief overview of the device's appearance
2. What should be included in the technical characteristics of a device?
   A. Brand name and price
   B. Colors and sizes available
   C. Technical specifications such as size, weight, power consumption, etc.
3. Why is it important to include technical characteristics in a device's documentation?
   A. To make the document look more professional
   B. To provide customers with detailed information about the device
   C. To confuse customers with technical jargon
4. How should technical characteristics be presented in the documentation?
   A. In paragraph form
   B. In bullet points or tables for easier reading and understanding C. In a narrative style with lots of technical jargon
5. What is the purpose of including technical drawings or diagrams in the documentation?
   A. To show off the designer's artistic skills
   B. To help customers understand the device's technical features and how it works
   C. To fill up empty space in the document

PRACTICAL PART

I.Preparation

Before reading study the following vocabulary:

appliances
breakthroughs
energy consumption
highly insulated
to interact
incandescent bulbs
developing new foam insulation
emission combustion burner

to ensure
sustainable

II. Reading Text №1

8 Energy-Saving Solutions on the Horizon

From heating and cooling to electronics and appliances, it takes a lot of energy to power our daily lives. Our homes use 37 percent more energy today than they did in 1980. But without energy efficiency -- through technology innovation and federal energy conservation standards -- this number would be a lot higher. In fact, even though our total energy use has grown, our energy use per household is down about 10 percent, despite that our homes are larger and contain more devices.

Thanks to breakthroughs by our National Labs, industry and academia, equipment we use in our homes is more energy efficient than ever before, saving consumers money and slashing carbon pollution. Let's take a look at a few technologies we can expect to see in the marketplace within the next few years that will make our homes even more sustainable.

1. SMARTER, MORE CONNECTED HOMES

We live in an increasingly connected world -- the same is true for our homes. New electronic devices and appliances can now be linked to the Internet to provide real-time data that makes it easier to understand and lower energy use.

Soon these technologies will be more cost effective and smarter as a result of a project supported by the Energy Department's Building Technologies Office. New wireless sensors developed at Oak Ridge National Laboratory will boost home energy efficiency through automated control systems for heating and cooling units, lighting and other systems that access data such as outside air and room temperature, humidity, light level and occupancy all at a fraction of a cost of typical wireless sensors you see on the market today. Pacific Northwest National Laboratory, National Renewable Energy Laboratory and Lawrence Berkeley National Laboratory are also developing new protocols and standards that will improve how smart appliances communicate with each other and interact with the electric grid.

2. ULTRA-EFFICIENT HEAT PUMPS

The Building Technologies Office is ushering in the next generation of heat pump systems, which warm and cool your home by moving heat from one space to another. These include:

1) A fuel-fired, multi-function residential heat pump that can reduce primary energy consumption by 30 percent.
2) A natural gas heat pump and air conditioner that uses an ultra-low-emission combustion burner and other equipment to provide home heating, cooling and hot water.
3) A low-cost gas heat pump designed to reduce heating costs by 30 to 45 percent compared to conventional gas furnaces and boilers.

3. CARBON-FIGHTING CLOTHES DRYERS

The same concept behind heat pump technologies that keep your home comfortable can also be used for another important application: drying your clothes. Oak Ridge National Laboratory and General Electric are developing a new type of clothes dryer that uses a heat pump cycle to generate hot air needed for drying. The result: a more efficient dryer that has the potential to lower energy consumption by 60 percent compared to conventional ones on the market today.

4. MAGNETIC REFRIGERATORS (THAT'S RIGHT, MAGNETS)

Oak Ridge National Laboratory and General Electric have teamed up to create a revolutionary new type of refrigerator that uses magnets to create cold, also known as the magnetocaloric effect (lowering or raising the temperature of material by changing the magnetic field). For the past 100 years, refrigerators have relied on a process called vapor compression that uses coolants which can be harmful to the environment. The new refrigerator is a revolutionary technology that uses a water-based cooling fluid, making it better for the environment and more efficient, which means lower energy bills and less carbon pollution.

5. ADVANCED WINDOW CONTROLS

Lawrence Berkeley National Laboratory and Pella Windows are working on new highly insulated windows that use sensors and microprocessors to automatically adjust shading based on the amount of available sunlight and the time of day to ensure proper lighting and comfort, saving consumers energy and money.

6. NEXT-GEN INSULATION

Insulation is one of the most important ways to reduce your home heating and cooling costs. The Industrial Science & Technology Network is developing new foam insulation made with environmentally friendly and advanced composite materials that ensure heat doesn't escape from the attic, walls and other areas of the home during cold winter months.

7. REFLECTIVE ROOFING MATERIALS

Cool roofs coated with materials containing specialized pigments reflect sunlight and absorb less heat than standard roofs. Expect these types of roof systems to get even "cooler" due to new fluorescent pigments developed by Lawrence Berkeley National Laboratory and PPG Industries that can reflect nearly four times the amount of sunlight of standard pigments.

8. BRIGHTER, BETTER LIGHTING

LEDs (light emitting diodes) have come a long way, with today's highest-performing lights consuming 85 percent less energy than incandescent bulbs. The Building Technologies Office's Solid State Lighting Program supports research and development to lower the cost of LEDs, while making them even more efficient and long lasting. In fact, LED efficiency is expected to double from the current 125-135 lumens per watt to 230 lumens per watt in the next few years as result of continued R&D.

(From: https://www.energy.gov/articles/future-home-tech-8-energy-saving-solutions-horizon)

✍ **After-text exercises**

1. Insert the appropriate word or word combination from the text:

1) … capture thermal energy at relatively low temperatures (cold source), warm it and transfer it to a heat sink.
2) Retrofitting simply means adding a coating to your roof that has …properties.
3) … is one of the most important ways to reduce your home heating and cooling costs.
4) The new refrigerator is a revolutionary technology that uses a water-based cooling fluid, making it better for the environment and more…, which means lower energy bills and less carbon pollution.
5) … is today's most energy-efficient and rapidly-developing lighting technology.

2. Match the technologies with their process description:

1.MAGNETIC REFRIGERATORS	a) The idea here is that they will adjust the level of shading, level of sunlight and various other relevant factors.
2. CARBON-FIGHTING CLOTHES DRYERS	b) The principle of this cycle uses a heat-transfer fluid – in contact with the magnetocaloric materials (MMC) – flowing from the cold side to the hot side when the MMC is heated (magnetised), and from the hot side to the cold side when the MMC is cooled down (demagnetised).
3. SMART WINDOWS	c) The idea here is that the appliances and systems in the home will work in synch through automated control technology.
4. SMARTER, MORE CONNECTED HOMES	d) Instead of high-energy consuming dryers that gulp utility expenses, this new dryer uses a heat pump cycle to produce hot air.

3. Do the quiz "Saving Energy":

1. Which of these is an effective way to improve energy efficiency for air conditioning?
   a) Using portable heaters as well as air conditioning
   b) Dressing for the seasons: heavier in winter and lighter in summer (correct)
   c) Opening doors and windows when heating is on
   d) Turning the air conditioning higher than needed to help it warm up quicker

2. Which of these types of bulbs are the most efficient?
   a) LED (correct)
   b) Incandescent
   c) CFL
   d) Halogen

3. Why is using an energy management system effective?

a) It enables you to monitor individual users' energy usage and penalise them for any wastage

b) It enables you to schedule energy audits so employees are prepared to reduce their usage during the audits

c) It cuts energy consumption in half by automatically setting equipment to energy-saving settings

d) It enables you to effectively configure equipment and track energy usage throughout the building (correct)

4. Why should you analyze the building itself during an energy audit?

a) To see if extra overhead lighting can be installed

b) To check for areas from which draughts are originating (correct0

c) To make sure it is presentable

d) To ensure all windows are closed at all times

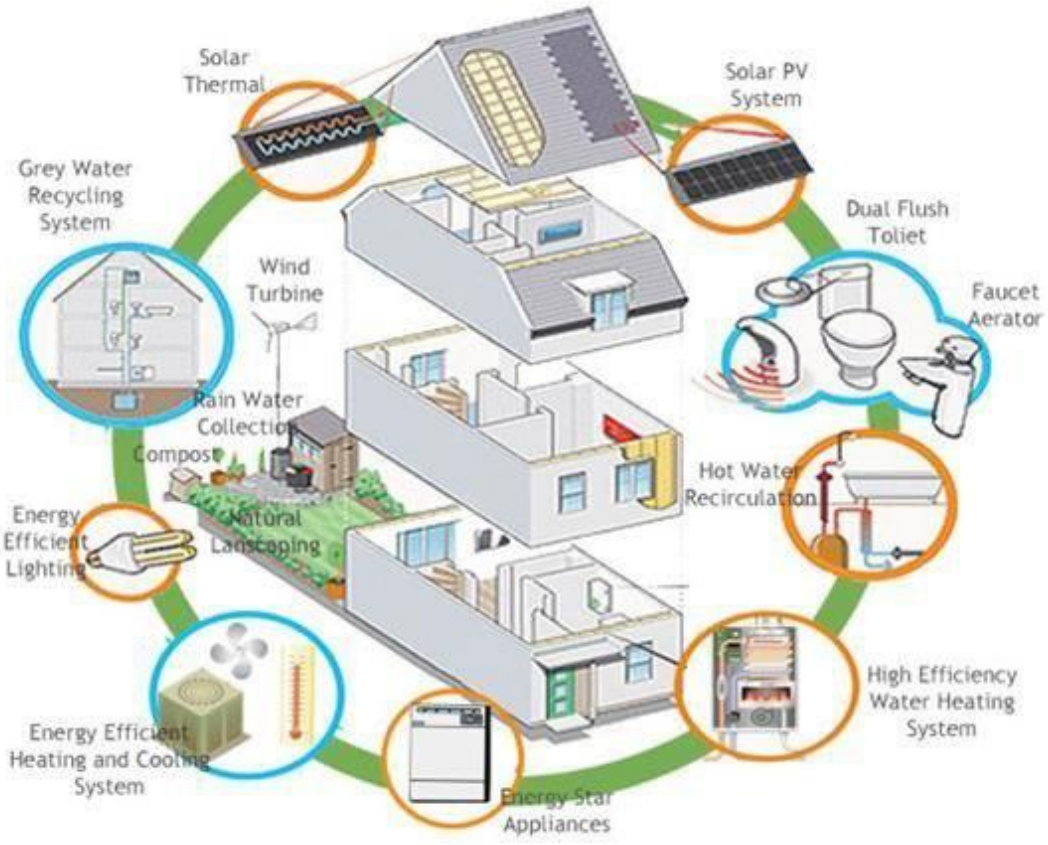
5. How much heating and cooling energy can strategically planted trees save?

a) Up to 20 % (correct)

b) Up to 15 %

c) Up to 30%

4. Look at the picture and give comments about energy-efficiency in smart homes. You may use the phrases: *to shrink their monthly utility bills, automatically adjust to changing energy needs, can be minimized, can be reduced, interact with our kitchen gadgets, optimize your home's heating and cooling*



III. Read the text №2

Modern heat insulating materials

A strong tendency of the increase requirements to modern heat insulating materials is being obviously seen nowadays. It is arisen by the resource-saving principle of the world industry development. Thus, the production of high efficient insulating materials is one of the most important task at present. The main function of insulating materials is the reduction of heat loss. Heat insulating materials must have a small factor of the thermal conductivity, a small volume mass, humidity resistance, mechanical strength, hard combustibility, frost resistance, homogeneous finely porous structure, bacterial and chemical resistance and environmental safety.

Qualitative heat insulating materials are very expansive products. For example, the cost of insulating materials in refrigerators is 25-40% of the whole construction site. So, the question of economic profitability of producing material is vivid nowadays. Thus, the most important item of creating resource effective production technology arises today. The most significant role in this process is belonged to raw material resources.

Existing heat insulating materials can't meet all the above mentioned requirements.

That's why it is necessary to depict those materials which have the most optimal and economically effective characteristics. According to given estimated calculations and comparing analysis one of those materials is viralit (artificial foamed stone). Getting possibility of viralit is produced by the nature. Under the volcano eruption the firing clinker is contacting with the earth crust and under the high temperature the thermal processing of the loams are being produced by the natural way. This natural phenomenon was noticed long ago by many famous scientists. The natural principle of loams processing has been realized for the technological base of viralit production.

The Combination of high constructional strength, heat insulating properties and economical efficiency allow to build objects without using additional insulating materials and to reduce the damage and production cost price. Being developed a new power and resource-saving technology of getting porous glass-ceramic material "Viralit" has a very wide application in such industrial branches as building, power energy, nuclear power, metallurgical, chemical and others. Having used scientific principles are being assumed the further improvement of the produced technology and creating new high efficient materials of strategic meaning. "Viralit 1000", for example possess unique thermal physical characteristics with high strength properties in comparison with the existing thermal safety materials.

Viralit's technology allows governing by strength and heat insulating properties of being get material at the wide ranges, and modify material's properties according to the product's thickness, overlapping heat insulating and ornate finishing functions. For example, the characteristic property of this technology will allow

regulating the heat extraction out of the cooled melt. The process impacts on the shrinkage of the crystallized material and considerably influence the quality of the getting product in the technological processes of metallurgical industry.

"Viralit 1000" will be taken as the used material for casting molds. Taking into consideration the condition of the heat exchange under melting of the viralit construction, one can considerably reduce the velocity destruction material in the case of the emergency situation at the nuclear station. The production of sandwich large block material (picture 1) allows creating building objects which are the perfecting product's development.

Picture 1. *Sandwich large block materials: heat insulating block "sandwich". Sidewall and medium wall from high-strength reflector ceramics, inner lay is porous*

✍ After-text exercises

1. Answer the questions

1) What materials are called heat insulating?
2) What properties must heat insulating materials possess?
3) What material's properties of heat insulating material are the most significant? In what way do you understand the resource-saving principle?
4) What heat insulating materials are being regarded high-performance?
5) What technical areas are these materials being used?
6) What heat insulating materials do you know?
7) What is the economic efficiency of produced material?
8) What is the economic facet of raw material resource?
9) What is treating principle of raw materials being laid in the technological base of "Viralit"?
10) What characteristics of material does the technology "Viralit" allow to govern?
11) What main functions does the material possess?
12) What structure does the glass ceramic material "Viralit" possess?
13) What industrial spheres can be the material used?

14) What do you mean by high performance material of strategic trend?
15) What the benefits does “Viralit 1000” possess in comparison?
16) What are the perspectives of enhancement “Viralit 1000” existing?
17) In what way the use of “Viralit 1000” can influence the product’s quality in the technological process of metallurgical industry?
18) What properties of “Viralit 1000” do allow reducing the destruction velocity of technological construction in the case of emergency situation at the objects of nuclear industry?

2. **Writing.** Write technical characteristics for an insulating material: thermal conductivity, temperature limits, electrical conductivity, dielectric strength, density, fire resistance, thermal expansion.

UNIT 12. INNOVATIONS IN THE ENERGY SECTOR OF UKRAINE

THEORETICAL PART
WRITING A MAINTAINANCE REPORT

Read and check your understanding.

It is a document that records all the activities that were carried out in a maintenance operation. It includes information such as what was done; when it was done; who did it, and how long it took. This report is then used to improve maintenance operations or as a reference for future maintenance activities.

Writing a maintenance report involves documenting the maintenance activities that have been performed on equipment, facilities, or a property. The report should be clear, concise, and include all relevant information. Here are the steps to follow when writing a maintenance report:

Identify the maintenance activity: Start by identifying the type of maintenance activity that was performed. This could include routine maintenance, repairs, or upgrades.

Describe the maintenance activity: Provide a detailed description of the maintenance activity that was performed. This should include information such as the date and time the activity was performed, the equipment or facilities involved, and any materials or supplies used. The description should briefly summarize what was done during the maintenance task. However, it should also be detailed at the same time. Elaborate enough so that someone reading the maintenance report will understand what was done, but don't include so much information that it becomes overwhelming.

Note any issues or problems: If any issues or problems were discovered during the maintenance activity, be sure to note them in the report. This could include anything from worn out parts to safety hazards.

Provide recommendations: Based on the maintenance activity and any issues that were discovered, provide recommendations for any additional maintenance or repairs that may be needed in the future.

Include photos or videos: If possible, include photos or videos of the maintenance activity and any issues that were discovered. This can help to provide a clear visual representation of the work that was performed.

Provide supporting documentation: If available, include supporting documentation such as work orders, inspection reports, and maintenance logs.

KPIs, or Key Performance Indicators, are specific metrics used to measure the success or progress of an organization, team, or individual in achieving their goals or objectives. KPIs are typically used in business, but can be applied in other contexts as well.

KPIs are chosen based on the specific goals and objectives of the organization or team, and should be relevant, measurable, and trackable over time. KPIs are

important because they provide a clear and objective way to measure progress and success, and help organizations and teams make informed decisions about where to focus their efforts and resources. By regularly monitoring and analyzing KPIs, organizations can identify areas for improvement, make strategic adjustments, and ultimately achieve their goals more effectively.

The most common KPIs and metrics for maintenance, including:

- Planned maintenance percentage (PPC)
- Overall equipment effectiveness (OEE)
- Mean time to repair (MTTR)
- Mean time between failure (MTBF)
- Preventive maintenance compliance (PMC)

SELF-ASSESSMENT

1. What is the first step in writing a maintenance report?
   a) Provide a detailed description of the maintenance activity.
   b) Identify the maintenance activity.
   c) Note any issues or problems.
2. What should be included in the description of the maintenance activity?
   a) The date and time the activity was performed.
   b) The equipment or facilities involved.
   c) Any materials or supplies used.
   d) All of the above.
3. Why is it important to note any issues or problems discovered during the maintenance activity?
   a) To show that the maintenance was completed properly.
   b) To provide recommendations for future maintenance or repairs.
   c) To highlight safety hazards or other concerns.
4. What should be included in the recommendations section of the maintenance report?
   a) Any additional maintenance or repairs that may be needed in the future.
   b) Any upgrades or improvements that could be made.
   c) Both a and b.
5. Why might it be helpful to include photos or videos in the maintenance report?
   a) To provide a clear visual representation of the work that was performed.
   b) To show that the maintenance was completed properly.
   c) To highlight safety hazards or other concerns.

PRACTICAL PART

I.Preparation

Before reading study the following vocabulary:

consumption
energy storage
nuclear industry

implementation
self-sufficient
to accelerate
reduction
to overcome difficulties
to foresee
to decrease
demand for
to contribute
to emphasize

II. Reading Text

On April 30, the ENERGY CLUB held an online meeting of the Ukrainian energy industry-leading stakeholders. The purpose of the meeting is to discuss the introduction of innovations, which is especially important in the context of the energy crisis.

Business representatives shared their vision of solutions for painful problems, such as an imbalance in the production/consumption of electricity, lack of energy storage sector, the crisis in the nuclear industry, and so on. Also, the rectors and scientists of leading universities in Kharkiv, Dnieper, Kyiv, and Ivano-Frankivsk spoke at the online conference.

The energy departments of universities not only train professionals for the future of modernized and transformed energy but also actively participate in the development and implementation of innovations necessary for the Ukrainian economy.

Mikola Savitsky, a doctor of technical sciences and professor of the Prydniprovska State Academy of Civil Engineering and Architecture, outlined the main social processes that need to be considered today when developing sustainable energy:

- **Decentralization** (administrative-territorial reform). The term "self-sufficient territorial community" introducing, which concentrates all the processes of social change;
- **Deurbanization** is a reduction in the population of large cities and their production potential (the process has already begun in developed countries). A global pandemic will accelerate the transition from urbanization to deurbanization;
- **Renewable energy development**. Stable energy is green energy.

How to modify the energy sector or what to do when the Ukrainian energy crisis? One of the most effective tools to overcome difficulties is the introduction of innovations in the energy industry. For example, digitalization and cybersecurity are just some of the main points of innovation. Recall that today Ukraine one of the leading countries in the number of cyberattacks on the energy system.

The first decisive steps must be taken in three directions:

- the formation of a balancing electricity market;

- introduction of the mechanism of energy decentralization;
- the creation of small distributed generation, small energy cooperatives.

Innovations in the Solar Energy Sector

As to solar energy, CEO Avenston Dmytro Lukomskyi noted that despite the rapid increase in capacity over the past few years, the development of this segment occurred without any innovation from Ukraine. Ukrainian companies completely repeated the processes that took place outside our country. It's time to think about the transformation of this sphere and the implementation of our innovations.

«In Ukraine, solar energy developed rapidly enough, new capacities tripled annually. But the market was regulated by the only mechanism of state support by a green tariff. Unfortunately, not everything was foreseen, and today we have many problems. The de facto development of the solar energy market in Ukraine has stopped. Many owners of solar power plants faced with non-payments for the supplied electricity and shutdown due to a decrease in demand for electricity.

State support is an effective tool but not eternal. The market must become efficient, and technology must develop independently. Innovation and technological development around the world contribute to lowering the cost of solar energy and increasing its economic efficiency.

In Ukraine, the payback period for solar power plants for self-consumption is less than 10 years, with a lifetime of 20-25 years. According to forecasts, the cost of traditional electricity will increase, therefore, when taking into account the energy independence of both individual enterprises, and the country as a whole, you can see many incentives for the development of solar energy. So the number of projects for self-consumption will increase even without the green tariff» said Dmytro Lukomskyi.

And yet, speaking about market efficiency and innovation, Dmytro Lukomskyi especially emphasized that it is important to reckon with those projects that already built. Large industrial solar power plants still have unresolved issues, both technical and financial.

The introduction of forecasting systems will be a useful innovation for large industrial power plants, will make it possible to make predictions of the insolation level, and effectively regulate the PV-generation. Another working solution is the introduction of energy storage systems. According to Dmytro, reducing the cost of energy storage systems will be a powerful impetus for renewable energy development.

What holds back the development of the energy storage sector?

Answering channel 112's question about what is holding back the development of the energy storage sector, Dmytro Lukomskyi pointed out the high cost of equipment: «It is necessary to stimulate the implementation of these projects. Otherwise, the development of energy storage in Ukraine will occur rather slowly. Businesses are not interested in investing heavily in relatively expensive technology. There are two options: wait until energy storage technologies become cheaper and

become effective in our market, or introduce state support mechanisms to stimulate the implementation of such projects» remarked Dmytro Lukomskyi.

Social, environmental, and economic processes all over the world are lead mankind to the decentralization and self-sufficiency of the territorial communities. The world will change, and traditional energy will cease to exist. And solar energy will take its place of honor in the future energy system!

(From: https://avenston.com/en/articles/innovation/)

✍ After-text exercises

1.Insert the appropriate word or word combination from the text:

1) He … 100 dollars to the charity.
2) Yearly sales … by five percent.
3) …is the capture of energy produced at one time for use at a later time to reduce imbalances between energy demand and energy production.
4) He wanted …. (to us) that he hadn't meant to offend anyone.
5) That standard, which defines how much ozone is unhealthy, was set in 1997, but its…. was delayed by legal challenges.
6) Many voters want to see some …. of the deficit.
7) He finally managed … his fear of flying.

2.Match the words with their definitions:

1. implementation	a) urgent need
2. self-sufficient	b) to grow progressively less (as in size, amount, number, or intensity)
3. sustainable	c) something that is used or done to deal with and end a problem
4. contribute	d) the process of making something active or effective
5. solution	e) able to maintain oneself or itself without outside aid
6. consumption	f) involving methods that do not completely use up or destroy natural resources
7. decrease	g) the use of something
8. demand	h) to give (something, such as money, goods, or time) to help a person, group, cause, or organization

3.Answer the questions:

1) What social processes should be considered today when developing sustainable energy?
2) What are the main points of innovation?
3) Why has solar energy market in Ukraine stopped?
4) What is the payback period for solar power plants for self-consumption in Ukraine?
5) What holds back the development of the energy storage sector?
6) Will traditional energy be in a demand in the future?

4.Speaking. Do you agree or disagree with the statement "Ukraine's post-war recovery should be based on renewable energy. 50% share of renewables in electricity generation by 2030 is realistic and feasible target for my country"? Give your arguments. (https://www.innovationnewsnetwork.com/renewable-energy-technologies-reconstructing-ukraines-energy-sector/22842/ June, 2022)

5. Speaking. Discuss in groups or in pairs the engineering design of the heat exchanger Try to describe the design process. The following plan will help you to do it.

1. Need recognition of the heat exchanger
2. Definition of a problem
3. Gathering information about the heat exchanger
4. Evaluation of this design
5. Communication of the design

6. Writing. Complete the maintenance report form. You may use the phrases from "Scope of work":

All casing rings are worn and require replacement with new.
Verify all repair work is complete
Record all final sizes, clearances and settings
Verify all required documentation is complete
Verify all parts are cleaned and ready for assembly
Install rotor with stationeries into casing lower half
Check rotor float without top half installed
Install upper half casing and torque bolting
Check rotor float with top half installed
Install bearing housings with assembly/alignment ball bearings and centralize rotor
Set running position and insure locked end play
Drill and ream for dowel pins
Reinstall housings
Paint pump with hi temperature paint

first national REAL ESTATE
Lewis Prior Home Rentals

Maintenance Report Form

Date..... **Tenant Name**: .....

Property Address .....

Contact Mob).....W).....

AH)..... Email .....

MAINTENANCE DETAILS

Please describe the repair clearly, including appliance details, what room together with make and model number of appliance etc.

1.....

2.....

3.....

4.....

5.....

ACCESS DURING BUSINESS HOURS

Please Tick One Box Below

☐ **Access With Key-** we give permission for the tradesperson to access the property with an office key, if we are not home

☐ **Tradesperson To Contact Me-** Please Get Them To Contact Me For Access **During Business Hours** (Please Ensure we have ALL your contact details above)

Please Note - If you request the tradesperson to come after hours, and an after hours rate is charge to us by the tradesperson, we will forward this extra rate (amount above the normal day rate) in a tax invoice to the tenant, for payment within 14 days.

Please Ensure All Details Have Been Completed

Signed .....

Tenant Name.....

Dated...../...../.....

Office Use Only- Work Order Generated– Date ...../...../.....

Final Test

Complete the sentences with the correct word:

1) Steam turbine driven current generators are often used as spare exciters in…
   a)steam power plants.
   b)Steam power stations
   c)Power stations
2) About two-thirds of the heated air combined with the products of ….is expanded in a turbine resulting in work output which is used to drive the compressor
   a) radiation
   b) specification
   c) combustion
3) A gas turbine is a rotary machine similar in principle to a steam turbine and it consists of three main components: a compressor, a……, and a turbine.
   a) heat pump
   b) a combustion chamber
   c) capacity
4) One common type of heat pump works by exploiting the physical …
of an evaporating and condensing fluid known as a refrigerant
   a) Properties
   b) Preporation
   c) Drawbacks
5. Siemens helps to save up to 10 million tons of CO2 ….per year.
   a) emissions
   b) permissions
   c) pollution
6. To address this massive challenge, Siemens offers measures that help …energy costs by 20 - 40 percent on average.
   a) increase
   b) reduce
   c) define
7. Large amount of fossil fuels are …everyday in power stations to heat up water, to produce steam which further runs the turbines to generate electricity.
   a) produce
   b) bought
   c) burnt
8. A strong tendency of the increase requirements to modern heat …materials is being obviously seen nowadays.
   a) insulating
   b) inserting
   c) inventing
9. Solar power is a safe and cost-competitive ….. energy source.

a) expensive
b) renewable
c) raw

10. The wind sector is also a significant …. to the EU economy, boosting growth and creating long-term sustainable jobs.
a) contributor
b) consumer
c) pollution

11. Wind turbines work on a simple principle: the wind makes their …spin, creating kinetic energy.
a) blades
b) circles
c) drums

12. The process of replacing fossil fuels with …energy sources and other zero-carbon solutions in the heating and cooling sector has so far been slower than in electricity generation
a) oil
b) raw
c) renewable

13. …. heat travels in a straight line away from any surface and heats anything solid that absorbs its energy.
a) radiation
b) radiant
c) rigid

14. Structural … panels are prefabricated elements for use in building walls, ceilings, floors, and roofs.
a) insulated
b) incorporated
c) innovated

15. Energy-efficiency improvements …. the amount of electricity on the grid at one time
a) increase
b) reject
c) reduce

16. What is heat power equipment?
a) Equipment that generates electricity
b) Equipment that converts fuel into heat energy
c) Equipment that produces mechanical power
d) Equipment that uses solar energy

17. What is the primary purpose of heat power equipment?
a) To generate electricity
b) To provide heat for industrial processes
c) To provide mechanical power
d) To provide air conditioning

18. What is the difference between a boiler and a furnace?
    a) A boiler is used to generate steam, while a furnace is used to heat air.
    b) A boiler is used to heat air, while a furnace is used to generate steam.
    c) A boiler uses gas as a fuel source, while a furnace uses oil.
    d) A boiler is a type of furnace.
19. What is a heat exchanger?
    a) A device that converts mechanical energy into heat energy
    b) A device that transfers heat from one fluid to another
    c) A device that generates electricity
    d) A device that produces mechanical power
20. What is thermal efficiency?
    a) The efficiency of a heat power equipment in converting fuel into heat energy
    b) The efficiency of a heat power equipment in generating electricity
    c) The efficiency of a heat power equipment in producing mechanical power
    d) The efficiency of a heat power equipment in providing air conditioning

APPENDICES

GLOSSARY OF TERMS IN HEAT POWER ENGINEERING

1. **available power shortage of a power system** – дефіцит наявної потужності енергосистеми
2. **aspirator** – витяжний пристрій
3. ash catcher – золоуловлювач
4. **Adiabatic process** – адіабатичний процес
5. **adjust –** настроювати, регулювати
6. **amplifier** – підсилювач
7. **board** – плата, пульт, панель
8. **bleed** – сопло
9. **calandria** – випарний апарат
10. **capacity** – місткість, об’єм
11. **capacitor** – конденсатор;
12. **clamp** – затискач
13. **coolant** – охолоджувач
14. **control unit** – панель управлення
15. **cost of kWh not supplied** – вартість недоданої електроенергії у кіловатах;
16. **conductivity** – електропровідність
17. **circuit of installation** – схема монтажу
18. **chamber dryer** – сушарка камерна
19. **customer of an electricity supply organization** – абонент енергопостачальної організації
20. **decentralized heat supply** – децентралізоване теплопостачання
21. **emergency state –** аварійний режим
22. **energy utilization efficiency** – коефіцієнт корисного використання енергії;
23. **energy efficiency** – енергоефективність;
24. **energy efficiency increase** – збільшення ефективності
25. **energy carrier** – енергоносій
26. **energy saving operation of a power system** – енергоощадне функціонування енергосистеми
27. **endurance test** – випробування на витривалість;
28. **Exergy flow of the body** – ексергетичний потік тіла
29. **Enthalpy** – ентальпія
30. **fault location** – визначення місця пошкодження;
31. **fuel rods** – стрижні палива
32. **gear** – шестерня;
33. **national grid** – державна електроенергетична система
34. **hydroelectric power station** – гідроелектростанція;
35. **heat supply** – теплопостачання;
36. **heating controller** - терморегулятор
37. **heat storage** – теплонакопичувач;

38. **heating well** – нагрівальний колодязь;
39. **Irreversible process** – необоротний процес
40. **jet cooling** – струменеве охолодження
41. **Laval nozzle** – насадка Лаваля
42. **lightning conductor** – блискавковідвід;
43. **line circuit-breaker** – головний вимикач;
44. **load recovery** – відновлення навантаження;
45. **load**-breaking isolator – вимикач навантаження;
46. **load curve of a consumer's power plant** – графік навантаження енергоустановки споживача;
47. **load duration curve of a consumer's power plant** – графік тривалості навантаження енергоустановки споживача
48. **lubricant** – мастило;
49. **manual drive** – ручний привод;
50. **maintenance expenses** – вартість технічного обслуговування
51. **malfunction** – збій
52. **multi-terminal circuit** – багатополюсник;
53. **measuring relay** – вимірювальне електричне реле;
54. **nuclear power station** – атомна електростанція;
55. **opening, tripping** – вимикання, розмикання;
56. **on-off switch** – вимикач;
57. **operational earthing** – експлутаційне заземлювання;
58. **output terminals of a network** – вихідні затискачі схеми;
59. **output** – потужність;
60. **operating power reserve of a power system** – експлутаційний резерв потужності енергосистеми;
61. **pit drying stove** – піч-сушарка
62. **power system dispatching** – диспетчерське керування енергосистемою;
63. **polyphase** circuit – багатофазне коло;
64. **primary voltage** – первинна напруга;
65. **pulverized coal** – вугільна пил
66. **pit drying stove** – піч-сушарка
67. **renewables** – джерела палива, що відновлюються;
68. **run out** – закінчуватися;
69. **Reciprocating compressor** – поршневий компресор
70. **Saturated steam** – насичена пара
71. **Specific heat capacity** – питома теплоємність
72. T**hrottling** – дроселювання
73. **sampling test** – вибіркове випробування;
74. **secondary winding** – вторинна обмотка;
75. **sealed transformer** – герметичний трансформатор;
76. **saving of organic fuel** - економія органічного палива;
77. **short circuit** – коротке замикання;
78. **stable mode** – усталений режим;

79.**standby mode** – режим очікування;
80.**standby power** – енергоспоживання в режимі очікування;
81.**state variables of a power system** - змінні стану енергосистеми;
82.**strain insulator** – анкерний ізолятор
83.**transmit** – передавати, посилати;
84.**trim** – підлаштовувати;
85.**TRS** – Транзистор;
86.**turbine blades** – лопатки турбіни;
87.**wind power engineering** – вітроенергетика;
88.**ultimate energy technologies** – кінцеві енергетичні технології;
89.**unavoidable energy** – енергія вимушеного використання;
90.**Winding – обмотка**

COMMON PHRASES USED IN ACADEMIC TEXTS

Актуальний up-to-date (важливий/популярний сьогодні), relevant, pressing, urgent (нагальний), …is/are of great
importance today, is/are currently of great interest (*типова помилка:* actual; *уникайте:* topical)
Актуальність significance, importance, relevance (*уникайте:* actuality, topicality)
Анотація abstract

Важливий significant, important
Визначити define (дати дефініцію), determine (дату тощо),
identify, indicate, outline, specify (особливості)
Виконувати (див. “здійснювати")
Виникнення the rise, emergence, appearance, origin (походження)
Висвітлити (тему, проблему) cover, describe, report on, highlight
Висновки conclusion
Виявити identify (визначити), show, find out, reveal, discover
(відкрити щось нове)
Відзначати note, stress (наголосити на ...)
Відповідний relevant
Вітчизняний (тобто український) Ukrainian (*типова помилка:* native, domestic)
Вплив impact (сильний вплив), effect (effects), influence (довготривалий)
Вивчено... The article explores (examines) … *Можливий варіант у пасивному стані:* ... is/are explored (examined)
Визначено особливості... The specific features of … are outlined
Визначити основну думку (причини) identify the main argument (the causes)
Висвітлено проблему ... The issue concerning … is highlighted
Виходячи з досвіду ... Judging by the experience of … On the basis of …
Виявлено... … is/are found out
Відповідно, ... Accordingly, …
В контексті ... within **(**in) the context of …, from the perspective of …, in relation to …
В умовах … in/under the conditions of …

Головну (основну) увагу приділено... Particular (special) attention is paid (drawn) to… The author focuses on …

Даний (цей) **...** this …, the present …, the current
Діяльність activities (*типова помилка:* activity, це – активність)
Дозволити (дати можливість) make it possible to …, enable, permit
Доповідь report
Дослідження research (наукове вивчення взагалі)**,** study

(конкретна наукова розвідка, наукова стаття), case study (конкретне дослідження)
Досліджувати study, analyze, explore, examine (*типова помилка:* research)
Досягнення (у значення "прогрес") advances in …
Детально описано … is/are described in detail
Доведено факт ... The author has established the fact that …
Доведено, що... it is shown that … The author shows (demonstrates) that … The author argues that …
Досліджено... The paper/author explores… (examines …, studies…, investigates…, describes …, considers …). *Можливий варіант у пасивному стані:* ... is/are explored (examined, etc.)

Зазначено, що... The author states (shows, points out, explains, indicates, develops the view) that … It is claimed that …
За цих умов (обставин) under these conditions (circumstances)
Звернути увагу на ... draw attention to …
Здійснене дослідження the study, this study (*типова помилка:* the conducted study)
Здійснювати дослідження conduct a study
Зображено... is shown (demonstrated)
З позиції ... from the standpoint of …
Зроблено спробу визначити .... An attempt is made at identifying (defining) …
Закономірності laws, regularities, a regular pattern
Застосовувати apply (метод, правило, теорию), use (використовувати: наприклад, матеріал)
Збірник (наукових праць) journal
Здійснювати perform (оцінювання), conduct (дослідження, аналіз)
Значення (важливість) importance, significance, implications, relevance
Зокрема more specifically, particularly

Ключові слова keywords (key words)
Коло проблем a number of issues, a whole range of, wide variety of
Конкретний specific, particular

Лежати в основі underlie

Наведено аналіз ... The article provides an analysis of … The article provides a detailed examination of …
Наведено дані про ... Data are given about …
Наведено приклади ... This article provides examples of … …gives examples showing…
Наведено характеристику... … is/are described
На підставі (на основі, на базі)... considering …, drawing on …, proceeding from …, having analyzed …, … is based on …

На початку / наприкінці (80-х. pp. XX ст.) in the early / late 80s of the 20th century (1980s)
На прикладі (на матеріалі ...) the case of, by …ing, proceeding from, having analyzed …, … is based on …, using … as an example (*Типова помилка:* by the example of …)
На сучасному етапі at present
Наголошувати emphasize, stress
Назва (статті) (research paper) title
Напрям line, trend, direction, research area (напрям наукових досліджень), the main activities, the area of activities (напрям діяльності), policy

Обґрунтований justified
Обґрунтовувати justify**,** give a rationale for …, substantiate
Обґрунтування main arguments, justification, motivation
Обсяг (матеріалу, роботи) the scope
Огляд overview (огляд проблем), survey, the literature review (огляд літератури)
Окреслити (намітити) outline
Описати describe
Опитування survey
Основний main, principal, major, key
Особливості characteristic (specific, distinctive) features, characteristics (peculiarities означає "щось незвичне")
Охарактеризувати describe (описати, дати характеристику), identify (визначити), characterize as … (охарактеризувати як ...)
Охоплювати cover (певний обсяг роботи з наголосом на повноту охоплення), encompass (певні теми з наголосом на додатковий характер інформації)
Окреслено коло питань стосовно ... is/are … highlighted
Окреслено характерні риси... Characteristic features of … are outlined
Описано ... The paper/author describes (offers a description of…). *Або:* ... is/are described
Особливу увагу приділено ... Particular (special) attention is paid to… The paper concentrates on … focuses on ... Extensive coverage is given to … Much attention is given to …
Охарактеризовано... The author explores (describes, examines, analyzes)… is/are described (identified)

Питання (проблеми) issues, problems (*типова помилка:* questions)
Підхід до approach to
Повідомлення, повідомляти report
Показати show, demonstrate, indicate
Поняття concept
Попередні дослідження previous research, research

publications
Постановка проблеми problem statement, research justification
Пояснення (наукове) interpretation
Пояснити explain, demonstrate, illustrate, argue, explicate, elucidate, interpret
Праця (наукова) study, paper, research publication, work (не про свою роботу)
Представити present, provide
Причина cause (те, що спричинило щось), reason (підстава, мотив)
Проаналізувати analyze, explicate
Проблеми problems (те, що потребує вирішення), issues (теми, що розглядаються)
Прокоментувати interpret (матеріал, дані)
Пропозиція suggestion (ідея для розгляду),
Пропонувати suggest (ідею для розгляду), offer (щось конкретне), propose
Піднімати питання ... raise the issue of …
Показано вплив... The influence (impact, effect) of … on … is shown
Показано значення... The importance (significance) of .. for …is stressed
Показано на прикладі (проілюстровано**) ...** is exemplified by
Пояснити на прикладі ... illustrate by …ing
Представлено огляд... This paper presents a review of …
Проаналізовано особливості... characteristic (specific, distinctive) features of ... are analyzed. *Або:* The author analyzes … (presents/provides an analysis of …)
Проблему розглянуто шляхом ... The study investigates this issue by examining …
Проведено (здійснено) дослідження... (*див.* **Досліджено**)

Розв'язати проблему find a solution to the problem
Розглядаються проблеми... The issues addressed are …
Розглянуто... (У статті розглянуто...) The paper deals with …This article discusses the issue of... The study is concerned with … The paper describes … The paper is concerned with … The author considers … *Або:* … is (are) described (discussed, considered, etc.)
Реалізувати ідею implement an idea
Результати results, findings, outcomes
Резюме (короткий виклад змісту статті) summary
Розглядати discuss, describe, consider, study, explore, cover, investigate, view (treat)… as … (розглядати щось як...) метод
Розкрити show, describe, find, demonstrate, explain, unfold, reveal (*помилка:* disclose)
Розробити develop (теорію), design (план)
Розробка research, study (наукова діяльність, праця), development, elaboration (ідеї)

Розуміння insight into… (розуміння наукове), scientific interpretation (розуміння проблеми)

Світогляд world-view, world outlook
Світоглядний world-view, relating to world outlook, philosophical, ideological
Соціокультурний socio-cultural
Специфіка specific features (nature, character) (*типова помилка:* specificity)
Спостерігати observe, study
Стан дослідження state of research
Стаття (наукова) article, paper, study
Стосовно relating to
Суттєвий considerable
Сучасне суспільство contemporary society
Сучасний present, present-day, current (нинішній), modern, up-to-date (такий, що відповідає вимогам часу), contemporary (того ж часу, про який ідеться)
Сучасність our time (*уникайте:* contemporaneity)
Систематизовано й узагальнено... … is/are systematized and summerized
Стаття присвячена питанням... The article is devoted to…
The article deals (is concerned) with… The paper touches upon the issue of… The study addresses the problems of … *уникайте:* dedicated to …)
Стисло описано ... is/are described in short
Сфера досліджень the field (area) of research

Творчість creative work (творча діяльність), works (доробок науковця, митця, письменника)
Тези доповідей conference reports, summaries, abstracts of reports
Тези доповідей (збірник) proceedings of the … conference
Тлумачення explanation

Узагальнити generalize (отримані результати), summarize (інформацію з попереднього досвіду, з прочитаної літератури)
Установити find out (з'ясувати), identify, demonstrate, prove
Установлено місце та роль... The position (place) and role of … are identified
Установлено факт … The author has established the fact that…
Уточнено... is/are specified

Характеристика (опис) description, outline
Характерний specific
Характерні риси (див. "особливості")

Явище phenomenon (множина: phenomena. *Типова помилка:* phenomenons)

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Навчальне видання

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ПРОФЕСІЙНО-ОРІЄНТОВАНИЙ ПРАКТИКУМ ІНОЗЕМНОЮ МОВОЮ

Навчально-методичний посібник для здобувачів ступеня вищої освіти магістра
спеціальності «Теплоенергетика»
освітньо-професійної програми «Теплоенергетика»

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