



УНІВЕРСИТЕТ імені АЛЬФРЕДА НОБЕЛЯ

N.P. Bidnenko

English terminology

Scientific and technical translation



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Н.П. БІДНЕНКО

**ТЕРМІНОЛОГІЯ
АНГЛІЙСЬКОЇ МОВИ
ТА НАУКОВО-ТЕХНІЧНИЙ
ПЕРЕКЛАД**

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Навчальний посібник є другим, доповненим виданням, присвяченим термінології англійської мови та теорії і практики науково-технічного перекладу з англійської мови, спрямованим на формування навичок як усного, так і письмового перекладу. У посібнику розкрито питання стосовно лексики, граматики та синтаксису наукових і технічних англійських текстів. Кожен розділ містить теоретичний матеріал, практичні завдання, оригінальні тексти, англійську та українську термінологічну лексику, а також лексичні, лексико-граматичні і комунікативні вправи.

Посібник розрахований на здобувачів вищої філологічної освіти фахових факультетів і може бути використаний у нормативному курсі науково-технічного перекладу з англійської мови, загального курсу письмового перекладу і термінології англійської мови.

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The present manual is a methodological support for the course of English terminology and scientific and technical translation from English, focused on forming oral and written translation skill of future linguists and translators. The problems dealing with the peculiarities of the vocabulary, grammar and syntax of English scientific and technical texts are in the center of attention in this book. Each chapter consists of the theoretical material, various tasks, original texts, English and Ukrainian terminological vocabulary and lexical, lexical grammatical and communicative tasks for studying English Terminology and Scientific and Technical Translation.

The manual is for the students of philological departments of the universities and can be used as a mandatory course of English scientific and technical translation, as an introduction to the course of written translation and English terminology.

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ПЕРЕДМОВА

Даний навчальний посібник є другим доповненим виданням, присвячений термінології англійської мови та теорії і практики науково-технічного перекладу з англійської мови, спрямований на формування навичок як усного, так і письмового перекладу у майбутніх лінгвістів та перекладачів. Навчальний посібник розрахований на здобувачів вищої філологічної освіти фахових факультетів вищих навчальних закладів України і містить інформацію як лінгвістичного, так і перекладацького характеру стосовно лексичних, граматичних та синтаксичних особливостей перекладу англомовних наукових і технічних текстів та англомовної термінології.

Даний посібник забезпечує формування стійких мовленнєвих вмінь та навичок, необхідних для свідомого професійного володіння англійською мовою. Автор зібрав теоретичні матеріали з термінології англійської мови та науково-технічного перекладу вітчизняних і закордонних фахівців і зробив спробу узагальнити результати досліджень з термінології минулих років. Теоретичну частину було взято з підручників, посібників та наукових статей, які присвячені актуальним питанням термінознавства.

Посібник складається з десяти розділів, кожен з яких містить теоретичний матеріал та практичні завдання для проведення семінарських занять. Після кожного розділу представлено питання для самоконтролю, а також дві контрольні роботи у декількох варіантах по закінченню курсу. Поаспектний розподіл теоретичного матеріалу, а також вправи для закріплення роблять посібник корисним для викладання таких дисциплін, як «Термінологія англійської мови», «Науково-технічний переклад», «Письмовий переклад» та «Іноземна мова професійного спілкування», що входять до навчального плану перекладацьких відділень і філологічних факультетів.

Основні теоретичні питання англійської термінології, семантичні й стильові аспекти наукових та технічних текстів подаються в посібнику безпосередньо через практику письмового й усного відтворення специфічних особливостей науково-технічного дискурсу у відповідно підібраних для цієї мети вправах. Науково-технічна лексика, терміни і термінологічні сполучення та фрази, автентичні англомовні і україномовні тексти, які розглядаються, взято з навчальної літератури згідно з обов'язковою програмою для здобувачів вищої філологічної освіти. Окрім фахової лексики, посібник містить і лексику різних галузей знання, яка складає основу міжнародного термінологічного фонду. Також у додатках подано інструкції до написання наукового доповіді англійською мовою та перелік питань для самоконтролю.

У першому розділі посібника «Terminology as a linguistic science» наведено основні теоретичні поняття термінології як науки, факти з історії термінологічної науки, у тому числі в Україні. У другому і третьому розділах розглядаються основні термінологічні поняття і явища, подаються наукові дефініції термінів, термінологічної системи, класифікації термінів,

мови професійного спілкування, пояснюється також термінологія перекладацького характеру (засоби перекладу термінів-неологізмів, термінів-інтернаціоналізмів, запозичених термінів, безеквівалентної лексики, термінологічних багатокomпонентних атрибутивних конструкцій та ін.). Ознакам наукових та технічних текстів, особливостям науково-технічної літератури як окремого жанру, теоретичному матеріалу про специфіку науково-технічного перекладу, вимогам до перекладу науково-технічної літератури присвячено четвертий розділ. Питання диференціації міжнародної термінологічної лексики та мов для спеціальних цілей (LSP) висвітлено у п'ятому і шостому розділах посібника. Семантичні процеси в термінології англійської та української мов (полісемія, омонімія, синонімія, антонімія термінів) та специфіка термінологічної номінації (семантична, морфологічна, синтаксична, запозичені види номінації) розглядаються у наступному розділі навчального посібника.

Використання сучасних термінологічних словників, а саме галузевих, тлумачних, двомовних, багатомовних, словників скорочень, енциклопедій, довідників, а також етапи роботи зі словником є об'єктами вивчення у восьмому розділі. Незважаючи на те, що існує багато словників, якими користуються при перекладі англійської науково-технічної літератури, у тому числі і словники із комп'ютерної техніки, жоден словник не може дати або передбачити усіх термінологічних значень тієї чи іншої лексичної одиниці у конкретному контексті. Тому у восьмому розділі також викладено інформацію щодо ролі інтернету при перекладі сучасної англомовної науково-технічної літератури.

У подальших розділах викладено лексико-граматичні питання перекладу науково-технічної літератури, а саме різні види перекладу (анотаційний, реферативний переклади), особливості перекладу інструкцій і патентів.

Виклад теоретичних питань і положень супроводжується і всебічно ілюструється прикладами. Загальна структура посібника і графічне виділення ключових понять у кожному розділі надають можливість здобувачам легко зорієнтуватися у тематиці курсу.

Посібник є результатом багаторічної дослідницької діяльності викладачів кафедри англійської філології та перекладу і студентів відділення «Філологія» університету імені Альфреда Нобеля у місті Дніпро, був апробований на кафедрі і відповідає програмі з англійської мови для студентів перекладацького відділення. Незважаючи на те, що ця книга є не першою спробою створення системного посібника з термінології англійської мови та науково-технічного перекладу, автор із вдячністю прийме усі критичні зауваження та пропозиції, щодо поліпшення запропонованого посібника. Автор також висловлює щире подяку рецензентам за корисні поради і зауваження при перегляді рукопису даного посібника, а також О.Вересовій, патентному повіреному за надання професіональних консультацій щодо перекладу патентів.

Unit 1

TERMINOLOGY AS A LINGUISTIC SCIENCE

1.1. Terminology as a branch of linguistics.

1.2. The historical outlook on terminology.

1.3. Terminology and other branches of linguistics, science and technology.

1.1. TERMINOLOGY AS A BRANCH OF LINGUISTICS

Terminology as an independent branch of linguistics summarizes experience of terminology works and terminology phenomena has its structured set of terminological concepts taken from technical and scientific writing and documentation. The modern linguist Valeontis Kostas, the president of the Hellenic Society for Terminology (ELETO) and the Chairman of the Permanent Group for Telecommunications Terminology at the Hellenic Telecommunications Organization considers terminology in two main meanings:

1. the first one as the discipline concerned with the principles and methods governing the study of concepts and their designations (terms, names, symbols) in any subject field, and the job of collecting, processing, and managing relevant data, and

2. the second one as the set of terms belonging to the special language of a definite subject field (the concepts and their representations in special languages) (V. Kostas, E. Mantzari: 2006, 2).

In the second meaning terminology can be considered as multidisciplinary because it borrows its fundamental tools and concepts from a number of disciplines (e.g. science, linguistics, information technology and other specific fields) and adapts them appropriately in order to cover particularities in its own area.

Speaking about terminology, the linguists as a rule recognize the following meaning:

1) a branch of linguistics that studies terms, in Ukrainian *термінознавство*;
2) professional vocabulary as a part of national language (English terminology, Ukrainian terminology and etc.);

3) special words or professional terminology used for professional communication (linguistic terminology, mining terminology, judicial terminology and etc.).

Terminology is not a chaotic set of terms but it is a system of special words logically and linguistically organized. A general theory of terminology is based on the conceptual relations between terms and notions, between the sciences such as physics, chemistry, biology, etc. and the combination of other disciplines such as linguistics, logic, ontology, and computer science. Ukrainian linguists emphasize that “terminology is a science which studies special professional vocabulary, its typology, origin, forms, content, functioning and its usage, creation and development” (Л. Білозерська: 2010, 15). Thus, terminology can only be understood in the relations with special languages, communication and information to fulfill different goals and objectives.

Terminology in modern world connects with special languages or Languages for Special Purposes, related to scientific and technical information or professional communication. “Languages for specific purposes, or, in this case, English for Specific Purposes (hereinafter referred to as ESP) can be dealt with at least two perspectives: on the one hand, from a didactic perspective, as ESP is a sphere of language teaching. On the other hand, we must approach the issue of specialized language(s) from a linguistic viewpoint, as English for Specific Purposes is a peculiar segment of a language, with its major component – **terminology**, to which some authors add the science specific grammar, i.e. linguistic issues and particularities”, - considers Dr. Nagy Imola Katalin (I. Katalin: 2014, 262).

Not all experts agree that terminology comprises a separate discipline, nor do all consider it as a theoretical subject. For some, terminology is a practice dealing with social needs that are often related to political and/or commercial aims. In the opinion of others, terminology is a true scientific discipline with various subject fields and fundamental concepts. There are many intermediate positions, recognizing that terminology contains some original theoretical aspects, only within the framework of other, more consolidated disciplines. There is, consequently, a wide range of approaches to the theory and practice of terminology.

Therefore, it is necessary to establish a series of basic assumptions by all approaches. First, it is needed to identify four different points of view, which in turn lead to different focuses for terminological work and applications:

1. for linguists, terminology is a part of the lexis defined by the subject matter and pragmatic usage.
2. for subject field specialists, terminology is a formal reflection of the conceptual organization of special subjects and professional communication.
3. for end-users (either direct or intermediary), terminology is a set of useful, practical communication units which are assessed according to criteria of economy, precision and suitability.
4. for language planners, terminology is an area of a language requiring intervention in order to reaffirm its usefulness and survival and to ensure its continuity as means of expression through modernization.

Mindful of these four points of view, there are two separate user groups of terminology: the users of terminology for direct communication or communication through intermediaries, and terminologists, who write glossaries, facilitate communication, or mediate in some other way. According to the needs of these two groups, terminology can have two dimensions closely related: a communicative dimension and a linguistic dimension. The theory of terminology can be identified as having three different dimensions: the cognitive, the linguistic, and the communicative dimension (J. Sager: 1990, 2). For the first group, terminology is a tool for communication, for the second one, it is the target of their work.

The direct users of terminology are the specialists in each subject field of science and technology. For them, terminology is a necessary tool for communication and an important element for conceptualizing their own subject

matter. This two-sided function of terminology causes their interest in standardization for determining the definition of concepts and fixing the corresponding names. Specialists use terminology regardless of whether a term is appropriate within a particular linguistic system or not. Their communicative needs start from the knowledge of the concepts and from the needs to communicate using them; their interest in terminology focuses on concepts and how these concepts can be named clearly and unambiguously. According to this approach terminology is primarily a business and subject matter of several groups of specialists with their working methods and knowledge united with one professional field. In this sense, terminology comprises merely technical aids in a multidisciplinary field.

Terminology intermediaries are language professionals like translators, technical writers, and interpreters who need terminology to carry out their professional duties and communication. They need glossaries and specialized dictionaries because they assist in technical and scientific writing or translating. "Terminologists, terminographers and neologists, language planners and information scientists must be both specialists in language, information and documentation and in an appropriate subject field" (M. Cabre: 1999, 12). Their work consists of compilation, description, processing and creation of terms.

The main aim of terminology is to provide creating and perfecting **terminology systems** or **LSP (languages for special purposes)** in the definite subject fields of knowledge. Terminology is devoted to the bases of a modern terminological vocabulary for understanding concrete scientific and technical texts and conversations on professional themes, or for teaching foreign languages in universities and institutes, for mastering modern languages.

As the number of works in this area is constantly increasing, the agenda of terminology science includes:

- a) social terminological studying neologisms proposed by terminologists and language planners;
- b) case studies on terminology development by standardization and harmonization efforts;
- c) researches concerning the establishment and use of terminology databases for various user groups and purposes (e.g. translation, technical writing, information management);
- d) researches concerning vocabularies for documentation and information retrieval purposes (thesaurus, classification systems, etc.).

Terminology is one of the most mobile, quickly filled up parts of national vocabulary. There is a dual process in it: the number of the terms accessible only to specialists overgrows rapidly in every highly developed language and is estimated in millions, and at the same time, there is an intensive penetration of special terminology into general literary language. Otherwise, terminology is not isolated from literary language, and those processes that happen in literary language are reflected in it. However, unlike lit-

erary language terminology deals mainly with the written form of a national language, including signs, shortenings, abbreviations, which are rarely studied by linguists.

The progress of science and technology, means of communication today has caused the emergence of new requirements to the translator profession. There have been organized several European projects working on the new objectives, criteria and characteristics of translation competences. According to PACTE group (2000), the project of European Master's in Translation (EMT) started in 2009, and the European Commission, developed a list of professional translation competences, new criteria for the formation of future translators' knowledge and linguistic skills were offered (European Master's translation; A. Beeby, D. Ensinger and M. Presas. PACTE. Acquiring Translation Competence: Hypotheses and Methodological Problems in Research Project; Translation services requirements). The main results of this work was creating a single international standard ISO 17100 2015 on translation activities and services and Modern Professional Translator's competences and Translation service requirements (http://www.iso.org/iso/catalogue_detail.htm). The deep knowledge of modern terminology (general and specialized), ability to use terminological dictionaries, especially electronic ones, and different search systems for a fast and highly qualified translation have been noticed among the most important professional translators' competences.

Professional terminological vocabulary can be in different variation depending on its use: mathematical, physical, chemical, biological, medical, legal, philosophical, economic and others with further subdivisions. In recent decades, the Internet space has given the opportunity to use electronic terminological dictionaries such as MultiLeks, Lingvo, ABBY LINGVO, TERMIUM, TERMIUM Plus, INTENT, GIGATRAN, the International Vocabulary of Metrology (VIM) and others. Moreover, students working on translating terminological texts with electronic dictionaries develop linguistic knowledge, skills and new professional translation competences; understand changes in special vocabulary or languages for special purposes; make some theoretical summaries and carry out various lexicographical work automatically; create new articles in electronic dictionaries and translation databases and, thereby, improve translation quality. Taking into account the new European requirements for the modern translators' professional activity, as well as the quality of translation services, and new translators' competences, the role of teaching professional terminological vocabulary or Languages for Special Purposes (LSP) becomes of a great importance. Teaching terminology helps to form not only translators' linguistic competence, but also the ability to work effectively in computer-aided translation using electronic dictionaries, modern search engines and other technologies.

The methods applied in terminology are closely connected to linguistic ones. It is the descriptive method, used for creating new terms and terminology systems; the method of structural analysis; the contrastive and comparative typological

methods, allowing oppose and compare separate terminology systems, find their similarities and differences. The method of statistical analysis is used for identifying the most typical and frequent types of terms, comparing terminology elements and terminology models. The statistic method is used for compiling various types of terminological dictionaries and preparing guidelines for the elaborated specialized dictionaries.

Nowadays, a number of separate disciplines were developed in terminology as a linguistic science. First of all, **theory of terminology**, which investigates the processes of creating, developing and functioning special lexis. Scientists signify **applied terminology**, which studies practical principles and recommendations on the creation of new terms and avoiding misconceptions and imperfections of new terms and terminology systems have already existed in the language. In its turn, **general terminology** explores the peculiarities, problems and processes connecting with professional vocabulary while **special terminology** investigates special lexis used in different spheres of human activity. **Comparative terminology** conducts investigations of definite terminology systems for identifying similarities and differences, for recognizing general peculiarities of special vocabulary in different languages, for instance, in the Ukrainian and English languages. In addition, some scholars recognize **semasiological terminology** for studying problems of special vocabulary, changing their meanings, and other semantic processes such as polysemy, homonymy, synonymy and antonymy of terms. **Onomasiological terminology** analyses special words structures, the process of nominating professional concepts. **Historical terminology** studies the history of terminological thinking, planning and developing. **Functional terminology** deals with investigating modern functions of terms in different texts and professional communication and training professionals. As the object of terminology and the main terminology unit is a term, **terminography** is considered as a discipline connected with terminology that summarizes terminological investigations and publications for compiling terminological dictionaries.

Teaching terminology should be considered as a separate discipline with its own methodology and research principles. The knowledge and fluency in modern terminology (general and specialized), ability to use Glossaries, especially electronic ones, different search engines for the fast, high quality and skilled translation are recognized among the most important professional competences. All these skills, knowledge and competences should be reflected in modern curriculum and programs for academic translators' training which will be based on the competence approach including self-determination, self-analyzing, developing individuality and socializing. The emphasis should be on the practical aims more than theoretical ones. It will allow future translators communicate without barriers and work more effectively.

1.2. THE HISTORICAL OUTLOOK ON TERMINOLOGY

Terminology, the discipline deals with investigating and compiling various terms, is not a new field of linguistics, but only in the recent decades has been systematically developed, with fully considered principles and methodology. Linguists and scientists have recognized its social and political importance already on both the national and international scales (*Languages for Special Purposes in a Multilingual, Transcultural World. Proceedings of the 19th European Symposium on Languages for Special Purposes, 8 – 10 July 2013, Vienna, Austria*).

The appearance of terminological vocabulary, so-called **terminological explosion**, was caused by the development of science, modern technology, agriculture, art and other fields of human activity. It has a brightly expressed social character and is still under the control of society. Terminology, as we understand it today, initially appeared in the 1930s after World War I. The development of terminological investigations had been started after the period of massive term creation when the great amount of concepts as incorporated special words penetrated in languages. Due to the simultaneous expansion of knowledge and the growth of technology and communication in the 18th century, terminology had been seen as a necessary tool to overcome some difficulties caused by the science and technology development. The researches in chemistry by A. Lavoisier and C. Berthollet or in botany and zoology by Carl von Linné exemplified the scientists' interest in the process of nominating scientific concepts.

The rapid progress and development of technology required not only the nomination process of new concepts, but also the systematization of used terms. Then as the internationalization of science in the 19th century had grown up, there was a need to establish a set of rules for forming and understanding terms used in different fields of human activity. The systematization of terminology and creating its scientific status, standardization that had been started before World War I formed and intensified terminological development caused the appearance of patent literature being especially full of new terms from modern spheres of science, medicine, engineering, and technology. Not by chance, the quick development of terminology researches was conducted simultaneously with the foundation of International Organization on Standardization (ISO) after 1946, (<https://www.iso.org/the-iso-story.html>).

The beginning of terminology deals with Austrian scholar Eugen Wüster (1898 – 1977) and Russian scientist Dmitrij Lotte (1898 – 1950) whose works were published in 1930s. Austrian linguist E. Wüster, who is considered as the founder of the General Theory of Terminology and the main representative of the Vienna School, has come from the field of engineering. Russian terminologist D. Lotte is the founder of the Soviet Terminology School and official of the Committee for the Standardization of Terminologies in the Institute for Standardization of the Council of Ministers in the USSR and a member of the Soviet Academy of Sciences.

Foreign terminologist E. Wüster was related to the International organization of standardization: “in 1951 E. Wüster took over the Secretariat of Technical Committee ISO/TC 37 “Terminology (Principles and Coordination)” for the Austrian Standards Institute (ON)” (<http://inmyownterms.com>). In 1961 the scholar was elected as a Chairman of the Sub-Committee on Proposals for Multilingual Dictionaries (UNESCO). Later, in 1968 E. Wüster published “Machine Tool Dictionary”, with 1401 concepts arranged according to the Universal Decimal Classification (UDC) system, showing terms in German and definitions in English and French. The publication of “Machine Tool Dictionary” became the preparation for creating the multilingual term bank of the European Commission the machine tool EURODICAUTOM (today Inter-Active Terminology for Europe – IATE). Moreover, in 1969 the Universal System for Information in Science and Technology (UNISIST) program was launched headed by E. Wüster. The result was that Infoterm (the International Information Centre for Terminology), was founded in 1971 by contract with the United Nations Educational, Scientific and Cultural Organization (UNESCO), with the objective to support and co-ordinate international co-operation in the field of terminology in Vienna in 1971 (<http://www.infoterm.info>).

In his turn, D. Lotte, just like E. Wüster identified the necessity of establishing the system of standardization of terms and concepts in technical communication among specialists. Two major developments in the former Soviet Union gave rise to the Russian School of Terminology: scientific and technological progress and multilingualism. In 1931 D. Lotte published an article entitled “Pressing Problems in the Field of Scientific and Technical Terminology”, the same year that E. Wüster published his doctoral dissertation “Linguistic Standardization in Technics” which gave rise to the General Theory of Terminology (GTT). Heribert Picht in his “The Science of Terminology: History and Evolution”, explains that “Wüster and Lotte had in common the basic approaches to terminology such as: the concept as a unit of knowledge, the term formation regulated by guidelines, and dynamic standardization of concepts and terms” (H. Picht: 2011, 20). Thus, two separate events took place in the world of science and technology without them even knowing it. Heribert Picht claims that D. Lotte is the authentic father of Terminology, since he has been interested in the theoretical aspects of terminology before E. Wüster. But it was Wüster who modelled terminology into a dictionary that was the basis of the GTT. While E. Wüster recognized the need for linguistic understanding terminology, and limited his work to the study of specialized terms, D. Lotte considered that language could not be “simplified” but that we also need to take into account socio-cultural factors of the language.

As it was stated above, modern terminology was founded in the 1930s with the works of E. Wüster and D. Lotte. In his doctoral dissertation, E. Wüster presented peculiar arguments for systematizing the methods of terminology, established a number of principles to work with terms and outlined the main points of the methodology for processing terminological data. As G. Rondeau notes, at that

time “E. Wüster was particularly concerned with methodology and standards as opposed to theory, since he considered terminology as a tool used as effectively as possible to eliminate ambiguity in scientific and technical communication” (Cabre M.: 1999, 56). According to Auger (1988) there are **four basic periods** in the development of modern terminology:

1. the origins (1930 – 1960);
2. the creation of terminological fields (1960 – 1975);
3. the boom or explosion (1975 – 1985);
4. the expansion (1985 – present) (M. Cabre: 1999, 62).

The initial period deals with the development of scientific terminology (1930 – 1960) characterized by the creation of systematic formation of terms. The first theoretical texts by E. Wüster and D. Lotte appeared in those times. When D. Lotte published his “Fundamentals of the Structure of Scientific and Technical Terminology” in 1961, E. Wüster had had the opportunity to check the rationale and suitability of the methods presented in his doctoral dissertation “Linguistic Standardization in Technics” in 1931. His dissertation was translated into Russian and became mandatory reading for students of terminology in the Soviet Union in 1935.

During the first half of the 20th century neither linguists nor social scientists paid essential attention to terminology. Only from the 1950s the interest was renewed. It is interesting that linguists have generally shown their little interest in terminological studies; instead, they have been concerned with the developing the theory of terminology and its principles.

On the second stage of terminology development (1960 – 1975), the most important innovations came from the computers fields and documentation techniques. During this period, the first approaches to standardize terminology within a language were made. Thus, the first databanks appeared that time and the international coordination of processing terminology principles was initiated. “There was a general shift in the 1960s away from producing international standards covering basic test methods and terminologies towards producing standards related to the performance, safety and health aspects of particular products” (V. Grey: 1997, 36). It was the time when most terminological fields were created.

On the third stage there was the boom or explosion of terminology (between 1975 and 1985) which is marked by the proliferation of language planning and terminology projects; some countries like the former USSR and Israel had begun their language policies earlier. In the former USSR along with E. Drezen, D. Lotte prepared teaching materials and manuals used at different Russian universities. These two engineers determined the most essential notions linked with the term and its properties as well as the development towards standardization and internationalization of the terminological sphere and focused their attention to the creation of terms and borrowings. V. Danilenko, the famous Russian terminologist, published his work “Russian terminology: the experience of linguistic description” (1977) in this period where the problem of functioning grammatical categories in

terminology had been risen. Later S. Chaplygin, an aerodynamics specialist, established the Soviet Academy of Terminology.

The fourth stage in the development of terminology is characterized by the modernization of languages and creating new terms. The spread of personal computers caused appearing and processing terminological data. Terminologists now have at their disposal various tools and resources that are better adapted to their needs, more useful and more effective (Inter Active Terminology for Europe - IATE and Euro Term Bank, Humanterm – Multilingual glossary for the humanitarian field, Statistical Data Base (SDB), INTENT, MULTITRAN, GIGATRAN, Lingvo glossaries and others. At the same time, the new market emerges the language development in which terminology occupies a privileged position. International cooperation is strengthened, spread and consolidated, as international networks are created to link agencies and countries that share special requirements and standards or are interested in cooperation. Examples of this process are the exchange of information and the international cooperation in training terminologists. Finally, the model of terminology is linked to planning, which is so necessary for developing countries, is being consolidated at this time.

Systematic interest in terminology arose simultaneously in several European countries (Austria, the former Soviet Union, and the former Czechoslovakia). It is from these **three centers** that terminological practice first expanded to the West (France, Canada, Quebec) and the North (Belgium and Scandinavia) then to the South (Northern Africa, sub-Saharan Africa, Central and South America, Portugal, Spain) and, even more recently, to the East (China and Japan). Developments in each one of these regions are characterized by the context in which terminology is studied and by the stated purposes.

According to Auger (1988) there are three major tendencies in terminology processing defined by their main objectives: terminology adapted to the linguistic system (the linguistic approach), terminology for translation (the translation approach), and terminology for planning (the terminologists approach).

These three tendencies are represented by the three schools of Vienna, Prague and Moscow. **The best known, Vienna or Austrian school of terminology** is based on the works of E. Wüster and adopts his principles formulated in his “General Theory of Terminology”. The Vienna school has developed a systematic corpus of principles and methods that constitute the basis of theoretical terminology and practice from the needs of modern technicians and scientists to standardize the terminology fields for efficient communication among specialists. The principles of this school are reflected in standardized documents on terminology, on methodology and data exchange, and on final terminological products. Most European countries work within this framework, where specialists from different fields science and technology work on systematizing terms.

The Czech school appeared because of the functional linguistic approach developed by the Prague linguistic school. Czech scientists and linguists focused on the theoretical and applied researches of Terminology. According to M. Cabré, the Czech school was led by Eduard Benes, Vilém Mathesius, Josef Vachek, and Nikolai Trubetzkoy, and mainly Lubomir Drodz and Ferdinand de Saussure. M. Cabré writes, “the Prague School is the most ‘linguistics-centered’ school” (M. Cabré: 2001, 43). The Czech school was almost exclusively concerned with the structural and functional description of special languages, in which terminology played an important role; it focused on the standardization of languages and terminologies; and its terminological work was linked to the Czech Language Institute (a part of the Academy of Sciences). This school postulates that terms are the units of functional professional language existing in other styles such as literary, journalistic, or conversational ones.

The Russian school of terminology was based on the works of D. Lotte, S. Chaplygin, A. Reformatzkiy, V. Vinogradov, G. Vinokur, R. Budagov, S. Ozgegov, F. Skorohod’ko, V. Danilenko, O. Akhmanova and their coworkers. Consequently, the Russian school was mainly interested in the standardization of concepts and terms because of the multilingualism in the former Soviet Union. The works of Russian linguists became the base for creating different terminological schools in the former Soviet Union that investigated:

- the interaction of terms with general vocabulary (A. Aksyonov, 1954; B. Konovalova, 1964; L. Kapanadse, 1966; I. Aleksandrovskaya, 1973);
- the structural and grammatical peculiarities of terminology (L. Teslina, 1969; G. Guseva, 1970; T. Kandelaki, 1970, 1977; A. Pumpyanskiy, 1971; L. Komissarova, 1973);
- the formation of terms (G. Vinokur, 1939; I. Arnold, 1954; M. Barak, 1955; A. Skorodko, 1960; M. Bonelis, 1962; V. Borisov, 1969, 1970; V. Danilenko, 1971, 1977; V. Tribunskaya, 1980);
- the formation and development of terms and different terminology systems (R. Budagov, 1940, 1971; B. Bogodskiy, 1964; Y. Tkacheva, 1973; V. Sorokoletov, 1981);
- the synonymy and polysemy of terms (S. Korshunov, 1952; N. Salnikova, 1979);
- the lexicography and automatic analysis of scientific and technical texts (P. Alekseev, 1965; K. Lukyanenkov, 1969);
- the translation of terms (L. Chernyahovskaya, 1971; F. Tsytkina, 1978).

Foreign linguistic terminological investigations were conducted by R. Brown (1954), V. Fleisher (1974), E. Wüster (1966, 1974, 1977), G. Rondeau (1965), P. Gove (1961), J. Sager (1988, 1990), M. Cabre (1999), V. Kostas (2006), I. Katalin (2014) and others.

At the opening session of the Infoterm symposium in 1975, E. Wüster himself named four scholars as the intellectual fathers of the Theory of Terminology:

1) the German scholar A. Scholman, who discovered the systematic nature of special terms;

2) the Swiss linguist Ferdinand de Saussure, who was the first had drawn the attention to the systematic nature of a language;

3) the Russian linguist D. Lotte, who was a pioneer in postulating the importance of standardization;

4) the English scholar J. Holmstrom, who was a researcher in systematizing terminologies on an international scale from UNESCO.

It is also worth noticing the works of well-known Russian philologist O. Akhmanova, who has founded a single terminological methodology and offered the methods for distinguishing scientific terminology from different scientific issues. O. Akhmanova had conducted the deep research for 20 years that had a number of the concrete conclusions for the theory and practice of teaching foreign languages. One of such conclusions is the statement about the semantic nature and peculiarity of term as a language unit.

Thus, all these three schools of terminology were based on linguistics, theoretical structure and methodology. Looking at the development of these three schools, we can identify three different approaches to terminology:

- The first approach considers terminology to be an interdisciplinary but autonomous discipline of science and technology.
- The second approach focuses on philosophy investigating the logical classification of concepts and organization of knowledge.
- The third approach focuses on linguistics, studying the component of special language or terminological system.

Ukrainian terminology was founded at that time when scientific literature was developed in the 18th century, although many terms from agriculture, architecture, and philosophy had appeared much earlier. Linguists suppose that the terminology flourishing was started in Ukraine in the beginning of 20th century as in other European countries (Л. Білозерська: 2010, 1). **I. Gavrishkevich, I. Verhratskiy, O. Rogovich** and many other scientists and lexicographers are considered the founders of the Ukrainian terminology.

The development of Ukrainian terminology was under the strict control in the former USSR in a close contact with the Russian school since 1933. The State Committee of Standardization regulated all terminological problems with the publication of special bulletin named ГОСТ in Russian. These bulletins contained the lists of standardized terms and their definitions, the requirements for their usage and their foreign equivalents. Ukrainian terms were often replaced with Russian ones because of historical and political circumstances and the process of rusification reflected even in the formation of Ukrainian terms.

Other linguists consider that “the development of Ukrainian terminology, the period of so-called ukrainization, when the Ukrainian language became the language of Ukrainians and Ukrainian Soviet Republic was ten years earlier in

1920s” (Л. СИМОНЕНКО: 1994, 200). It signified that foreign elements were borrowed very rarely only when it could not be done with the Ukrainian language means. Moreover, Russian elements in terms were replaced with the linguistic elements of that language from which the term was borrowed.

However, during in the process of industrialization, internationalization of science and technology with the Russian language and total russification of the former Soviet Union in 1930s, many Russian terms were borrowed in the Ukrainian terminology. Furthermore, the authentic Ukrainian terminology became inaccessible to users and was deleted from the official dictionaries and manuals that times (Л. Білозерська: 2010, 13). **Finally, the Ukrainian terminological dictionaries** were eliminated, sometimes left only in one copy.

Ukrainian terminology was renewed only in 1991 after the dissolution of the Soviet Union that is why the processes of improvement and development continue up today. Nowadays the Ukrainian terminological dictionaries are developed, a great number of various scientific researches on terminology are conducted, the articles and manuals devoted to the Ukrainian terminology are published. Linguists, professionals from different fields of human activity created several terminological centers in three Polytechnic institutes: in National Technical University «Kharkiv Polytechnic Institute», National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute” and L’viv Polytechnic National University. After the proclamation of independence, Technical Committee for Scientific and Technical Terminology Standardization (TC STTS) of State Committee of Ukraine for Standardization was set up in 1992. TC STTS and Ministry of Education and Science of Ukraine have become the state structures of Ukraine that provide scientific and technical terminology researches; organize and coordinate compilation, expertise, approval and publication of Ukrainian terminological standards and dictionaries; promote international cooperation and experience exchange in the field of scientific and technical terminology standardization; participate in corresponding ISO and IEC committees (http://tc.terminology.lp.edu.ua/TK_En/TK_vocab_CD_En.htm).

TC STTS with Ministry of Education and Science of Ukraine, Ministry of Economic Development and Trade of Ukraine, L’viv Polytechnic National University and others Ukrainian institutions has organized International Scientific Conference devoted to the Problems of Ukrainian Terminology since 1993. After the Conference, the herald of L’viv Polytechnic National University has been published pointing out the process of terminological development in Ukraine. TC STTS staff has gained considerable experience in providing conceptual basis and practical recommendations for Ukrainian scientific and technical terminology normalization. The work allowed launching a wide-scale lexicographical project known as terminological series **Slovo Svit (Word World)** in 2000. During those years twelve works have been published, namely ten terminological dictionaries of different fields of knowledge: biological engineering, installation and engineering

technologies, heat engineering and cock chemistry, architecture and building, informatics and programming, medicine etc.

Up to now three software dictionaries have been already compiled and published along with their printed versions:

- «Russian-Ukrainian dictionary on building and architecture»;
- «Russian-Ukrainian dictionary on engineering»;
- «Russian-Ukrainian coke-chemical dictionary” (<http://tc.terminology.lp.edu.ua>).

Ukrainian terminologists investigate the problems of term formation and development of terminological system. The questions of systematizing scientific and technical terminology, creating Ukrainian electronic terminological dictionaries for qualified translation, the problem of terminological heritage and culture of scientific language, the ways of term translation are considered in the works of such Ukrainian linguists as T. Kyjak, A. Djakov, V. Karaban, A. Kovalenko, L. Chernovatyj, O. Vakulenko, I. Kvitko, M. Mostovyj, L. Bilozerska and many others.

Nowadays there is a tendency towards multilingualism across the cultures justified by the necessity for direct and efficient communication, where national languages are used as communication tools for marketing products and sharing information. In this case, the concept-oriented approach has appeared in terminology management for investigating the ways to improve the quality of machine translation based on the conceptual integration to language engineering. For the last fifteen years, scientific knowledge has been constantly changing. Major efforts are being made to rationalize the diversification of languages by means of state sponsored linguistic planning projects. These projects should respect cultural identity, encourage international relations and systematize world terminology allowing national terminology become a part of a huge linguistic group.

European research projects (Translator’s Workbench, ESPRIT Programme) or the similar project in Canada (Translation Workstation), European Research Infrastructures, including e-Infrastructures, Vox Tran, LIND-Web, Gala Crisp show a clear tendency towards the systematic integration and the vital role of terminology in the process. Terminology for Europe (IATE), operated since 2004, is the terminology database for all EU institutions created with the aim to provide an internet-based service for sharing terminology between institutions. It contains publications, traineeships, a neologism database, a glossary, DocHound document search tool, articles, theses, papers and many others.

The European Association for Terminology is a “non-profit” professional organization for the terminology sector in Europe in particular designed to further multilingualism through terminology, to provide a European platform for promoting and improving terminological activities to cooperate actively with other relevant organizations, associations and institutions at all levels.

Terminologists have started recently the project Humanterm funded by the Universidad Europea de Madrid with the aim of creating a terminological multi-lingual glossary for translators working in the humanitarian field. More specifically, Humanterm concentrates on:

- compiling documents for term identification and extraction
- uploading these terms into a collaborative platform that allows for public access (<http://www.humantermuem.es/tiki-index.php>).

Thus, modern terminology is greatly affected by social changes such as the accelerated development of science and technology, creation of new means of communication, the necessity of standardized goods, products and services, the appearance of new markets for scientific, technical, cultural and commercial exchange. Examples of this exchange are the international linguistic projects and training terminologists and interpreters.

Computer technology is one of the most important forces behind changes in terminology. The massive information of data requires powerful and effective support. Terminologists now have at their disposal tools and resources that are better adapted to their needs and more effective. However, these latest databases require constant updating. Moreover, according to the world changes and new needs they must be accessible and multidimensional. This fact emerges new markets where terminology is in privilege.

Modern linguists conclude that in the 18th and 19th centuries, scientists were the leaders in terminology; in the 20th century engineers and technologists were involved; in the 21st century – translators and terminologists. Only in the 20th century, terminology has acquired a scientific base recognized as a socially important activity.

1.3. TERMINOLOGY AND OTHER BRANCHES OF LINGUISTICS, SCIENCE AND TECHNOLOGY

General terminology deals with **the problems of speech culture** as terminologists constantly conduct the selection of the most suitable forms and variants and make recommendations on forming the new terms. In this sense, terminology is parallel to **lexicology** and **lexicography**: it investigates the names of concepts and their meanings. However, exact definition of a term is more important in general for terminology. For example, the word “*mark*” means *a written symbol, assessment* in Pedagogy, *name of currency* in economics, *issue* in technology and etc.

If lexicology is the linguistic science that studies words and their meaning in general, terminology studies the words of special language, (terms) associated with particular fields of special knowledge. Neither lexicology nor terminology is directly concerned with any particular application. Lexicography, however, is the linguistic science that compiles dictionaries with the most common general-language words, but occasionally with special professional words (i.e. terms). Most

dictionaries also contain a number of special terms, often embedded within entries together with general language words. Terminography (or often misleadingly “terminology”), on the other hand, is concerned exclusively with compiling the words of Special Languages.

As terminologists research the origin of terms and different ways of terminological nomination, terminology is connected with **etymology**, which investigates the history of language. Thus, you can trace the origin of each term in terminological etymological dictionaries and explore its meaning and changing (Online Etymology Dictionary <https://www.etymonline.com>).

Terminology also deals with non-linguistic disciplines such as Mathematics, Information Technology, Psychology, and Sociology. For instance, mathematic means are widely applied for statistic conclusions, for identifying the frequency level of term usage in a definite terminology system. Terminology is created as a professional language so the connection of terminology with Sociolinguistics is obvious.

The basic interest in concepts is shared by terminology with logic. As opposed to semantics, which is interested in the name-meaning relationship, terminology studies the relationship between terms in the real world and the concepts that represent them. This fact connects terminology with logic. Logicians use a process of abstraction to generalize various objects existing in the real world to identify classes of objects. To accomplish this, logic allows eliminating irrelevant characteristics of the objects retaining only those features that are peculiar to the class.

Information Technology uses terminology to construct the concept field that subsequently provides access to the information about the documents. Different modern information technologies are used in terminology dictionaries and databases. Compiling thesauri is one of terminological activities because it focuses on the characteristics and structures of the content. Thesauri consist of the terms and their definitions at the same time. Computer Technology is the key for terminology because of the enormous possibilities: it offers to store information and order conceptual systems. Information technology use terminology to summarize professional fields and terminological system.

Finally, terminology is closely linked to special professional fields: it serves science, technology and professional communication. Specialists together with general and applied terminologists work on systematizing, standardizing terms, and concepts in each special field.

PRACTICAL ASSIGNMENTS

Task 1. Get ready to discuss the following questions.

1. Describe terminology as a linguistic science. Identify its aims and purposes.
2. Explain which two separate user groups of terminology exist, illustrate your answer with the needs and targets of these two groups.
3. Talk about the methods applied in terminological investigation.

4. Speak on the history of terminology. Name the first three terminological schools. Point out their representatives and agenda.

5. Comment on the origin and main periods in the development of terminology as a science.

6. Name outstanding scholars created terminology as a linguistic science.

7. Analyze the historical facts in the development of the Ukrainian terminology. Name three terminological centers existing in Ukraine. Find out information about their activity in the net.

8. Speak on the development of terminology in the last few years. Which problems are in the center of attention of modern linguists?

9. Enumerate European projects created to improve terminology. Explain their aims and objectives.

10. Expand on the relations between terminology and other branches of linguistics, science and technology:

a) terminology and culture of speech;

b) terminology and lexicology;

c) terminology and lexicography;

d) terminology and etymology;

e) terminology and non-linguistic disciplines;

f) terminology and information technology.

Task 2. Read unit 1 and complete the following sentences.

1. Terminology is an independent branch of linguistics _____

_____.

2. A general theory of terminology is based on _____

_____.

3. However, unlike literary language terminology deals mainly with _____

_____.

4. The methods applied in terminology _____

_____.

5. Ukrainian terminology was founded at that time when _____

_____.

6. Linguists, professionals from different fields of human activity created several terminological centers in three Polytechnic institutes _____

_____.

7. General terminology deals with the problems of speech culture as _____

_____.

Task 3. Read and analyze the following abstract from the book “Terminology: Theory, Methods, and Applications” by M. Cabré (1992). Discuss the point of view on terminology. Express your agreement or disagreement with the independent status of terminology. Translate the text into your mother tongue.

There is no substantial body of literature which could support the proclamation of terminology as a separate discipline and there is not likely to be. Everything of import that can be said about terminology is more appropriately said in the context of linguistics or information science or computational linguistics. We see terminology as a number of practices that have evolved around the creation of terms, their collection and explication and finally their presentation in various printed and electronic media. Practices however well-established, do not constitute a discipline, but there is no denying a long history of methodologies which themselves require theoretical underpinnings to justify their distinctive nature. Disciplines establish knowledge about things and as such are justified in their own right; methodologies are only means to an end, in the case of terminology, how to do things. Sager (1990)

Task 4. Read the following text, find the words whose meanings are determined on the context, the words whose meanings are not quite clear and understandable for the reader without specific background knowledge. Translate the text into your mother tongue.

The appliance must be installed by a qualified technician in accordance with the manufacturer’s instructions. Improper installation due to a failure to follow these instructions can cause injury or damage to persons, animals or property.

The manufacturer will not be held liable for such damages. The appliance’s electrical system is safe and secure only when it is correctly connected to an appropriately earthed system which complies with electrical safety regulations.

Make sure this basic safety requirement has been complied with. If in doubt, have it checked by a qualified technician.

The manufacturer will not be held liable for damages caused by the improper earthing of the appliance.

Before connecting the appliance, make sure the specifications on the rating plate correspond to those of your power supply.

Make sure that the current of the electrical system and the outlets are sufficient for the maximum rated output indicated on the rating plate. If in doubt, contact a qualified technician for assistance.

Task 5. Match the following terms to their English equivalents from the text above.

Кваліфікований спеціаліст, електричний побутовий пристрій, заземлення електричного пристрою, нести відповідальність, технічні характеристики на номінальній панелі електричного пристрою, інструкції виробника, максимальна потужність, сила струму в електричній системі та розетках, відповідати правилам безпеки, викликати травми та ушкодження, джерело електропостачання, бути правильно зв'язаним з відповідною системою заземлення.

Task 6. Fill in the missing words. Check your answers using the text from task 4.

1. The appliance must be installed by a qualified technician in accordance with the instructions. 2. Make sure this basic requirement has been complied with. 3. Improper due to a failure to follow these instructions can cause injury or damage to persons, animals or property. 4. The current of the electrical system and the are sufficient for the maximum rated output indicated on the rating plate. 5. The appliance's electrical system is safe and secure only when it is correctly connected to an appropriately system. 6. Specifications on the rating plate correspond to those of your supply.

Task 7. Translate the following word combinations into Ukrainian.

1.	strong man	3.	careful man
	strong forces		careful observation
	strong paper		careful work
	strong magnetic field	4.	fine weather
2.	solid particles		fine wire
	solid argument		fine edge
	solid book		fine sand

Task 8. Translate the following word combinations into Ukrainian. Then complete the following sentences.

- The development of science....
The development of new methods...
The development of new devices...
- The performance of a plane...
The performance of a task...
- The stroke of a piston...

- The stroke of a clock...
 4. The treatment of a problem...
 The treatment of a metal...
 The treatment of diseases...
 5. The handling of an instrument...
 The handling of dangerous fission products...

Task 9. Match the terms to their Ukrainian variants.

1. ship movement service	a. координаційна зона
2. coordination area	b. коефіцієнт захисту
3. frequency division multiplex terminal equipment	c. коефіцієнт підсилення антени
4. frequency modulated voice-frequency telegraph equipment	d. двигун
5. machine engine	e. наземна станція
6. communication station	f. апаратура тональної телеграфії з частотною модуляцією
7. earth station	g. кінцева апаратура частотного ущільнення
8. protection ratio	h. коефіцієнт прискорення
9. antenna gain	i. служба руху суден
10. acceleration factor	j. станція зв'язку

Task 10. Translate the text in written.

A NEW APPROACH TO THE PROBLEM OF “GOLD LIGHT”

One of the most interesting and important transformations of one form of energy into another is that of turning power into light. The first and still the most widely used method of generating light depends upon the phenomenon of incandescence.

Another method of considerable practical importance is that of causing radiation by the passage of an electric current through gas or vapour. The radiation produced under the influence of elementary particles plays an important role in the study of atomic problems. Various substances giving off radiations of specific spectral composition are used for all kinds of analyses in medicine, industry and agriculture. After the analysis of biological compounds with the help of radiation, one can detect various diseases and observe their development.

The third method of converting energy into light is called electroluminescence. When certain material is placed in an electric field under proper conditions,

they emit light directly under the influence of the electric field. This constitutes the phenomenon of electroluminescence.

Since this is a direct transformation of electrical energy into light, a new field of study is revealed offering great possibilities from both theoretical and practical points of view.

Task 11. Read the following word combinations and find them Ukrainian equivalents. Then make sentences with these words.

Emphasis added, remember that, the study has revealed, the investigation has shown, emphasis original, to reach a conclusion, to approach a problem, to address a source.

Task 12. Read and translate the following text about the role of terminology in modern world, then study Figure 1 and explain the links of terminology with other disciplines.

WHY TERMINOLOGY?

The communication of specialist knowledge and information, whether monolingual or multilingual, is thus irretrievably bound up with the creation and dissemination of terminological resources and with terminology management in the widest sense of the word. This process is not restricted to science and engineering, but is also vital to law, public administration, and health care, to quote just three examples. In addition, terminology plays a key role in the production and dissemination of documents, and in workflow. Terminology as an academic discipline offers concepts and methodologies for high-quality, effective knowledge representation and transfer. These methodologies can be used both by language specialists and by domain specialists after appropriate training. In addition, they form the basis for an increasing number of tools for the identification, extraction, ordering, transfer, storage and maintenance of terminological resources and other types of knowledge.

Terminological resources are also valuable in many other ways: as collections of names or other representations, as the object of standardization and harmonization activities, and as the input (or output) of a wide range of applications and disciplines, whether human or machine-based (see Figure 1). (www.computing.surrey.ac.uk/ai/pointer/report/section1.html)

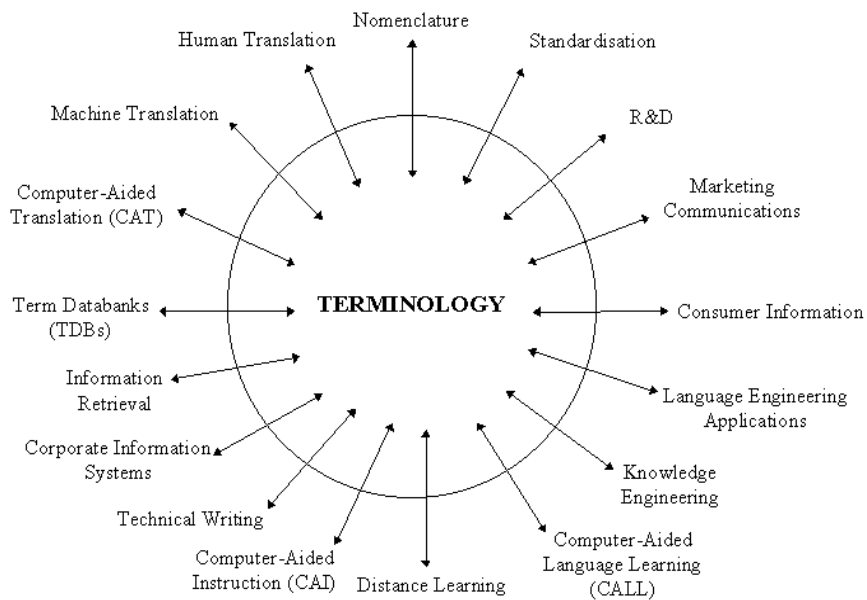


Figure 1. Terminology Applications and Products

Unit 2

TERMS AND THEIR CLASSIFICATION

- 2.1. Systematic nature of a term.
- 2.2. Classification of terms.
- 2.3. Types of term-combinations.

2.1. SYSTEMATIC NATURE OF A TERM

The object of terminology and the main terminology unit is a term. Term is a word of a special language used for professional or scientific communication to represent scientific or technical concepts. According to the definition “term (from Latin *Terminus*) is a special word or word combination of a definite professional field used in special conditions. Term is a word definition of a concept that comprises the system of concepts of a definite field of professional knowledge and defines the concept of a definite field of knowledge or human activity” (Короткий тлумачний словник української мови: 2010, 247).

Terminologists give different definitions of a term emphasizing various peculiarities. For example, A. Reformatskiy wrote that “any term could be a word but any word could not be a term that is why term had a limited sphere of usage” (А. Реформатский: 1968, 104). O. Akhmanova considered term as “a word or word combination of special (scientific, technical and etc.) language had been created, accepted or borrowed for exact expressing special concepts and defining special objects” (О. Ахманова: 1957, 95 – 96). V. Lejchyk suppose that “term is a lexical unit of a definite language for Special Purposes that defines general, concrete or abstract concept of a special field of knowledge or activity” (В. Лейчик: 1987, 21).

All definitions of a term emphasize the common feature that term is a word or word combination defining a concept (an object, a notion, a quality or process) specified for a definite field of science or technology. Using **terms** for defining concepts is more useful than words because term is more recognizable in its boundaries. Term is a linguistic sign of a concept and it is not independent from a concept. This linguistic sign can consist of a single word or a set of words - fixed phrase - used only for denoting a special concept. Most terminologists point out that term combination or phrase can include two, three and more elements and be called a term combination with multi elements.

The main function of a term is definitive. **Terms** and **term combinations** are used for logical representation of scientific concepts. If we compare such words as “soda”, “sugar”, “spirits”, “soap”, “fat”, “rubber”, “plastics”, “carbohydrates”, “fiber”, known to the general language user, and the words like “sodium carbonate”, “lactose”, “ethanol”, “2-chlor butadiene”, “polyurethane”, which are specific for theo-

retical chemistry it will be evident that the second group of words will be easily understood only by professionals.

The following requirements applied to a term were offered by famous Russian linguist D. Lotte: brevity, monosemy, motivation, simplicity, concordance with other terms of the same terminology system (Д. Лотте: 1961, 34). It means that an ideal term must be very simple, have only one semantic meaning in the boundaries of one terminology system, correlated with other terms and be recognizable.

Some linguists add that a term has to be semantically neutral or i.e. non-emotional. It means that a term must have only one semantic meaning without any connotations. In spite of its non-emotional nature, a term may have a figurative or emotionally coloured meaning only when it is used in a formal or colloquial speech. However in that case a term becomes a common word, cp.: the adjective *atomic* was used to describe the atomic structure of material until 1945, and it was as emotionally neutral as words like quantum or parallelogram. But since Hiroshima it has accepted a new meaning, so that the common phrase *this atomic age*, which is taken literally, now is used to denote the age of a great scientific progress or massive destruction (*atomic children, atomic century*).

As far as a term is an instrument of scientific intentions and a tool of producing activity, it is artificial in its nature because it deals with a definite terminology system and should be recognizable. In general, there are standards (norms) in term formation distinguish terms from the words of general language, cp.:

- *Рідкий - рідинний;*
- *Частий і частотний;*
- *Швидкий і швидкісний.*

The words mentioned above are similar in their forms but differ from each other in their semantic meanings. We can understand the meanings of these words from their structures because all terms are morphologically motivated.

A term has a limited sphere of usage because **special words** are created for professional communication. That is why we hardly understand the words “*zeugma*”, “*apocope*”, “*asyndeton*”, “*polysyndeton*” and others if we do not study philology.

Another requirement for a term distinguishing it from a non-term is that a term as a linguistic sign should have a definition (Л. Білозерська, 2010, 19). Cp.:

Barometer is device used to measure atmospheric pressure. Because atmospheric pressure changes with distance above or below sea level, a barometer can also be used to measure altitude. There are two main types of barometers: mercury and aneroid (<https://www.britannica.com/technology/barometer>).

In this sense a term can exist as a unit or element of a definite terminology system. **Terminology system** is an organized set of terms used in a definite sphere of human activity or knowledge. So, as we consider the term “*barometer*”, we identify its terminology system – *physics*.

How can we distinguish terms from non-terms or everyday words? The division lies between factual and linguistic. In spite of the large number of books and articles on terminology, the methodology of researching in this field of science has not been specified or properly worked out. To begin with, we must turn to extra-linguistic and extra terminological reality and try to visualize certain “fields” (as they are sometimes called).

Firstly the ideas of distinguishing terms from non-terms were introduced in the famous philological research by O. Akhmanova. The linguist investigated the nature of term and discussed the problem of its definition. Thus, O. Akhmanova considered several words such as *sugar*, *soap* and others used as common words and chemical terms. For instance, the word “*sugar*” as a non-term is simply a “*sweet substance obtained from various plants*”. To the common language user it is the sweet taste of sugar that is of primary importance, whereas a chemist thinks of it as “*a sweet carbohydrate*” of the class of organic elements with general formula. Two types of definitions of the word “*sugar*” clearly show two different parameters:

- in a general definition the parameter of taste is clearly stood,
- the second parameter is the source of origin.

When the definition of “*sugar*” in general vocabulary is deeply analyzed, it is seen that the definition is based on the parameters easily understood by a common language user. If we compare the common definition of the word “*sugar*” with the scientific definition their difference becomes completely obvious.

In case of a scientific definition the whole system is completely different. A chemist does not think of “*soap*” as an item used for washing and cleaning but as “*a salt of a higher fat acid*”. In chemistry the word “*soap*” denotes a class of organic compounds and is viewed in terms of the whole chemical system. Thus, it is defined as a water soluble compound made by a reaction (called saponification) between caustic soda (sodium hydroxide) or caustic potash (potassium hydroxide) with animal and/or vegetable fats (oils) (Read more: <http://www.businessdictionary.com/definition/soap.html>).

Comparing the definitions represented above, we can see a certain semantic connection between the chemical meanings of «*sugar*», «*soap*” and non-chemical ones. These two words are understood by a common language user and a chemist quite differently, as they are parts of two different lexical subsystems. For example, we can compare mathematic terms and symbols. In the case of mathematics (and this applies to the most other sciences) the situation is obviously different from the ideal situation we find in chemistry. When a child is at school, he regards all the words, used in the classroom, as terms. When he grows up, the attitude changes in most cases: the words become familiar.

What happens when the same lexical units are used both in everyday language and scientific terminology? For instance, what does the word “*number*” scientifically mean? “*Number*” may denote “positive integers” (in such phrases as

“theory of numbers”) or “the set of all complex numbers”. If we compare this definition with one given in general dictionary (“3, 13, 33 and 103 are numbers”) we will see the difference very clearly. The definitions show the place of the concept “number” in relation to other concepts of mathematics.

There are a lot of parameters used to indicate concept (shape, location, belonging to a definite class of objects, parameter of hardness/softness), but we can say that pillow is soft or we can say that somebody’s skin is soft. But could we call snow soft? - Only metaphorically, probably. Of course, we can lie on the snow and compare it with ice. But we cannot compare snow with other things which are actually soft. If we come to Kyiv and look at the snow lying on the ground in winter, we will be able to feel that it is not soft at all. It is a solid mass, well compressed and stay compressed sometimes for months till the end of winter. So, we can conclude that these definitions have no similarity with the original meanings. These are descriptions based on very arbitrary parameters, factors, and, what is the most important, all these parameters are completely social linguistically conditioned.

We can conclude that the division between terms and non-terms is the difference between common and scientific definitions or terms. The scientific definition is not social linguistically conditioned, i.e. it has nothing similar with sociolinguistics of a certain country. The definitions of “soap” or “snow” become scientific only, if they raise to extranational level getting the meaning of universal truth. So, terminology can only be understood in the links between special languages and scientific communication to signify concepts.

Non-terms in the language for the special purposes are usual phenomena which promote communication. These are words of a general language used in terminological texts and even combinations, for example, in biology texts we can find: “it corresponds to a certain class”/«відповідає окремому класу»; “cell breathes”/ «клітина дихає»; “the process of photosynthesis continues in the chloroplasts (chlorophyll grains)”/ «процес фотосинтезу триває у хлоропластах (хлорофілових зернах)». In mathematic texts we can read: “axiom starts without the proofs”/ «аксіома приймається без доказів»; “to take integral”/«отримати інтеграл», “to restore perpendicular”/ «відновити перпендикуляр»; “function grows”/ «функція зростає». In the texts on the metallurgical science: “to add fluxes into the furnace”/ «додавати флюси у ніч»; “blast furnace works”/ «домена ніч працює»; “furnace goes hotly (coldly)”/ «ніч нагрівають (остуджують)»; “the temperature of furnace gas grows/falls”/ «температура нічних газів зростає /падає».

The problem of distinguishing terms from non-terms (everyday words) and establishing the boundary between them is vital. The criterion of “**terminological definability**” is based on a systemic comparing scientific definitions with the explanatory ones found in “general” (non-terminological) dictionaries. Specialist is primarily interested in the function and a kind of material, a machine, mechanical appliances or structure, so in the definitions in any special dictionary the parameter of function, and also dimensions of given objects are regularly found.

Some scholars identify **terms-professionalisms**, the words or phrases used by a professional group of people. These words are also named “*professional slang*” or “*argo*”. Professional words define special notions, equipment, products, working processes, tools and etc. Professionalisms differ from terms because terms represent official scientific names of notions and concepts, whereas professional words are used in informal style and communication, in daily speech between colleagues at work. Professionalisms are non-official words, often emotionally coloured, cp. : *properties – props, final exams – finals* and others. Unlike terms professional words cannot be used in official documentation and oral speech, only in non-official, familiar situations.

All professional languages are also based on a nomenclature. **Nomenclature** is a word (from Latin *nomenclatura* means “a list of words, categories, concepts”) used in special terminology. For example, the definite system of nomenclature units is used to express different varieties of wind where the basic principle of classification is a wind direction (“*adverse wind*”, “*alternating wind(s)*”, “*backing wind*”, “*cross wind*”, “*on-shore wind*”, “*off-shore wind*”, “*east wind*”, “*north wind*”, etc.) or manner of blowing/motion (“*billow wind*”, “*choppy wind*”, “*fitful wind*”, “*gusty wind*”, etc.) and other peculiarities of wind characteristics (“*glacier wind*”, “*gravitational wind*”, “*planetary wind(s)*”, “*tidal wind*”, etc.) (**Terminology. Theory and method:** 1974, 37 – 35).

On the other hand nomenclature is a system of abstract notions and coding signs to express definite concepts and objects in the most convenient way. For instance, a “*bone*” is a hard tissue that constitutes the framework of skeleton of a body; a “*neuron*” is a unit of the nervous system; a “*muscle*” is a structure composed of muscular tissue. The applicability of this principle can be exemplified by the designation of muscle. There is a quite number of designations of muscles standing for a certain muscle type: “*abductor*” is a muscle that draws a part from the median line of the body, “*compressor*” is a muscle that has a compress function, “*dilator*” is a muscle which has a dilating function, “*flexor*” is a muscle that flexes a part, “*elevator*” is a muscle which raises a part, etc. Each of the mentioned terms represents a bright example of medical nomenclature.

But we should distinguish terms from items of nomenclature otherwise it will not be possible to compile terminological dictionaries of a reasonable size for many sciences especially the technical ones. The items of nomenclature are extensive; its number is increasing every day in all different fields of human knowledge and human life. The main difference between terminology and nomenclature should be considered in denoted objects. If the word “*nylon*” denotes a general concept, it is a term; if it is the name given as the label attached to the object, then word “*nylon*” becomes a completely abstract symbol or nomenclature item. Nomen (the item of nomenclature) is a relevant mark of the object which does not identify its lexical meaning (Л. Білозерська: 2010, 23).

Another difference is shown in the definitions of a term and nomenclature as concepts: nomenclature is a list/ number of notions otherwise a term is used in a definite special sphere of human activities. We can distinguish economic nomenclature (a list of goods and products and their classification), chemical nomenclature (a list of chemical elements and formulae), geographical nomenclature, medical nomenclature and etc.

All meanings of terms are fixed in special literature (dictionaries, glossaries and references) and included in the system of professional knowledge. However it does not mean that every term has a single definition in science. Different authors use the same term for different aims. Definitions of the most important terms are given in the end of a glossary or in a list of terms in many special texts. Such metatext (every text that is complementary accompanied with the basic text) as glossaries, references, bibliographic data is very convenient for a reader or researcher and is always worth of attention. In many cases indexes where terms are located in alphabetical order with pointing the number of page are used.

2.2. CLASSIFICATION OF TERMS

There are different classifications of terms in modern terminology. The first one classifies terms on the base of their graphic expression, such as:

- **symbolic** representations (terminological abbreviations, alphanumeric codes; graphical symbols, audiovisual symbols; or combinations of them – *USB, FTP, H₂O, H₂SO₄, @, %, mph, g, H-bomb*);
- **descriptive** representations (definitions, explanations as linguistic descriptions of concepts; pictures, charts, graphics as graphical/pictorial descriptions of concepts, combinations of them).

According to the sphere of their usage, terms can be divided into **general professional, special professional, intersectional professional terms** and **narrow specialized professional terms**. General professional terms are used in different fields of science and technology and can be understood easily without any additional knowledge. Special professional terms are used only in special professional fields. **Intersectional professional terms are used in several professional fields**, for instance, medical terms are often used in computer technology terminology, and economic terms are used in social science. The narrow specialized terms are used only in one professional subject field. For example, some linguistic terms, such as *paradigm, modality, assimilation, allomorph, morpheme*, are not always clear for a non-specialist unlike *word, language, bilingual, synonymy, antonymy* and others.

On the base of terminology system there are terms which belong to **scientific terminology or technological one**. V. Komisarov divided terms according to the sphere of their usage into scientific, technical and nomenclature, narrow scientific and narrow technical terms.

Upon their structure terms are divided into:

1. **Simple** consisting of one word: *circuit* – *електричний ланцюг*, *voltage* – *напруга*, *download* – *вносити інформацію у комп'ютер*.

2. **Compound** consisting of two words written together or with a hyphen: *fly-wheel* – *махове колесо*, *die-hard* – *консерватор*.

3. **Term-combinations** consisting of several elements: *circuit breaker* – *автоматичний перемикач*, *electric motor* – *електричний двигун*, *hydraulic unit* – *гідравлічний пристрій*.

4. **Shortenings or shortened terms** consisting of letters, signs and numbers: *UB40*, *Fed*.

According to their morphological structure terms can be divided into **simple** consisting of one element or word, and **derived** (*electric* – *electricity*). Derived terms can be formed with affixes (prefixes and suffixes), with conversion (*chlorine* – *to chlorine*; *to fall out* – *fallout*) or with reversion or back formation (*to cherry-pick* – *cherry-picker* – to pick out for oneself the best and most desirable items).

The most interesting terminological classes are shortened terms (shortenings, clipped terms, blendings or portmanteaus, abbreviations, initialisms and acronyms). Shortened terms are very popular in scientific and technical literature and in professional communication, because they save place and time and it becomes necessary to give more and more information in the shortest way. Some scholars claim that the use of abbreviation and initialisms has been popularized with the emergence of Short Message Systems (SMS). In order to fit messages into the 160-characters limit of SMS, the following initialisms appeared: *DL* – *down load завантажити*, *ASAP* – *as soon as possible якого можна швидше*, *WIP* – *work in progress робота у процесі виконання*, *NRN* – *no reply necessary відповідь не потрібна*, *P&L* – *profit and loss прибуток і збиток*. There are also linguistic causes of abbreviating words and word groups, such as the demand of rhythm, which is satisfied in English by monosyllabic words.

Shortening is not the main or unique term, but generally accepted and exceptional. The development of modern technology give the rise of new shortenings affecting the structure and vocabulary of the national language. All kinds of shortening are very productive in modern English. They are especially numerous in colloquial speech, both familiar and professional slang. They display great combining activity and form bases for further word-formation. Unlike conversion, shortening produces new terms belonging to the same part of speech. Verbs are met more often than nouns among shortened terms: *to rev* (*revolve*), *to tab* (*tabulate*), *to air*, *to vacuum* and others. Shortened adjectives are met very rarely, e.g., *comfy* (*comfortable*), *awk* (*awkward*), *impos* (*impossible*).

Clipping is a type of shortening when one part of term or term-combination is taken away, as a result the new terminological form appeared. In clipped or shortened terms the retained part is not changed phonetically, but spelling of the term is changed, e.g., *double* – *dub*, *navigation* – *navig*, *specific* – *spec*, *prefabricated* – *prefab*.

The generally accepted classification of shortened terms is based on the position of the clipped part. According to it, final, initial or middle clippings can be distinguished:

- **initial** clipping (or **apheresis**, in Greek “aphairesis” - taking away), e.g., phone (telephone), chute (parachute);
- **final** clipping (or **apocope**, in Greek “apokoptein” – cutting off), e.g., cap (captain), gym (gymnasium, gymnastics), lab (laboratory), ed (editor);
- **medial** clipping (or **syncope**, in Greek “syncope” - cutting up), e.g., fancy (fantasy).

Final and initial clipping may be combined and, as a result, shortened terms with the middle part of the prototype are retained, e.g., *flu* (*influenza*), *fridge* (*refrigerator*), *tec* (*detective*).

Some final clippings are the shortened words only in written speech while orally they correspond with full forms: *capt.* – *captain*, *col.* – *colonel*, *sgt* – *sergeant*, *BA* – *Bachelor of Arts*, *DM* – *Doctor of Medicine*, *Prof.* – *professor* and others.

If we consider shortened terms from the point of view their structure, they can be divided into two groups:

1) shortened terms correlated with words, e.g., *cabbie* (*cabman*), *nightie* (*nightdress*), *teeny* (*teenager*);

2) shortened terms correlated with term-combination or phrase, e.g., *finals* (*final examinations*), *perm* (*permanent wave*), *pub* (*public house*), *taxi* (*taximeter-cab*).

Another type of shortening is blending. **Blending** is a type of compounding shortened terms or parts of terms into one new word. This process of word formation is also called telescoping, because the terms seem to slide into one another like sections of a telescope, e.g., *brunch* (*breakfast + lunch*), *smog* (*smoke + fog*), *smaze* (*smoke + haze*), *slimnastics* (*slim + gymnastics*), *shoran* (*short-range navigation*). It seems practically to distinguish the following groups of blends:

a) combination of new word from the initial elements of one word and the final elements of another, e.g., *drunch* (*drink + lunch*), *pulsar* (*pulsating + star*);

b) combination of new word with notional word and the final element of another word, e.g., *manglish* (*man + English*), *radiotrician* (*radio + electrician*);

c) combination of the initial elements of one word with a notional word, e.g., *mobus* (*motors + bus*), *legislady* (*legislative lady*).

Such combinations are often formed with a humorous intention to represent various shades of emotive colouring which makes them the most popular words in different types of professional slang or argo: *dopelomat* (*dope + diplomat*), *Yanigan* (*Yankee + hooligan*), *nixonomics* (*Nixon + economics*). Although blends are not very numerous, they seem to be on the rise, especially in terminology and also in commercial advertising.

English portmanteaus are the type of blending when the beginning of one word is combined with the final part of another word. As this process is popular in modern English terms are also changed into portmanteaus, for instance the word

“*bit*” used in computing (as in “*megabit*”) is a portmanteau of “*binary*” and “*digit*” (its development is connected with the fact that “*bit*” already was an English word meaning a small amount of something). Below you can compare the most common portmanteau words in English that are more or less acceptable:

alphanumeric = *alphabetic* + *numeric*

advertorial = *advertisement* + *editorial*

brainiac = *brain* + *maniac*

breathalyzer = *breath* + *analyzer*

Brexit = *Britain* + *exit*

camcorder = *camera* + *recorder*

electrocute = *electro-* + *execute*

email = *electronic* + *mail*

emoticon = *emotion* + *icon*

endorphin = *endogenous* + *morphine*

forex = *foreign* + *exchange*

guesstimate = *guess* + *estimate*

infomercial = *information* + *commercial*

intercom = *international* + *communication*

maxcap = *maximum* + *capacity*

mechatronics = *mechanics* + *electronics*

metrosexual = *metropolitan* + *heterosexual*

moped = *motor* + *pedals* (borrowed from Swedish)

motel = *motor* + *hotel*

napalm = *naphthenic* + *palmitic*

navaid = *navigation* + *aid*

newscast = *news* + *broadcast*

Oxbridge = *Oxford* + *Cambridge* (used in the UK to refer collectively to the University of Oxford and the University of Cambridge)

paratrooper = *parachute* + *troop* + *-er*

phablet = *phone* + *tablet*

radstat = *radio* + *station*

shopaholic = *shop* + *-a-* + *alcoholic*

Spanglish = *Spanish* + *English*

televangelist = *television* + *evangelist*

transistor = *transconductance* or *transfer* + *resistor*

vlog = *video* + *blog* (itself a shortening of *web* + *log*)

vitamin = *vital* + *amine* (introduced by a Polish biochemist when it was thought that all vitamins contained an amino acid)

webinar = *web* + *seminar*

The following type of blending is less common than portmanteau words in English, formed with the initial parts of two words:

Amerind = *American* + *Indian* (referring to native Americans)

botox = botulism + toxin

cyborg = cybernetic + organism

modem = modulator + demodulator

sitcom = situation + comedy

Pay attention that the list of mentioned above blendings excludes brand and product names, which are often based on a portmanteau.

Abbreviation is a type of shortening when terms are formed from the initial letters of each part of terminological phrase. Abbreviations are pronounced as a series of letters, letter by letter, i.e. the alphabetical reading of the letters, and are called **initialisms**, e.g., *acdc* (electrical current), *VHF* (Very High Frequency), *S.O.S.* (Save Our Souls, a wireless code-signal of extreme distress, also figuratively, any despairing cry), *COBOL* (Common Business Oriented Language); *HGV* (heavy goods vehicle) and many others.

At present scholarships point out “the abbreviation explosion” which takes part in all world languages [Ткачева Л.: 1987, 13]. This process occurs not only with the multi component term combinations but also with the terms consisting of one word. Many homonymous forms of initial abbreviations (homonyms are words pronounced identically but different in lexical meanings) exist in the professional language that make difficulties at searching necessary meaning:

- *S.F.* — *Self feeding* – автоматична подача;
- *SF* - *signal frequency* - частота сигналу;
- *SF* - *square foot* – фут у квадраті.

The examples conceive the population of abbreviation in scientific and technical literature and in professional communication.

The phenomenon of terminological abbreviation attracts attention of many linguists. The works of M. Segal, R. Soll are of particular interest. Although the linguists analyze the questions of abbreviating words in different languages, its place in the language system, the ways of forming abbreviations, its structural and semantic peculiarities, and the conditions of their appearance in speech, the problems of their rendering and translating have not been solved completely yet.

Numerical symbols can substitute a full word in abbreviations, for example: *AC-3* – *Audio Compression-3*; *1LT* – *first lieutenant*; *B2B* – *Business to Business*; *B2C* – *Business to Customer*, *W3C* – *World Wide Web Consortium*.

A specifically English word pattern consisting with initial abbreviations in which the first element is a letter and the second is a full word is almost absent in Ukrainian called **hybrid abbreviation**: *A-bomb* – *atomic bomb*, *X-rays* - *roentgen rays*. There is no uniformity in semantic links between the elements of such abbreviation type: *Z-bar* is a metallic bar with a cross section shaped like the letter Z, while *Z-hour* is an abbreviation of zero – hour meaning the time for starting attack, U is standing for upper classes in such combinations as *U-pronunciation*, *U-language* and *U-boat*.

The international system of Units (SI) defines **measurement abbreviations**, a set of base units, from which other units were derived. The abbreviations, or more accurately “symbols” (using Roman letters, Greek letters in the case of Ohm, and micro and other characters in the case of degrees Celsius) are also clearly defined together with a set of abbreviated prefixes. For example, *ms* is a compound term formed from the two fundamental SI units *meter* and *second*, cp. *g, l, m, s, cd, ha* represent *gram, liter, meter, second, candela* and *hectare* respectively.

Likewise, the abbreviated prefixes denote powers of ten: *m mili* represent a thousandth, but *M mega* represents a millionth, *nanometer nm* represents 10 in the ninth degree.

Acronyms are abbreviations formed with the initial letters of term-combination or the first syllable of shortened terms or terminological phrase. They are written together and pronounced like one word:

NATO /neitou/ - The North Atlantic Treaty Organization,

UNO /ju:nou/ - United Nations Organization,

SOAP/soup/ - Simple Object Access Protocol for exchanging information among computers,

TEWT /tevt/ - tactical exercises without troops,

CLASS /kla:s/ - Computer-based Laboratory for Automated School System,

NOW /nau/ - National Organization for Women,

JATO /dgeito/ - Jet Assisted Take Off,

radar - radio detecting and ranging;

laser - light, amplification stimulated emission radio;

maser - microwave amplification stimulated emission radio;

ammo - ammunition;

memo - memorandum.

Christian names are often met in terminological acronyms: *Fred* - fast reading electric device; *Oscar* - orbiting satellite; *Eva* - electronic velocity analyzer.

Acronyms have become so popular that their number justified by the publication of special dictionaries (See: D. Spencer “Computer Acronym Handbook”, Crystal, David “Abbreviation”, the SEMATECH Acronym and Abbreviation List, The New IEEE Dictionary of Electrical and Electronics Terms, the Mc Graw-Hill Dictionar of Scientific and Technical Terms, <http://www.acronymfinder.com>).

A specific type of abbreviations, having no parallel in Ukrainian, is represented by Latin abbreviations, which are not pronounced as Latin words but substituted by their English equivalents, e.g., *a.m. (ante meridiem)* - *in the morning*; *p.m. (post meridiem)* - *in the afternoon*; *i.e. (id est)* - *that is*; *cp. (comparare)* - *compare*; *e.g. (exempli gratia)* - *for example*, *etc. (et cetera)* – and so on.

Shortenings, as units of written or spoken language, are often very difficult to understand and translate. Some shortenings or abbreviations could have several meanings in the various terminology fields or system (*BC- Before Christ, BC –*

Birth Certificate, BC – Binary Code, BC – Building Code, BC – Below Center, BC – Broadcast). In some cases translation of abbreviations, especially, acronyms is impossible without using special dictionaries. They are expressed in the way they are pronounced in the origin language: ANZUS (Australia, New Zealand, United States) is АНЗУС in Ukrainian, SALT (Strategic Arms Limitation Talks) is now ОСВ – договір про обмеження стратегічного озброєння not as it was later – СОЛТ.

That is why the first step in the process of translation is to define terminology system of the text and, after that, to find the proper translation in the dictionary. Sometimes abbreviations and their explanations could be given in the reference source to a text such as notes, glossaries, subject indexes and others.

2.3. TYPES OF TERM-COMBINATIONS

Term-combinations on the base of their structure can be divided into simple or elementary (two-word combinations) and compound or consisting of multiple elements (three and more word combinations).

In their turn, term-combinations can be:

a) the attributive combinations **in which the content of elements are expressed** without any grammatical links (affixes, prepositions), when all elements before the last words do an attributive function: *load governor - регулятор потужності; brake landing - посадка з гальмуванням;*

b) the combinations whose elements are grammatically formed (affixes, prepositions): *rate of exchange - валютний курс; braking with rocket - гальмування за допомогою ракетного двигуна.*

On the base of semantic links existing between elements term combinations can be:

1. Term-combinations the elements of which are **independent words** and can be used separately with their own meaning: *brake – гальмувати; gear – механізм, пристрій, шестерня, brake gear – пристрій для гальмування.* But the term-combinations of **this type get new meanings and have semantic completeness**, for example: *electric motor – електричний двигун; ionic rectifier – іонний очищувач.*

2. Term-combinations in which one of the elements is a technical term and the second one is from general vocabulary: *safety switch – аварійний вимикач (елек.); locked switch – закрита стрілка (заліз.); change-over switch - перемикач (елек.); change-tune switch - ручка налаштування (рад.); electric eye - фотоелемент; atmospheric disturbances – атмосферні опади (рад).*

The elements of such type of term-combinations could: two simple nouns, or an adjective and noun. This method of forming scientific and technical terms is more productive than the first one mentioned above where two elements are in-

dependent terms: *back coupling* – зворотній зв'язок; *variable capacitor* – змінний конденсатор.

One of the peculiarities of term-combinations of the second type is that the second element (a noun) can accept the meaning of the whole combination and appear as an independent term in the context: *current замість electric current; circuit замість electric circuit, searcher замість search engine*.

3. Term-combinations **both elements** of which are **words from general vocabulary** and only combination of them is a term: *line wire* – дрiт під напругою (елек.); *live steam* - свіжа пара (мен.).

This method of forming scientific and technical terms is unproductive. There are not close semantic links between the elements of the third type term combinations: they can be used as an ordinary combination of an adjective and noun in their direct meanings: *thermal stress* – термічний тиск (*thermal aquarium*); *progressive illumination* – послідовне освітлення (*progressive direction*).

Although there are different types of term combinations in English used in scientific and technical texts, the preference is given to attributive ones. The main element, as a rule, is in the end of an attributive term combination. The element which is before the main element is called attributive and includes the expression of a concept characterizing the main element.

Attributive term combinations play a great role in human mentality as they convey a definite characteristic of an object and classify it making specific among others. Attributive term-combinations have their own structural and semantic features consisting of semantic links between their elements, thus can be expressed by various constructions. Nouns are often used as a main element of attributive term combinations, whereas a dependable element can be expressed with an adjective, pronoun, numeral, participle and even another noun.

According to contemporary linguistic researches the attributive element is often expressed with adjectives: *remote control* – дистанційне керування; *direct current* - постійний струм. Attributive adjectives always express the comments to the objects in speech. Such comments can include state descriptions (*broken, sharp*), quantity descriptions (*one, three, lots*), dimensional descriptions (*large, tiny, square, parallel*), material descriptions (*metal, glass, rubber*), quality descriptions (*thick, liquid, water resistant*) and etc.

Besides the structure “adjective + noun” (AN), which is the most spread in technical literature and scientific researches, attributive function can do:

1. **Participle** (“Present Participle + noun»: *acting pressure* – робочий тиск; *alternating current* – перемінний струм, *accounting period* – звітний період; “Past Participle+noun»: *balanced amplifier* – сбалансований підсилювач; *estimated cost* – проектна (кошторисна) вартість, *related hypotheses* – відповідні гіпотези).

2. **Pronoun** (*his research, another element*);
3. **Numeral** (*the second time, twenty four hours experiment*);
4. **Noun** (substantive attributive constructions: *peak energy* – максимальна енергія; *labour capacity* – продуктивність праці);
5. **Adverb** (*room upstairs, man near the door*),
6. **Prepositive attributive constructions** (*lid of frame* – кришка корпусу; *body of reactor* - корпус реактора; *the case of law* - випадок судової практики; *the case for defendant* – факти на користь підсудного; *real density of catalyst* – реальна щільність каталізатора).

Attributive term combinations with their complex semantic and syntactic links are the specific phenomena of the English language, and their translation requires the knowledge of such links. The differences between the English and Ukrainian language systems are clear in translating term combinations: they as a rule have opposing meanings: *high hopes* - великі надії; *breakneck rapidity* – шалена швидкість.

In the end of the unit it can be concluded that terminology whose main unit is a term, is a highly sociolinguistic phenomenon. Scientists often create new material or immaterial objects and concepts in their researches that should be named with terms. Most of those terms are known only to professionals. However, due to the massive development of science and technology, terms gradually become the part of common languages.

Terms are often used to express concepts, notions and processes in different spheres of human activities. The main function of a term is to give definition. Terms comprise terminology systems, professional or subject fields.

Term is a very peculiar type of word used like a sign in many aspects of scientific and technical activities. It is artificial in its nature and recognizable. Term is motivated among the other terms in a definite terminology system or field.

An ideal term must be **monosemantic** in the boundaries of its usage. The meaning of a term remains stable until the new concept expressed with the same term appears. This view on the nature of a term is very idealistic. Nowadays we trace the process of terminological polysemy.

Being fully independent from the context, term can have **no contextual meaning**, it has only lexical one. When term is used in a definite scientific or technical field, it must be **non-emotional or semantically neutral** without any additional connotations. However term may have a figurative or emotionally coloured meaning only when it is used in literary or colloquial speech. But in that case term becomes an everyday word.

There are different classifications of terms in modern terminology: on the base of their graphic expression, semantic links and morphological forms. The most common classes of terms nowadays are shortened and term combinations.

PRACTICAL ASSIGNMENTS

Task 1. Get ready to discuss the following questions.

1. Give definitions to a term. Discuss the different definitions of a term given in Unit 2.
2. Describe the peculiarities of a term as a linguistic unit, exemplify your answer.
3. Name different types of terms and term combinations, give examples.
4. Identify the term “shortening” or “shortened term”, exemplify different types of shortenings in terminology.
5. Comment on the reasons for appearing shortened terms in terminology.
6. Name different types of terminological abbreviation, exemplify your answer. Point out the difference between a terminological abbreviation and acronym.
7. Read acronyms and blends used in Unit 2 and give them Ukrainian equivalents.
8. Explain how a term can be distinguished from a non-term (everyday word).
9. Compare terms with professionalisms and nomenclature words.
10. Prove the statement that terms can be used in fiction.
11. Define the kind of literature which systematizes terminology.
12. Name the main principles of translating attributive term-combinations.
13. Explain difficulties that appear in the process of translating attributive term-combinations with multiple elements. Give examples.
14. Speak on a systemic nature of a term.

Task 2. Find the meanings of abbreviations and shortened terms in the dictionary. Define the type of shortenings.

UB40	Fed.	ACT
C of I	Interpol	SW
FCC	a/c	Bn
qty	FCE	www
QC	c/s	FDA
MDT	acdc	L/A
AD	MBA	C/S
IQ	d.o.b.	HF
Doc	RR	hp
HGV	rpm	DMus

Task 3. Read the text, find terms and characterize them. Define types of terms, their structure, and terminology system they belong to.

Cold Bonding of Silicone Rubbers with Metal and Other Materials with the Help of Heat-Resistant, Cold Setting GUM KT-30

Gum KT-30 is 80% solution of silicaorganic resin in toluol. It is used for bonding of silicone rubbers with metal (steel, titanium, duraluminium, etc.), plastics, glass-cloth, glass and other materials.

10-15 minutes before bonding the surface of the rubber is cleaned with gasoline. The surface of the metal is also cleaned with the help of metal sand or emery paper. This operation is followed by deoiling by means of gasoline. The prepared surface of the metal is covered by a thin layer of gum and then it is dried during 10-15 minutes. Subsequently both surfaces are connected and put on pressure with the help of a weight.

Optimum bonding strength is achieved after keeping the bonded articles under pressure within 48-60 hours.

The gum KT-30 provides reliable bonding within temperature range between - 60°C and 300°C. It stands long ageing under temperature of 200-300°C and it is moisture resistant.

Task 4. Find the answers to the following questions in the text above:

- a) What is the quality of the gum?
- b) What specifications has the gum got?
- c) What is the gum used for?

Task 5. Match the following terms to their English equivalents from Task 3.

Оптимальна міцність склеювання, розчин кремнієво органічної смоли у толуолі, очистити поверхню бензином, холодне склеювання силіконових резин, нанести тонкий шар клею, витримувати тривале старіння, наждачний папір, бути стійким до впливу вологи, поверхня гуми, теплостійкий клей холодного твердіння.

Task 6. Fill in the missing words. Check your answers using the text from task 3.

Gum KT-30 is 80% of silicaorganic resin in toluol. It is used for of silicone rubbers with metal (steel, titanium, duraluminium, etc.), plastics, glass-cloth, glass and other materials.

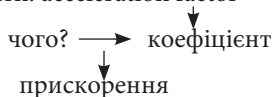
10-15 minutes before bonding the of the rubber is cleaned with gasoline. The surface of the is also cleaned with the help of metal sand or This operation is followed by by means of gasoline. The prepared surface of the metal by a thin layer of gum and then it is dried during 10-15 minutes. Subsequently both surfaces are connected and put onwith the help of a weight.

..... bonding strength is achieved after keeping the bonded articles under pressure within 48-60 hours.

The gum KT-30 provides reliable bonding within range between - 60°C and 300°C. It stands long ageing under temperature of 200-300°C and it is moisture

Task 7. Translate the terms (noun + noun) into Ukrainian.

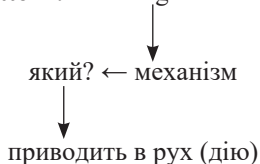
Pattern: acceleration factor



- | | |
|-----------------------|--------------------|
| 1. application period | 5. range finder |
| 2. cabin design | 6. fabric industry |
| 3. wind tunnel | 7. water space |
| 4. peak energy | 8. load capacity |

Task 8. Translate the terms (Participle I + noun) into your mother tongue.

Pattern: actuating mechanism



- | | |
|-----------------------|------------------------|
| 1. actuating pressure | 5. reacting region |
| 2. actuating cylinder | 6. detecting element |
| 3. translating system | 7. halving circuit |
| 4. adding element | 8. alternating current |

Task 9. Read and analyze the following texts. Find terms and identify their types. Translate the texts into your mother tongue.

Three Vitamins That Can Hurt You

Americans are spending more than \$25 billion a year on vitamins and herbal supplements, because for decades, vitamins have been promoted to bring plenty of benefits for our health. Now, people have to understand that vitamins can do more harm than good and flushing money down the toilet for supplements that not only are ineffective but also provoke serious diseases should stop. Here are the three vitamins that can hurt you in ways you never think it's possible.

Vitamin C

This vitamin is good in preventing colds and fighting infections. It's true for vitamin C coming from foods and false for vitamin C supplements. There's not one single American in this country that hasn't in his medical cabinet a vitamin C supplement whether is a bottle of pills or a package of chewables because the doctor prescribed it. Well, doctors can be wrong sometimes as there's no scientific evidence that that vitamin C pills can prevent a cold. Besides, if you take more than your body can use, you will eliminate the excess but you could also experience nausea, diarrhea or stomach pains and you could even develop kidney stones if you take more than 500 milligrams per day.

Vitamin E

Vitamin E plays an important role in immune function and cell communication and if it was once believed to cure cancer, nowadays MDs all over the world begin to militate against its use. A study revealed that men who took vitamin E supplements were 17 percent more likely to develop prostate cancer and that this vitamin brings important benefits to our health only when it comes from natural sources, such as wheat germ, sunflower seeds, and broccoli. Taken regularly or in high doses, vitamin E loses all benefits and can hurt you.

Vitamin A

Though some people need to take vitamin A supplements for conditions that hinder fat absorption, such as celiac disease, Crohn's disease, and pancreatic disorders, vitamin A deficiency is uncommon amongst Americans. Yet, vitamin A overdose is extremely common among US citizens. That's because most take such supplements when they actually don't need it and develop serious diseases such as liver problems, while newborns have birth defects and disorders of the central nervous system. Of course, vitamin A is very important for reproduction, bone health, and immune function as well as for preventing cancer, but only when obtained with moderation through healthy diet. In supplement form, this vitamin does exactly the opposite.

Task 10. Make abbreviations from the following term combinations. Translate them into your mother tongue.

Geographic information systems, acquired immune deficiency syndrome, British Broadcasting Corporation, frequently asked questions, individual retirement account, compact disc read only memory, international union of pure and applied chemistry, personal identification number, universal product code, individual physical proficiency test, human immunodeficiency virus, automated teller machine, compact disc, the International Bureau of Weights and Measures.

Task 11. Complete the following sentences.

1. Term is a word of special language _____
_____.
2. Another requirement for a term distinguishing it from a non-term _____
_____.
3. An ideal term must be _____
_____.
4. All meanings of terms are fixed in _____
_____.
5. When term is used in a definite scientific or technical field, it must be _____
_____.

6. Term-combinations on the base of their structure can be divided into

7. Nomenclature is a system _____.

8. The most interesting terminological classes are shortened terms

9. _____ are abbreviations formed with the initial letters of a term-combination or the first syllable of shortened terms or a terminological phrase written together and pronounced like one word.

10. Attributive term-combinations have _____.

Unit 3

THE WAYS OF TRANSLATING TERMS AND TERM COMBINATIONS

- 3.1. Terminological key.
- 3.2. The ways of translating terms.
- 3.3. Translation of proper names in terminology.
- 3.4. Translation of international terms.
- 3.5. The main principles of translating term combinations consisting of multiple elements.

3.1. TERMINOLOGICAL KEY

There are many controversial definitions of term translation and interpretation suggested by the representatives of various terminological schools and modern linguists. The wide range of term translation definitions includes formal, structural, linguistic, interlingual and even cross cultural ones. All scholars agree that translating terms is a very scrupulous and creative work when conveying terms as scientific signs depends on one person. It is difficult even to imagine if a translator interprets these scientific signs in a wrong way. Nevertheless, unpredictable cases sometimes may occur.

Translation of terms requires a deep knowledge of that sphere of human activity, which deals with the particular terminology system, experience in both source and target languages, a perception of not only a linguistic image but also a concept or notion of that field of science and technology to which the term belongs. To convey adequately a foreign term a translator should be professional, understand the content of a term and sphere of its usage, and be in touch with the same term in the mother tongue.

Modern linguists claim that for an adequate term translation the knowledge of a **terminological key** is needed. In terminology the concept of terminological key is thought as a code or a coded word, or even a list of words and elements and forming affixes, roots used in a definite terminology system. There is a terminological key in every terminology system.

The concept of terminological key was developed since 1938 after the Esperanto language, an artificial language that was the simplest and easiest to remember. The structure of Esperanto consists of 16 rules, 11 grammar endings, 8 prefixes and 33 suffixes. The number of roots allows forming new words using only well-known prefixes, suffixes and endings.

Thus, to realize the content of a term and create simultaneously its equivalent in the target language it is necessary to be acquainted with a certain terminology system and its terminological key. It was known that terminological keys were

the objects of the long battles and even wars. Nowadays, using modern communication and technology, computer databases, the world network and the Internet has made terminological keys accessible.

General semantic rules of functioning and developing languages have caused the appearance of terminological polysemy. It means that terms can be polysemantic with different denotative meaning and break the law of sign. Consequently, the existence of polysemantic terms can cause some difficulties at the process of term translation. For example, a word *line* can be translated as *лінія*, but when it is connected to other terms, it will denote many concepts in the computing engineering:

line of code – кількість рядків програми;

line segment – частина ряду;

line load – лінійне завантаження, завантаження ряду;

line-printer – лінійний принтер, який друкує відразу рядок, а не символ.

To avoid different mistakes and misconceptions at the process of term translation it is needed to know the **general content** of the fragment or paragraph. According to the context and terminology system it is necessary to select appropriate meanings of a term, cp. the term *valve* can be translated as *клапан* in automobile discourse, as *електронна лампа* in computer technology, as *ступінь* in mathematical discourse.

The situation is more serious at the process of translating shortened terms, because many English terms have different lexical meanings and identical graphical forms, for instance, *a* can be translated as *acceleration (physics)* прискорення, *accommodation (business communication)* житло, *aircraft (aerodyn.)* літальний транспортний засіб, *ampere (elect.)* ампер, *area (geom.)* площа and etc.

Moreover, the shortened terms consisting of two, three, four elements of the same terminology system can also have several lexical meanings and cause some difficulties at the process of a term translation:

AD – *attention device* сигналізація, *avalanche diode* лавинний діод, *average deviation* середнє відхилення,

CAT – *computer aided testing* комп'ютерна перевірка, *computer aided typesetting*, комп'ютерний набір тексту, *computer automated translation* система автоматизованого перекладу. **To understand the meaning of such polysemantic terms** it is needed to clearly realize the context. Hence, the process of translating terms can be compared with decoding. Firstly, a translator should analyze the context where terms used and identify a terminology system. Then it is necessary to find terms and translate them according to the context selecting appropriate meaning. A. Kovalenko divides the process of term translation into two stages:

1. Identifying the meaning of a term on the context.

2. Translating the term into TL (A. Коваленко: 2002, 255).

To understand the procedure, let us consider the example: the term “*design*” in machine construction is translated as “*конструювання*”, but in the text about

engineering “*проектування*”, in the fashion magazine – “*моделювання*”, in fiction – “*задум*”.

Working on the term translation it is needed to understand semantic links between terms in the text and chose appropriate meanings according to the context. Thus, the term “*unit*” has numerous translation variants depending on the terminology system and context such as *одиниця* (вимірювання); *секція* (меблів і т.п.); *підрозділ* (*military*); the term “*reduction*” can be translated like «зниження» or «перетворення», «приведення» (*math.*), or like «відновлення» (*chemic.*) or «обтиснення» (*metallurgy*), or «знижка» (*econom.*), «скорочення» (*econom.*), «редукція» (*ling.*). Besides polysemantic terms, which have different meanings and not only in different spheres of human activity, science and technology, but also in one and the same sphere, are often met: *tile* - черепиця, плитка, кахель, цеглина; *schedule* - каталог, розклад, графік, програма, режим; *switch* - вимикач, перемикач, комутатор; *wot* – корінь, вершина (зварювального шва), хвіст лопати. Thus, a term can be compared with the name of a novel hero. In order to become acquainted with a personage and understand the character offered by the author, it is necessary to read a novel to the end. In order to master a term it is necessary to read all text containing it.

3.2. THE MAIN WAYS OF TRANSLATING TERMS

The process of translating terms and term combinations is not a simple task requiring that translator should do the following:

- to define terms in a text;
- to identify the lexical meaning of terms according to the context and stylistic functions of terms in the SL text;
- to select the appropriate meaning of terms according to the context;
- to translate terms saving their stylistic function in the TL.

There are the rules of term translation and the requirements for translated terms in standardized terminology:

1. Term of SL should be translated with a correlated term of TL.
2. The choice of the way of term translation and term combination depends on the context.
3. In case when a term of SL cannot be translated with a correlated term of TL, this term should be borrowed, or a new term in TL should be created saving all its terminological characteristics and corresponding with other terms in the terminology system. The term of SL can be also replaced with another one existing in TL, with a synonymous term or with a word used for this notion in TL. If the mentioned above ways are not suitable a term of SL can be borrowed in TL without any translation at all but with a full explanation given in the references, appendices or notes to the text.

There are fixed patterns and structures that are different in SL and TL. A translator must be aware of them in order to achieve uniformity and proper comprehensibility of scientific and technical translation. For example, logical sentence order is achieved not only by using appropriate linking elements but also by appropriate **theme – rheme distribution** within sentences.

At the process of translating scientific and technical texts it is very important to find the rheme in SL text and to place it to appropriate position in the ending part of a sentence in the Ukrainian translation. This rhematic position is very typical for the Ukrainian language even if the rheme is possible to be pointed out, or by means of specific syntactic constructions.

When speaking about rhematic position in English, it is necessary to mention that English has a fixed word order within a sentence, and thus to achieve rhematic position, it has to use syntactical, lexical or morphological means, in contrast to Ukrainian, where it can be easily achieved by the simple change in a word order. There are many ways in English how to indicate rheme. A common possibility is to place a rheme behind predicate expressed by verbs *to be, to seem, to appear, to stand, to live, to lie, and to hang*. In addition, this enables a combination with there.

The logical word order in the sentence is one of the key features of scientific and technical translation. If the principle of logical word order in the sentence is not be respected by a translator, and the English word order is preserved in the Ukrainian translation, the recipient would not comply with the object of communication intended in the source text. E.g.:

These phenomena will not be considered in the present book. – У цій книзі не буде описано це явище.

The principle of logical word order is equally applicable for ordering clauses within a complex sentence. Formal structures and complex sentences are predominant in scientific and technical style. *That* and *which* are not omitted in English subordinate nominal clauses. One of the most frequent expressive means that indicate relations between clauses are conditional relative conjunctions (*if, unless*), other linking elements *are providing, provided, on condition*.

Another frequent prepositions are those of temporal nature (*before, as, while, as soon as, when, until, once, after*), of consequence (*so that, with the result that, as a result of, in consequence of, consequently, therefore, hence*) and those of cause (*because, since, as, because of, an account of, owing to, due to*). Translators often wrongly preserve the original placement of adverbial modifier in English source text. Therefore, a translator rendering into Ukrainian needs to be aware of this and to change the order of clauses within a sentence.

Every translator must be aware of the fact that the primary objective in scientific and technical style is its functionality (pragmatic aspect). It does not mean that a translator is supposed to translate the texts literally. However, precise and comprehensible rendering relevant information is fundamental.

Therefore, translator can break the sentence units and rebuild them, if it is for achieving clarity. The form is secondary in translating scientific and technical texts. What is primary is the content; sometimes being very complex and difficult for understanding.

Condensation is a characteristic feature of scientific and technical style. When translating into Ukrainian, it is necessary to enlarge and specify these condensed structures adding clauses containing finite verb forms. The Ukrainian language in scientific and administrative style is also more condensed comparing with other styles. When we compare the Ukrainian language of scientific style with the Ukrainian language of manuals, reports and guides, we can find out that the Ukrainian language in scientific and technical style is more nominal. The consistency of expressing is reflected also in using of noun groups – semantic condensers.

In English, the semantic relations between particular substantial pre-modifiers are not explicitly indicated, and yet this relation can be immensely various, e.g.

Steam consumption = the consumption of steam

Metal tubes = the tubes made of metal

Friction losses = losses caused by friction

As Ukrainian examples show, it is obvious how the Ukrainian language is able to use variety of linguistic means:

Steam consumption = споживання пари (the use of genitive)

Metal tubes = металеві труби (adjective implies the material used for the pipes)

Friction losses = втрати на тертя (the use of preposition).

The structure of headlines in English scientific style differs from the structure of the headlines in Ukrainian. English headlines are typical for repeated occurrence of the same lexical unit (mainly the scientific and administrative styles tend to repeat pronouns). With respect to the Ukrainian language, traditional forms with empty words are still preferred.

We can experience two main difficulties when searching for optimal equivalences of such English terms in scientific and technical style. One of them is the different semantic condensation between SL and TL.

Semantic condensation is considerably more frequent in English, as it has already been mentioned as one of the main features of scientific and technical style. It enables to create such nominal structures in English as cannot be formed in Ukrainian because it is a synthetic flexional language. The key to decode the noun groups is hierarchical. However, there can be hidden various relationships in the underlying structure of compound terms. When translating into Ukrainian, in most cases a translator must convert the pre-modifying nouns into explicative and descriptive equivalents.

The second problem is that a translator might be faced with the problem of equivalency of metaphors at the process of translation. The occurrence of these

metaphors in English scientific style shows a rising tendency. The Ukrainian language is not accessible and open to metaphors in this style. Standardized terminology system in exact sciences (chemistry, medicine, and some technical disciplines), it is a possible way to achieve equivalence.

On the other hand, the humanity studies differ in this aspect. They reflect immense diversity of cultural traditions and social structures. Therefore, equivalence cannot be achieved easily. It is crucial to analyze the scientific texts content first and then search for equivalents complying with the standard of TL. In many cases, translator has to choose an alternative solution when standard methods of translation cannot be applied, for example, periphrastic form. It is necessary to be aware of the fact that the description is very explicit. Other types of shift can be observed also in terms of concrete/abstract or specific/general expressions.

When we approach to a technical text, it is evident that it is free from emotive language, connotations, sound effects and original metaphors. We read a technical text to understand it, underline terms and then to assess its nature (proportion of persuasion to information), its degree of formality, its intention (connection with its topic), the possible cultural and professional differences between our readership and the original one. Next, we should identify the framework of a recognized style of the translation, the format of a technical report adopted by our client, or if we translate an article or a paper, the style of the relevant periodical or journal issues.

To ensure a valuable scientific and technical translation, it is necessary to present the following requests:

1. The substantial acquaintance to a subject, which is treated in the original text.
2. Sufficient knowledge of the language, its lexical and grammatical features comparing with the native language.
3. Knowledge of the basic theory of translation, and specifics of technical translation.
4. Understanding the character of scientific and technical functional style both of the Source and of Target Languages.
5. Acquaintance with accepted conventional signs, abbreviations (shortenings), measure and weight systems of the Source and of Target Languages.
6. Good knowledge of a native language and the right use of its nomenclature.

The main way of translating term is the translation by means of **lexical equivalents**. An equivalent is meant as a linguistic variant of a certain word written in a dictionary, which does not depend on a context and has an exact identity with the meaning of a word from SL. In different languages equivalents could be special terms, proper and geographical names, names of historical events and notions, ethnographic and other realities, having a unique variant of translation in TL.

Searching for a term-equivalent should be started after the analysis of the peculiarities of a new foreign concept, and, if the name of a foreign term is based on

its main characteristic, this characteristic must be taken as the basis at the process of a term translation.

Equivalent term combinations are met more often than terms-equivalents. Such term-combinations as *the House of Commons* is always translated *Палата громад*, *common fraction* – простий дріб, *common law* – громадське право, but the word *common* is not translated by means of equivalent, ср.:

Common (*adj*) - 1) загальний, спільний; 2) громадський общинний; публічний; 3) поширений, загальновідомий, загальноприйнятий; 4) звичайний; простий, елементарний; 5) (мат.) простий; 6) грубий, вульгарний, банальний; 7) (грам.) загальний (Англо-український словник під ред. М. Баллої, 1996).

Terms-equivalents are mainly translated with idioms and phraseology term-combinations. The following equivalents as *люди доброї волі*, *переговори на найвищому рівні*, *переговори на близькій відстані* are not perfect but a translator has to adapt to the common language standards.

Terms, which have equivalents in TL, play an important role in the process of scientific and technical translation. They occupy a strong position in a text, opening the meanings of other words. They are able to determine the character of the whole text. Therefore, a translator should find lexical equivalents in TL 1 and extend the knowledge of terms-equivalents. However searching for appropriate equivalents in TL can cause difficulties at the process of a term translation because a great number of terms are not monosemantic having various lexical meanings depending on a context.

The analysis of bilingual dictionaries shows that a term has at least one definite lexical meaning written in a dictionary. For example, such terms as “*economics*”, “*chemistry*”, “*lexicology*”, “*atom*”, “*money*”, “*market*”, and “*biology*” have equivalents in the Ukrainian language. Nevertheless, sometimes to translate a term the specific dictionaries are used, ср. the term *opposition* is translated as *опозиція* only when it is used in a political context. However, this term may have different translation variants according to a context: *опір*, *протидія*, *заперечення*, *протесту* etc. To translate term-equivalents it is needed to realize whether a term has one or more lexical meanings. For instance, V. Karaban divides term-equivalents into those which have only one equivalent in TL, those which have two and more translation variants in TL (В. Карабан: 2002, 279). Therefore, to translate a multi equivalent term it is needed to identify a terminology system, which the term belongs to, and the context, then choose the appropriate meaning of a polysemantic term.

Working on a term translation it is needed to consider the interaction of terms in a context, then, translate terminology words and choose appropriate meanings according to a context. Thus, to translate a noun with several lexical meanings, it is necessary to take into account the meaning of a context, ср. *the advance of science* - прогрес науки; *the advance of army* – розвиток армії.

To translate an adjective into Ukrainian, it is necessary to consider the meaning of the noun, which this adjective belongs to: *close contact* – щільний контакт; *close battle* – ближній бій; *close air* – важке повітря. It is evident from the examples, that the meaning of an adjective depends on the meaning of a noun: *contact* - контакт, *battle* – бій.

To choose the meaning of a verb it is necessary to define the kind of a verb (transitive or intransitive). To translate terms, which are transitive verbs (the verbs which have a direct object) the meaning of the direct object should be considered, ср. *to launch a rocket* - запустити ракету; *to launch a ship* - спустити корабель на воду; *to launch an attack* – почати наступ; *to launch a blow* – нанести удар. These examples show that translation of the verb «*to launch*» is fully defined by the meaning of the noun, which is a direct object: “*rocket*” - ракета, “*ship*”- корабель, “*attack*” - наступ, “*blow*” – удар.

To translate the sentence where unknown words are a verb-predicate and a direct object, it is necessary, at first, to find the meaning of the direct object in the dictionary, and then to choose the meaning of the verb-predicate, for example: “*electric current accomplishes the task more effectively*” - електричний струм більши ефективно виконує завдання. If an unknown word is «*the task*», we define the meaning of the word «*task*» and then, on its basis, translate the word «*accomplishes*».

The meaning of a transitive verb is determined not only with the meaning of a direct object, but also with the meaning of a subject. For example, the verb «*to hold*» has such basic meanings as «*тримати, утримувати, володіти, вмішувати, мати в собі*»:

This room holds 20 men. – Кімната вміщує 20 чоловік.

In this sentence, the choice of meaning «*вмішувати*» is determined by both meanings of the direct object (20 people) and the subject (this room).

To choose the meaning of an intransitive verb it is necessary to pay attention to the meaning of a subject, ср. *a radio wave travels* – радіохвиля поширюється; *an airplane travels* – літак летить; *a man travels* – чоловік мандрує. As the examples show, the choice of the verb «*to travel*» is fully determined with the meaning of the subject.

Translation of an intransitive verb can also be defined with prepositional objects. In this case it is necessary to pay attention to the preposition, which the verb is used. A great number of intransitive verbs have different meanings depending on the meaning of a preposition. For example, the verb «*to look*» means “*дивитись*” with preposition «*at*», «*шукати*» with preposition «*for*», “*переглядати*” with preposition «*through*». The use of verbs with prepositions is explained in the dictionaries as a rule.

To choose the meaning of a verb-predicate in the passive voice, it is necessary to take into account semantic links between a verb-predicate and a noun, ср. *rockets are launched* – ракети запускаються; судна спускаються на воду.

Obviously, the different translation of the verb-predicate is determined with the meaning of the subject.

To translate the gerund with nominal or verbal functions in the sentence, it is necessary to identify the nature of *-ing form*, which may influence the way of its translation:

They insisted on their taking part in this experiment. –

Вони наполягали на тому, щоб приймати участь в експерименті.

Firstly, the meaning of the gerund can be identified with adverbs:

During the test we needed recording temperature immediately. –

У ході експерименту було потрібно у той час записувати температурні дані.

Secondly, the meaning of the gerund can be identified with the meaning of the direct object:

In this figure, the diagram of recording temperature is shown. –

Діаграма фіксування температури зображена на малюнку.

Translation of the passive gerund is completely identified with its function in the sentence:

The melting and solidifying being included in many metal working processes are also recorded. –

Металообробні процеси такі, як плавлення та отвердіння теж реєструються.

One of the productive ways of translating scientific and technical vocabulary is **selecting proper analogue in Ukrainian**. For example, *the most favoured nation treatment* – режим найбільшого **сприяння** нації. The selection of a meaning from different synonyms depends on a context.

When the term of SL is absent in terminology system of TL the lexical transformations are used. The most common lexical transformation applied in scientific and technical translation is transcoding (Л. Білозерська: 2010, 44). **Transcoding (transcription/ transliteration):** *avatar* - аватар, *briefing* – брифінг; *marker* – маркер, *sharding* - шардінг. A translator borrows the sound form (in transcription) or graphic form (in transliteration) of a term from SL into TL. The method of **transliteration** lies in rendering English terms with Ukrainian letters, e.g., *nylon* – firstly нейлон (фірмова назва), now – поліамідне синтетичне волокно, *spam* – спам (небажана інформація, що отримується по електронній пошті), *blog* – онлайнвий журнал або щоденник. The other way of term translation widely used nowadays is a practical **transcription** lying in rendering a phonetic form of a term. Differences between the systems of the Ukrainian and English languages are always conditional: *web camera* – веб камера, *spamdexing* – спамдексінг (пристрій для запобігання спаму).

However, at the translation by means of **transliteration** it is necessary to remember about the false friends of translator or misleading words, which, regardless of their accordance in the English and Ukrainian languages, have different

lexical meanings. These words in linguistic dictionary are also called **false internationalisms**, which do not have similar lexical meanings in the SL and TL. Professor V. Karaban claims that transliteration of these words will cause semantic calques, destroying the norms of lexical system, stylistic inadequacy of Ukrainian accordance, and, in the end, leads to rough distortions of lexical meanings of a word which is translated (B. Карабан: 2002, 410).

L. Bilozerska claims that another lexical transformation used in a term translation is calque (Л. Білозерська: 2010, 44). **Calque or loan translation** is meant the way of creating term-equivalent in TL, or the way of rendering the structure of a term from SL into TL when the parts of a foreign term (morphemes) are interpreted with appropriate elements of TL. Calque is a kind of borrowing which is assimilated in TL, ср.: *analogue display* – *аналоговий дисплей*; *rotary engine* – *ротаційна машина*; *hot swappable device* – *прилад гарячої заміни*; *digital certificate* – *цифровий сертифікат*. Some linguists distinguish literal borrowings (буквальні запозичення) which are understood as a case, when a word is borrowed with phonetic changes, based on the distinctions of the phonetic systems of two languages. It is the simplest and uncreative type of borrowing. From such borrowing it is necessary to distinguish cases, when terms are built with the help of foreign elements, (usually Latin and Greek), where they are not independent.

The most difficult for a translator is a non-equivalent terminological vocabulary, i.e. terms or term combinations, defining the objects, phenomena, processes, which are unique having none equivalents in TL is the most difficult for a translator. In this case, scholars offer lexical semantic transformations such as descriptive translation, concretization, generalization, modulation or a concept development where the context plays the main role to avoid difficulties, to give an orientation and direction in interpreting work.

To translate non-equivalent terminological units a translator may use **descriptive translation** supporting an English term with exact and clear explanation, e.g.: *Throughput is used to measure the performance of hard drives as well as Internet connections*.

Here the word *throughput* is blending (*through* – describing the way of action and *put* – meaning action). Compare with Ukrainian variant:

Пропускна здатність використовується для вимірювання продуктивності жорстких дисків, а також підключення до Інтернету.

As an example of a non-equivalent vocabulary, the following terms could be shown: *to demote* – видалити з головної сторінки, *paywalls* – програми платного доступу до інформації, *walledgarden* – обмежені зони навігації.

The way of translation consists of giving definition and translating terms in a concrete text. For example: *blue sky laws* – закони різних штатів, що регулюють випуск і розміщення цінних паперів з ціллю захисту покупців від махінацій з цінними паперами; *affirmative action* – дії, спрямовані проти дискримінації по

відношенню до певних груп населення, *gun control* – нормативи придбання і використання громадянами вогнепальної зброї.

Sometimes in the process of a term translation, it is necessary to do the change of a term or term combination from SL with a term or term combination from TL having a wider spectrum of meanings in TL, or with the equivalent concretizing the meaning of a term according to a context or stylistic requirements. The way of changing or concretizing requires searching for synonyms or common words in TL, which are more concrete and stylistically suitable to express specifics of the term from SL. Synonymous changing a term from SL with a term from TL having a wider concrete meaning is called **concretization**. For example, to translate a polysemantic term from SL having various lexical meanings a translator should concretize or select the meanings of a polysemantic term according to a context.

The way of **generalization** is also applied at the process of term translation. Generalizing initial meanings of a term takes place in those cases, when the volume of informative efficiency of a terminological unit in SL is wider than the efficiency of the same terminological unit in TL: *power lunch* – діловий сніданок, *DOS/VS* – операційна система диску, що реалізує віртуальну пам'ять, *dozen* – десяток.

There are also **grammatical transformations** that include changing a part of speech meaning (*commutating pole* - допоміжний полюс) or a number category; **replacement** or changing a word order (*a bureau of standards* – бюро стандартів). Linguists define **antonymic translation** or changing lexical meaning of a term into opposite one, **addition** (*bandwidth* – ширина смуги частот) and **omission** (*circuit breaker* – вимикач), **compression** and a **contextual change** among **lexical grammatical transformations**.

Contextual change is the kind of transformation when the translation variant of a term or term combination from TL is chosen according to the context not from the dictionary (В. Карабан: 2002, 288). For example, the verb *access* means *to get in touch with (one's deepest inner feelings or subconscious desires), to experience at a deep level* (<http://www.dictionary.com>). However, in the computer technology context *access* is a term means *to open a computer file (= a collection of information stored on a computer) in order to look at or change information in it* used particularly since the late eighties and originating in American English (<http://dictionary.cambridge.org/>). Contextual change is used to add, concretize, or generalize something in the meaning of a term, ср.: *a watchdog* – електронний регулятор часу; *wearable computing devices* – електронні пристрої, що місять приватну інформацію.

Another lexical grammatical transformation while translating the terms is a method of **compression**. Compression is a more compact exposition of ideas due to omission of some elements out of the language context. This method is usual-

ly used to translate professional vocabulary at the level of macro context, less often – at a micro level, because it can be a result of an unsuitable omitting the part of lexical meaning of this term.

In scientific and technical literature there are terms borrowed from other languages, mainly from Latin and Greek, which occupy a considerable place in the world vocabulary. We easily guess their origin and meaning after the analysis of their structure, but their translation causes some difficulties, as many international terms **can be false friends of translator or misleading words**. They are identical in sound and graphic forms, but have different lexical meanings causing mistakes at the process of their translation. Translation of international terms becomes complicated in those cases when these terms acquire certain specific meaning in scientific and technical texts. For example: *revolutionary changes in tube sign* – *значні (радикальні) зміни у конструкції труби, а не революційні зміни у конструкції труби*; *massive tube failures* — *сильні пошкодження труби, а не масивні пошкодження труби*; *optimistic, pessimistic* are translated in scientific and technological texts as «*завищений*» and «*занижений*»; *optimistic percent* – *завищений відсоток*, *theory is pessimistic* — *розрахунок дає занижені результати*. Sometimes the use of international words at the process of translating English internationalisms into Ukrainian is the violation of stylistic language norms of Ukrainian scientific and technical literature.

To conclude all translation transformations mentioned above are needed to adapt a term from SL to the norms and rules of TL, to succeed simplicity in conveying term into TL, to systematize a term from SL with another terms from TL.

There are the following recommendations on translating a term and term combinations:

1. only standardized terms of TL should be used at the translation process;
2. a translator should realize which terminology system a term of SL belongs to and interpret it into TL according to the context or other terms existing in this terminology system, i.e. a translated term should correspondence with other terms of TL in the same terminology system;
3. if there is a term of SL which does not exist in the TL a translator should select an appropriate translation variant. Then a term should be translated with transcoding and descriptive translation;
4. a translator should avoid of synonymous terms and synonymous changes because all term definitions and translation variants should be unique and repeated in the whole translation text as a term is used as a scientific and technological sign, a coded word;
5. all additional definitions of a term should be pointed in appendices to the text or in metatext;
6. if there is no equivalent of a term in TL it should be rendered with an appropriate way of translation and the origin form of a term of SL should be given in the brackets;

7. if the terms of SL are names of the concepts in Latin, they should be completely translated;

8. shortened terms of SL should be translated with appropriate terms of TL. A translator is not allowed to create new shortened terms.

9. the words of nomenclature can be retained in their original forms;

10. the terms represent measurement units and abbreviations of SL should be conveyed with the appropriate measurement units and abbreviations of TL;

11. a translator should realize Ukrainian terminology is in the process of quick development. It means that some Ukrainian terms have two translation variants (*auto* авто/ ауто, *neuro* нейро/невро, *caner* очеретний, очеретяний, *authentic* автентичний/ аутогентичний, *patterned* візерунковий/ візерунчастий). A translator should recognize the frequency of using a term and term combination of TL and select an appropriate translation variant according to the results.

3.3. TRANSLATION OF PROPER NAMES IN TERMINOLOGY

The proper names (foreign names and last names, geographical names, names of companies, machines, devices, wares, chemical matters, names of newspapers, magazines, streets, and others) and abbreviations as mentioned above can belong to terminological vocabulary. At the process of translation, they can be conveyed into Ukrainian mainly with transcoding (transliteration or transcription) and traditional translation.

1. **Transliteration:** UNESCO – *United Nations Educational, Scientific and Cultural Organization* – ЮНЕСКО. But the full name of this term does not contain the same names, ср. *Організація з питань освіти, науки та культури при ООН*. That is why we can say about transliteration and word for word translation.

However, transliteration is not widely used, because of the difficulty in the English graphic system that does not coincide with the Ukrainian one.

2. **Transcription** is a more frequent method of translating names as foreign terms: SAGE (*Semiautomatic Ground Environment*) – наземна напівавтоматизована система управління коштами Сейдж, GMO (*Genetically Modified Organisms*) – ГМО генетично модифіковані організми. There are cases which do not follow the rules of practical transcription (*Munich* – Мюнхен, а не М'юнїк; *Roma* – Рим, а не Рома; *Danube* (анг., фр.) – р. Дунай).

The names and last names used as terms in scientific and technical literature are not translated and are conveyed into Ukrainian with the help of transcoding. Initials used in the names if the full name is unknown are also interpreted with transcoding: П.Френс (*P. Frense*). The names of foreign authors are conveyed with transcription according to the rules of pronunciation applied to these names: *George* – Джордж

(анг.), Жорж (фр.), а не Георгій. The parts of *Mac-*, *Saint-*, *San-*, *Santa-* are joined to another parts of the name with a hyphen (*Мак-*, *Сент-*, *Сен-*, *Санта-*) and written in translation with capital letter, ср. *McClain* – Мак-Клейн, *Saint Lawrens* – Сент-Луоренс, *Saint Simon* – Сент-Симон, *San-Marino* – Сан-Марино.

Sometimes non-professional translators make funny mistakes in the translating proper names. For instance, in the beer industry there is a term *Lager Beer* that means *light beer*. Nevertheless, once an interpreter of this term used a phonetic calque and thus a new term *Лагерне Пиво* appeared on the cans.

As terms are often expressed in abbreviations or in shortened words or word combinations, there are the following ways of their translation offered by linguists:

1. Analogue translation. Translation of abbreviations by means of TL: *PC* (*personal computer*) – ПК (персональний комп'ютер), *NMR* (*nuclear magnetic resonance*) – ЯМР (ядерний магнітний резонанс), *Ltd* (*limited company*) – ТОВ (товариство з обмеженою відповідальністю).

2. Descriptive translation. Translation of abbreviation by means of explanation of the whole term or term combination: *C&C* (*computer and communications*) – засоби обчислювальної техніки і зв'язку.

3. Transcoding (transliteration or transcription of abbreviation): *UPI* (*United Press International*) – агентство ЮПІ, *PACE* (*Parliamentary Assembly of the Council of Europe*) – ПАРЕ – парламентська асамблея Ради Європи.

4. Transcoding of the full form of abbreviation: *CAT* - Катерпілар (американська компанія, що виготовляє дорожно-будівельні машини і дизельні двигуни), *ICAO* (*International Civil Aviation Organization*) – ИКАО (Міжнародна організація цивільної авіації), *AP* – агентство Асошиейтід прес, *ATLAS* (*Air Traffic Land and Air Study*) – центр підготовки пілотів до польотів в умовах активного повітряного руху «АТЛАС».

5. Word for word translation: *Br Std* (*British Standard*) – Британський стандарт.

6. Loan translation. Sometimes English abbreviations are translated with Ukrainian words not with abbreviations or vice versa: *microwaves* – СВЧ, *LED* – світлодіод.

It should be noted that English abbreviations are widely used in English scientific and technical literature but they are out of the use in Ukrainian:

a.c. (*alternating current*) –перемінний струм;

b.p. (*boiling point*) – точка кипіння;

d.c. (*direct current*) – постійний струм;

s.a. (*sectional area*) – площа поперечного перерізу.

These abbreviations are not in Ukrainian and should be translated with explanations and full designation.

3.4. TRANSLATION OF INTERNATIONAL TERMS

In scientific and technical literature there are terms borrowed from different languages, mainly from Latin and Greek, which occupy a considerable place in the world vocabulary. These terms spread through different world languages and became international: *atom, proton, focus, cosmos* – in Physics; *plus, integral* – in Mathematics; *radio, diode, modem* – in radio technology and etc. Many international terms are in chemistry, medicine. The names of sciences are also international terms, cp. *Psychology, Biology, Geography*. As science and technology are in a quick development, international terms are continuously created, so we easily can identify the origin and meanings of international terms on the analysis of their structure or with the help of the method of immediate constituencies: *stem* (Greek, Latin, English) + *affixes/ flexion*. This widely spread word forming pattern can be found in the term “*electron*”. There are many important physical terms formed in the same way in science as *photon, neutron, nucleon, and proton*, and the meanings of these words are easily understood from their structure (motivation).

Though international vocabulary is widespread in English, its translation has specific features and causes some difficulties as many international terms **can be false friends of translator or misleading words**. Misleading words are identical in sound forms, but have different lexical meanings, so their identical graphical forms often cause mistakes.

Sometimes the usage of international words in the process of translating English internationalisms into Ukrainian is a result of violation of stylistic language norms and style of Ukrainian scientific and technical literature. Translation of international words becomes complicated in the cases when these words get certain specific meanings in scientific and technical texts. For example: *revolutionary changes in tube sign* – значні (радикальні) зміни у конструкції труби, а не революційні зміни у конструкції труби; *massive tube failures* — сильні пошкодження труби, а не масивні пошкодження труби; *optimistic, pessimistic* are translated in scientific and technological texts as «завищений» and “занижений»; *optimistic percent* – завищений відсоток, *theory is pessimistic* — розрахунок дає занижені результати.

3.5. THE MAIN PRINCIPLES OF TRANSLATING TERM COMBINATIONS CONSISTING OF MULTIPLE ELEMENTS

There is a certain amount of constructions consisting of multiple elements in scientific and technical English literature. The problem of decoding attributive term combinations consisting of multiple elements has raised the researchers' interest to develop certain teaching methods of translating these long combinations. Attributive term combinations with their complex semantic and syntactic links became the specific phenomena of the English language, and translation of

them requires the knowledge of such links. The differences between the English and Ukrainian language systems are clear in translating term combinations: they as a rule have opposing meanings: *high hopes* – великі надії; *breakneck rapidity* – шалена швидкість. The same adjective can be linked with different nouns in English and translated into Ukrainian by different adjectives depending on the meaning of the noun, ср.: *bad headache* – сильний головний біль; *bad debt* – несплачений борг; *bad apple* – гниле яблуко, *bad image* – невдалий імідж. However, there also exist such term combinations as: *gun control* – нормативи придбання і використання громадянами вогнепальної зброї; *power lunch* – діловий сніданок, which have different structure and can cause difficulties at the process of their translation.

To translate attributive term combinations correctly and adequately it is necessary to know their structural and semantic features, the main content of attributive term combinations, and understand semantic and syntactic links between element, the context and national realities and terminology systems they belong to. Attributive term combinations consisting of two elements are not needed of explanation: *space age* – космічна ера, *atomic electron* – атомний електрон, *functional electronics* – функціональна електроніка, *contact filtration* – контактна фільтрація, *radiation exposure* – радіоактивне випромінювання.

However attributive term combinations or phrases consisting of multiple elements cause difficulties at the process of their translation because they have a structure where several words stand in a succession one after another. To translate such attributive constructions the rule of right hand or the rule of order is used. The translation order depends on the semantic links between a determining word and determined one. Therefore, it is necessary to begin the process of translation with the right part of the term combination to the left one with the last noun, paying attention to a determining word. Sometimes it is needed to translate into Ukrainian with prepositive constructions or with nouns in cases: *electrical resistance losses* and *losses by electrical resistance*. Comparing these two combinations, it has become obvious that the basic knowledge is not needed to understand what is a determination and what is a determined word:

expansion ratio — коефіцієнт розширення

1 2 - 2 1

products price decrease — зменшення цін на вироби

1 2 3 - 3 2 1

The links between words are understood by the context, for example:

electric equipment supply — живлення електрообладнання

1 2 3 - 3 1 2

In this case the first word “electric” is attributive for the second “equipment”, ср. “micro spot welder” – апарат для мікроточкового зварювання.

It is clear that in such phrases as *absolute zero*, *high quality*, *nuclear energy*, *real number*, *high frequency*, *high energy*, *high speed*, *small scale*; semantic links of these term combinations require neither deep penetration into the content of the object, nor the use of some special knowledge. These term combinations are such stable units that decoding of three or more elements which include these dual element combinations (*absolute zero temperature*, *high quality level*, *nuclear energy conversion high*, *speed computer*, *real number system*, *high frequency instrument*, *small scale body*), can be achieved without any deep knowledge. It happens simply because of the fact that these dual component combinations are so accreted that there can be no possibility to breach their semantic links.

Different case is observed on the example of «mixed» attributive term combinations which have “adjective + noun + noun” structure such, as *large software development*, *various group elements*, *regular permutation group*, *general program system*, where we can understand quickly the correlation of elements without proper special information. If we try to decode this expression as *an intense light beam*, it can be *an intense beam of light* (інтенсивний промінь світла) or *a beam of the intense light* (промінь інтенсивного світла). Naturally, the problem of decoding becomes more difficult when we examine term combinations consisting of four or five elements, i.e. various complicated combinations of «beaded» compound words. This type of construction of word combination is not typical for the Russian or Ukrainian languages. The main word in such group is the last, and all preceding words are its attributives.

Thus, the order of translation of term combinations consisting of multiple elements requires such steps:

- 1) it is needed to find the end of the term combination, i.e. start translating from the last word as the main word of such term combination is the last;
- 2) next it is necessary to define semantic and syntactic links between elements of a term combination;
- 3) in the end it is offered to do back translation of a term combination to realize that the translation has done correctly.

As a model, consider the following term combination consisting of multiple elements: *free space wave propagation*. The last word of the term combination is *propagation* – поширення. Then there is the defined word *wave* – хвиля. So, there it could be as *поширення хвилі* as the next step we translate *free space* – вільний простір. Thus, the links between the words in term combination that belong to the last word could be formed: *Поширення хвилі у вільному просторі*. Compare another example, *London airport customs officials* – **представники митниці у Лондонському аеропорту**.

Sometimes for an adequate translation of a term combination consisting of multiple elements, a translator has to obtain specific knowledge. For instance, the following term combinations: *high density image sensor*, *high permeability soft iron core*, *minimum weight code vector*, *high pressure wind tunnel*, *minimal*

time control systems, high energy fission electrons, logic error correcting capacity, actual estimation error covariance can not be translated without additional knowledge of the context. The inner semantic links in such combinations can be defined only with special knowledge or information. In verbal speech when the term combinations are read or pronounced aloud, it is explained by the word stress and prosody, i.e. prosodic means for expressing semantic structure of these combinations. If we read the term combinations formed without a hyphen, it is obvious, that for decoding them the knowledge of the object is required. If we consider examples from mathematic texts, for everybody, who knows it well, such term combinations as *mean value theorem* (теорема про середню величину), *first order approximation* (наближення першого порядку), *intuitive set theory* (інтуїтивна теорія безлічі) are absolutely recognizable if we use a special prosody. However, when the basic knowledge of a reader or listener is insufficient, understanding the following terms can be complicated, that is why the question about orthographic expression of a term combination in scientific texts is still essential nowadays.

Sometimes in order to translate the term combination with several elements the translator has to read an article or a fragment of the text to the end to understand the correct semantic and syntactic links. For instance, the word “*poll*” can be translated differently depending on the semantic and stylistic links and the context: *poll tax* – виборчий податок; *poll tax states* – штати, в яких сплачується виборчий податок; *poll tax states conference* – конференція, що проводиться у штатах, в яких сплачується виборчий податок. **Thus, studying the structural and semantic peculiarities of term combinations** consisting of multiple elements allows to realize the greater range of semantic links between the elements of the term combinations in English than in Ukrainian.

To translate the term combinations with multiple elements different ways of translation are applied.

1. Descriptive translation is used when there is not any appropriate meaning for the term in TL and also when it is necessary to explain the term in a dictionary, ср.: *the commercial acid is generally not quite pure* – кислота, яка надходить у продаж, не зовсім чиста; *primary (standards) laboratory* – головна метеорологічна установа відомства, яка зберігає зразки вимірів вищих розрядів.

2. Calque or loan translation, i.e. translating English term combinations with the help of rendering their structural parts. Such type of translation is often called “word for word translation”: *low-noise engine* – малошумний двигун; *high-voltage switch* – вимикач високої напруги.

3. Translation with the help of cases or word for word translation: *direct current system* – система постійного струму; *high-power station* – силова станція великої потужності.

4. Transcription or transliteration, i.e. translation of term combinations with the help of letters of TL to express the sound form of term combinations: *Special System Industry* – Спеціал Систем Індастрі.

5. Translation of term combinations with the help of different prepositions: *data processing equipment* – обладнання для обробки даних.

A translator can find an appropriate meaning of term-combinations according to the meaning of the words, which are in the close link with them (the closest link is between a noun and adjective, between an adjective and determined word): *amplifiers are extensively used in radio transmitters* – підсилювач широко використовується в радіопередавачах.

Thus, term combinations with multiple elements include several words and cause difficulties at the process of their translation. Such multi element term structures attract modern researches and are widely used in technical literature. However, if the main part of a term combination from SL has the structure corresponding to the same one in term combination of TL, these term combinations do not cause difficulties at their translation. It is only needed to find an appropriate meaning of each element, ср.: *polarity of line* – полярність лінії (постійного струму); *pole of functions* – полюс функцій, but *natural rubber-based stock* – суміш на основі природного каучуку.

There are term combinations which can not be translated with the help of word for word translation though they have appropriate equivalents in TL because the elements of the term combinations differ from their equivalents in SL, ср. *mixed melting point* – температура плавлення суміші. The main difficulty in the translation of term combinations consisting of multiple elements is the elements which do not have any similarities with their real meanings. Sometimes they are even opposite to each other.

Indisputably, translation of terms is a very responsible task for a translator, requiring the deep knowledge of both SL or TL, as well as a perception of a linguistic image of the world, and also the excellent knowledge of that area of science or technology which is actually connected with translation. Nevertheless the fact, that the use of modern means of communication, world network, the Internet, as well as cooperation of different languages and cultures, a translator deals with the phenomenon that each language is unique and develops separately. Each language has its own **linguistic, cultural and historical realities, but simultaneously** there are the realities and concepts which still do not have any equivalents in other languages. For this reason, a translator plays the role of an interlingual mediator who helps recipients to get necessary information, and at the same time, creates new terminological vocabulary in his mother tongue. In the process of term translation, an experienced translator selects not only the way of term translation but also the meaning of a term according to the context and the rules and standards of TL terminology and international one saving all linguistic characteristics of a term.

PRACTICAL ASSIGNMENTS

Task 1. Get ready to discuss the following questions.

1. Explain the term “terminological key”.
2. Enumerate the stages at the process of term translation. Exemplify your answer.
3. Identify the main principles of term translation.
4. Name the different ways of translating terms.
5. Talk about the translation of polysemantic terms. Signify what translator’s choice is based on.
6. Comment on the requirements for translated terms.
7. Explain the ways of translating terminological proper names and abbreviations.
8. Identify the ways of translating international vocabulary; explain difficulties, which arise in the process of translating international terms.
9. Give definition of the term “translator’s false friends” or “misleading words”.
10. Name the main principles of translating term combinations, consisting of multiple elements.
11. Enumerate stages at the translation of term combinations consisting of multiple elements. Give examples.

Task 2. Read the following international words; identify which of them are translator’s false friends. Check your knowledge with the dictionary.

Master, commission, contribution, brilliant, manuscript, progress, solutions, transmission, measurement, argument, confident, potential.

Task 3. Read the following sentences and translate them into your mother tongue. Define the ways of translating terms given in bold.

1. A. Popov devoted the greater part of his life to the problem of the application of **electromagnetic waves** to **wireless communication**.
2. The greatest result of Mendeleev’s creative effort was the discovery of **the Periodic Law** and the drawing up of **the Periodic Table of Elements**.
3. Michael Faraday, **an English experimental physicist**, in his early life worked as a **bookbinder’s apprentice** earning his living.
4. Marie Curie saw some radium in **the glass test-tube**.
5. The principles of **multi-stage rockets** and **the laws of weightlessness** were described by Tsyolkovskij.
6. **Industry, mining and shipbuilding** began to develop in Russia in the beginning of the 18th century.

7. **The production of semiconductors** is a new branch of industry.
8. Many metal working processes include the **melting and solidifying of metal**.
9. The standard unit of mass is the kilogramme, a block of platinum preserved at **the International Bureau of Weights and Measures** near Paris.
10. Whenever **an ammeter or voltmeter** is connected to a circuit **to measure electric current or potential difference**, the ammeter must be connected in series and the voltmeter in parallel.

Task 4. Read and translate the following abbreviations used in military terminology.

Gen., capt., col., 1stLt, lt. col., lt. gen., maj., maj. gen., cpl., sgt., master sgt., CO.

Task 5. Translate the text. Remember that the main word in the term combination consisting of multiple elements is the last.

Низькотемпературний напівпровідниковий термометр опору призначений для точних вимірів температури. Конструкція термометра забезпечує можливість виміру опору в чотирипровідному електричному ланцюзі. Чутливий елемент термометра є вузькою пластиною з роздвоєним кінцем. Металева трубка з чутливим елементом заповнена гелієм під тиском 100-150 мм рт. ст. при кімнатній температурі. Термометр має високу стабільність при багатократних нагріваннях і охолодженнях.

Task 6. Translate the following terms; underline those, which are translator's false friends.

Physics, familiar, contribution, foot, universally, fundamental, distance, engineer, commerce, standard, code, capital, contribution, commission, file, unit.

Task 7. Find the appropriate Ukrainian variants of the term combinations given below.

Far-field sources, high-energy radiation, straight shock wave, suitable wind-tunnel, high-vacuum conditions, complete boundary-layer equations, different conductivity type, dual wave-particle nature, usual boundary-layer model, usual symmetry-plane equations, high-frequency radio waves, high-pressure wind tunnel, high-speed control unit, magnetic amplifier, electric field strength, peripheral processor.

Task 8. Read and analyze the following term combinations and phrases, defining the main word.

Time and power settings – установки часу і потужності;

Stainless steel top cover – кришка з неіржавіючої сталі;

Fixed contact - нерухомий контакт;

Pulse voltage amplifier – імпульсний підсилювач напруги;
Control desk – пульт управління;
Electric equipment supply – живлення електрообладнання;
One-probe and two-probe methods – однозондовий та двозондовий методи.

Task 9. Translate the following term combinations and phrases into your mother tongue.

The control system, measuring unit, semiconductor industry, measuring equipment, power consumption, voltage multiplier circuit, high voltage source, hardness meters, transistor tester, first-class quality, voltage selector switch, power supply line, power supply voltage selector switch, normal operation conditions, rubber industry.

Task 10. Read the text, find the terms, define the terminology system they belong to. Translate the text paying attention to the attributive term combinations.

TECHNICAL ABBREVIATIONS AND UNITS

In metric units there are two abbreviations CGS and MKS. CGS means: centimeter, gramme, second; and MKS means: metre, kilogramme, second.

A unit of force in the CGS system is called “dyne”.

$1 \text{ dyne} = 1 \text{ g} \times 1 \text{ cm/sec}^2$

According to the metre, kilogramme, second system (MKS system) the unit of force is called “newton” in honour of Sir Isaac Newton. Dynes and newtons are absolute units of force.

$1 \text{ newton} = 105 \text{ dynes}$.

Work, energy and power are closely associated with each other. Energy is described in terms of work.

Work = force x distance (work equals the force times the distance).

In the CGS system dyne times cm as a unit of work is called the erg.

$1 \text{ dyne} \times 1 \text{ cm} = 1 \text{ erg}$.

In the MKS system of units, a force of 1 newton acting through a distance of 1 m in the same direction performs an amount of work equivalent to 1 joule.

$1 \text{ newton} \times 1 \text{ meter} = 1 \text{ joule}$.

Power is defined as the rate of doing work.

Power = work

time.

In the metric system with work measured in ergs or joules, power is expressed either in ergs per second or in joules per second. One joule per second is called the watt, a unit of power.

$1 \text{ joule/sec} = 1 \text{ watt}$.

The kilowatt is another unit of power which is equal to 1000 watts.

In the English system, with work measured in foot-pounds, power is expressed in foot-pounds per second, and in h

Task 11. Translate terms and term combinations from English into Ukrainian paying attention to the main word.

Ecotourism geomarketing, to create a positive public image, holidaymakers, to bring to customers' notice, the rationale for the use of sth, reliable data, eco trademarks and labels, public recognition, eco-labeling, sound nature management, nature conservation and restoration, topicality, nature reserves and national parks.

Task 12. Translate the short abstract into English using the terms and term combinations from task 11.

Мас-медіа є одним з найважливіших інструментів побудови системи інформаційно-рекламної діяльності у геомаркетингу екологічного туризму, основою формування сприятливого суспільного значущого іміджу. Тому за участю мас-медіа повинні проходити всі важливі екотуристські заходи, за їх допомогою слід підтримувати постійну увагу клієнтів і партнерів до поточної діяльності екотуристські організації.

Task 13. Match term combinations to their meanings.

1. ecotourism geomarketing	a. на цих сторінках подано виклади
2. holidaymakers	b. заповідники і національні парки
3. eco trademarks and labels	c. актуальність
4. to organize events	d. охорона та відтворення природного середовища
5. reliable/verifiable data	e. раціональне природокористування
6. public recognition	f. розробка екологічних знаків і сертифікатів та їх упровадження
7. sound nature management	g. суспільне визнання
8. nature reserves and national parks	h. присуджувати сертифікати
9. these sites summarize sth	i. екологічні торгові марки і знаки
10. topicality	j. достовірні дані
11. to award certificates	k. доцільність використання
12. to bring to customers' notice	l. доводити до відома споживачів
13. to create a positive public image	m. відпочиваючі
14. eco-labeling	n. проводити заходи
15. to rationale for the use of sth	o. сформувані сприятливий суспільно значущий імідж
16. nature conservation and restoration	p. геомаркетинг екологічного туризму

Task 14. Devide the following words into three groups – internationalisms, partial pseudointernationalisms, full pseudointernationalisms.

Decade, order, construction, regular, contact, accurate, category, limit, objective, paradox, collection, paper, negative, intuition, reason, specialization, pilot, focus, literature, selection, variant, composition, algorithm, figure, formula, test,

deduction, isomorphism, operation, variant, familiar, algorithm, speaker, to discuss, computer, program, process, control, norm, automatic, technique, plan, intelligence, marker, principle, object, percent, author, technical, concern.

Task 15. Give Ukrainian equivalents to the international words and “pseudo friends” of the translator.

Pressure, vacuum, differential and absolute pressure, balance, diaphragm, metal, instrument, specially, recommend, phosphor, bronze, diameter, mechanism, type, operate, indicate, control, disc, maximum, principle, thermometer, construction, temperature, condition, special, industrial, precision, distance, indicator, application, gas, diesel engine, location, centralize, panel, figure, model, patent, guarantee, plastics, material, capillary, vibration, pyrometer.

Task 16. Read the following term combinations, analyze their structure and define the ways of their translation.

Breakneck rapidity – шалена швидкість; gun control – нормативи придбання і використання громадянами вогнепальної зброї; space age – космічна ера; atomic electron – атомний електрон; low-noise engine – малошумний двигун; high-voltage switch – вимикач високої напруги; functional electronics – функціональна електроніка; primary (standards) laboratory – головна метеорологічна установа відомства, яка зберігає зразки вимірів вищих розрядів; Special System Industry – Спеціал Систем Індастрі; data processing equipment – обладнання для обробки даних; contact filtration – контактна фільтрація; radiation exposure – радіоактивне випромінювання; free space wave propagation – поширення хвилі у вільному просторі; mean value theorem – теорема про середню величину; first order approximation – наближення першого порядку; intuitive set theory – інтуїтивна теорія множин; the commercial acid is generally not quite pure – кислота, яка надходить у продаж, не зовсім чиста; direct current system – система постійного струму; high-power station – силова станція великої потужності.

Task 17. Read the following sentences, find international words and define their types. Translate the sentences into your mother tongue.

1. All examples are taken from actual texts. 2. The manuscript was apparently completed in 1990. 3. This is dramatically illustrated by Erics. 4. Thus, the issue that this addresses is far from trivial. 5. Both contributions to this jubilee publication are appropriately authoritative. 6. Several indexes in the book make the wealth of information easily accessible. 7. The merit of this book lies in its rich collection of empirical data. 8. The articles are arranged according to subject matter rather than chronology. 9. In addition to the work mentioned above, the volume contains six studies originally published in English. 10. Each volume contains a «List of words cited» and an «Index of names». 11. Bateson’s description is ele-

gant and accurate. 12. **The present notation is inaccurate and, in some cases, confusing.** 13. **The defects of Cowie's analysis are typical of illuminating but unformalized descriptions.** 14. The second article illustrates receptivity to date of whatever source. 15. In physics, a theory is often the limit of a more general theory as some parameter vanishes. 16. **Progression from treatment of a selected individual problem to that of a broad question may also suggest the direction of these studies.** 17. The book concludes with a brief account of the renewed interest in Newton during recent decades. 18. Skenstrom's analytical framework is a rather extensively modified version of the modal introduced by J. Sinclair. 19. There is something for everyone in this book, but perhaps not enough of any one thing to make it indispensable to a specific audience. 20. **However, for lack of a strong theoretical overview, or of effective introduction to its different sections, this work falls short of its promise.** 21. **Aside from these caveats, this work is a careful and detailed illustration of how to deal with the enormous complexity of data.** 22. The studies here range from the Middle Ages to the present, and offer a combination of general surveys along with detailed investigations of specific aspects. 23. **The new work, however, is considerably broader in scope and is an ambitious successor to that still valuable first collection.** 24. With the exception of the paper written in 1991, all the articles contained here were included in their original languages of publication. 25. **The monograph is essentially significant in that it includes English translations of articles originally published in German.** 26. This theme will startle few readers; as usual, Robins brings to its exposition the twin merits of a clear prose style and a wealth of wide-ranging citations. 27. **These discussions and associated theoretical contributions are offered by Bates with characteristic modesty.** 28. The quality of the contributions is very uneven: some scholars have taken this opportunity to publish rather trivial thoughts or highly speculative hypotheses. 29. The argument as an addendum by Wittgenstein to Waissman's notes of discussion with Wittgenstein, in which Wittgenstein reports a form of argument he had used in his lectures in Cambridge at that time. 30. But these pages contain radical critiques of dominant, received theoretical stances, as well as contributions that go beyond predecessors. 31. Though I do not intend to propose anything near a comment or a criticism of Mr. Dummet's point of view, I would like to show this must be a false point of view. 32. **Hilbert gives historical examples of the fruitfulness of such a procedure; this has been seen as a defense of formalism.** 33. For each expression there is a floor of definition below which its value is nil. 34. However, a potential model of knowledge might be experimentally verified. 35. **He is surely among the few who subject their data to systematic and quantitative analyses in order to shed light on these controversial issues.** 36. **This is a fine piece of scholarship - clear and accessible to the non-specialist, and a significant work for specialists.** 37. Most of his arguments are quite persuasive - especially since he does not reject this type of evidence, but only cautions against too free use of it. 38. **Aston's work, which was accurate to 0.1 per cent, was the first quantitative study applica-**

ble to all the elements. For his discoveries he received many honours, including the Nobel Prize for Chemistry in 1922. 39. Hilbert was a professor at Gottingen, the former academic home of Gauss and Riemann. 40. Computers are sometimes thought - unjustifiably - to demand deep technical knowledge or proficiency in mathematics and electronics. In actuality, computers, like any other discipline, inspire different levels of expertise. 41. The rapid transmission of information over long distances and ready access to information have become conspicuous and important features of human society, especially in the past 150 years, and in the past two decades, increasingly so. 42. The designers of other artifacts such as cradles, the baby bottle, buttons and button holes, and slings that permit agricultural work while carrying an infant remain anonymous, but the probability is strong that they originated with women. 43. Through the power to allocate funds, a legislature can influence the course of government. 44. In 1924 the navy received delivery of the ZR3 airship, later christened the *Los Angeles*, made by the Zeppelin works in Germany in partial payment of war reparations. 44. **As a result, industries in industrialized countries have replaced chlorofluorocarbons in all but essential uses.** Results of subsequent atmospheric studies are inconclusive about the actual threat to the ozone layer by human activities. 45. The beliefs and customs of the groups may merge almost equally and result in a single culture.

Task 18. Read and translate the following abbreviations, define their types.

Eur - Europe; SW — Special Weapons; bldg — building; HRH — Her Royal Honesty; Aug. — August; transceiver — transmitter + receiver; HIPEG [‘haipeg] — High-Performance External Gun; BBC - British Broadcasting Corporation; comcast – communication + broadcast; Dec. - December; spork - spoon and fork; exam – examination; AIDS - acquired immune deficiency syndrome; Minn. – Minnesota; smog – smoke +fog; CD; pop – popular music; Laser - Light Amplification by Stimulated Emission of Radiation; flu - influenza; Oct. – October.

Task 19. Compare the English abbreviations with their Ukrainian variants. Define the ways of their translation.

AP (American Patent) - патент США, ANS (American National Standard) - Американський національний стандарт, AMIGOSAT - «Амігосат» (спутникова система зв'язку латиноамериканських країн), COSPAR (Committee for Space Research) - Комітет з космічних досліджень, КОСПАР, ARCS (aft reaction control subsystem) - хвостова РСУ, CODATA (Committee on Data for Science and Technology) - Комітет із збирання даних у галузі науки і техніки, ВН (Brinell hardness) - твердість за Брінеллом, COBOL (common business-oriented language) - (мова) Кобол, ВПУ (basic processing unit) - центральний процесор, ЦП; САМАС (computer-aided measurements and control) - (система) КА-МАК (уніфікована система автоматизованих засобів вимірювання, контролю і управління), АРРА (American Power Plant Association) - Американська енер-

гетична асоціація, BCRA (British Carbonization Research Association) - Британська коксохімічна асоціація, ALT (arithmetic unit) - арифметичний пристрій, АП; A.A.A.L. (American Academy of Arts and Letters) - Американська академія мистецтв і літератури, Cp (constant pressure) - постійний тиск, Abs E (absolute error) - абсолютна помилка, CP/M (Control Program/ Microcomputer) - операційна система CP/M для мікро ЕОМ, а.с. (author's correction) - виправлення автора, CSIR (Council for Scientific and Industrial research) - Рада з наукових та промислових досліджень (Великобританія), DB (data base) - база даних, БД; E/Z (equal to zero) - дорівнює нулю, Me (megacycle) - мегагерц, Мгц; UDC (universal decimal code) - універсальний десятковий код, УДК.

Task 20. Define the type of the following abbreviations. Compare your answers with your group-mates.

Gator - alligator; cinemax – cinema + maximum; USA; Necco - New England Confectionery Company; WDI – Walt Disney Imagineering; TV; MEMO – memorandum; Scuba - self-contained underwater breathing apparatus; Tues. – Tuesday; tec – detective; Benelux; EU; varsity – university; Gestapo - Geheime Staatspolizei; Calgone – calcium + gone; Mon. – Monday; OPEC; IMF; doc – doctor; Radar - radio detection and ranging; Interpol - International Criminal Police Organization.

Task 21. Translate the abbreviations and define the way of their translation.

IFF aerial, class-D amplifier, RAM analysis, 3-D animation, MPD arcjet, CCD array, UV astronomy, CPU board, V-bottom body, PET bottle, EHV cable, PIE cave, SECAM decoder, CRT display, AV-1 engine, V-channel FET, D flip-flop, CNC programming format, AVIO gate, API gravity, EVA handhold, LED indicator, NC job, Q-spoiled laser, PPM level, B/H loop, F-center maser, GTO mass, DNC network, HEO observatory, LC oscillator, non-FMS part, LIFO queue, T/D ratio, X-Y recorder, deep UV region, GEO satellite, ENG shoot, L-D heat transfer, FM tuner, B wind.

UNIT 4

THE PECULIARITIES OF SCIENTIFIC AND TECHNICAL STYLE AND SCIENTIFIC AND TECHNICAL TRANSLATION

4.1. The main peculiarities of scientific and technical style.

4.2. Linguistic features of scientific and technical translation.

4.1. THE MAIN PECULIARITIES OF SCIENTIFIC AND TECHNICAL STYLE

The style of science and technology comprise the fundamental part of the non-fiction style of literature executing informative function. People always need to use the language for writing about the results of their scientific efforts obtained from the research work and being represented in the clearest and the most objective and understandable way. A scientific writer always expects the analysis of the results of the conducted research in the discussion section, highlighting any opposing or supportive explanations or views.

Scientific and technical style is applied when certain scientific knowledge or information obtained from scientific research has to be conveyed. The main function of scientific and technical style is giving exact and clear information and description about concepts, notions, processes, the results of conducted, or being conducted researches.

Purely scientific style is used in researches, theories, hypothesis, proofs, conceptions, systematizing theoretical knowledge, explanations of scientific facts and hypothesis. There is also *academician literature* such as scientific articles, monographs, theses, dissertations and others aimed on the professional who understand the professional scientific information. There is also *scientific educational literature* such as textbooks and guides aimed on the future professional. There is also *science fiction* aimed on non-professional giving information in the most attractive way to appeal readers.

Scientific texts exist in both *written* (notes, abstracts, lectures, thesis, articles and others) and in *oral* (lectures, reports, presentations)

Purely technical style is used for giving information about different appliances, machine tools, devices, equipment and their usage from installation to services in writing guidance, manual, and instructions for installation, specific characteristics and requirements, books as guides. Unlike textbooks, encyclopedias, technical literature such as catalogues or specifications, is aimed directly on the users of these products, mechanisms and devices who are more interested in very professional information.

During the last decades, the scientific and technical styles have been split into a new and more specialized style in the result of developing science and technology and further higher specialization comprising scientific and technical writing. **The genre of scientific and technical writing** is mostly represented in the written form of the language (scientific articles, monographs or textbooks) but it may also be found in its oral form (in scientific reports, lectures, discussions at conferences, etc.); sometimes this style has some features of colloquial speech.

There are different types of the texts used in scientific and technical style:

- Scientific and technical literature itself (books/monographs, articles, conference, symposium, lecture, or similar event papers, presentations);
- Educational scientific and technical literature (manuals, books, reference books, theses, dissertations);
- Popular scientific literature;
- Technical documents;
- Technical advertisements and patents.

Scientific and technical style has some distinctive features. The main stylistic characteristic is clarity in explanation of scientific notions and concepts without any expressive linguistic means which add emotions to speech.

Clarity is an important part of scientific style. It can be achieved by using simple language in your writing as these help to improve the ease with which your readers will be able to understand you. Sentences are not long and do not contain too many clauses. If a sentence is too long, it should be divided into several smaller ones. The words in the sentences and linking words should be repeated to lead your reader through the smaller sentences and how they relate to each other. Every extra word gives the reader something extra to read and understand. The more words are used the greater chance that there will be a mistake or the reader will misunderstand something.

Another main feature of scientific and technical writing is logical expression. As all information should be represented in the objective, precise and clear way, there should be logics in the sentences. Sayings should be followed one after another and all terms should be repeated in the whole text. It can cause a tautology but it is not a drawback in scientific and technical writing because is used for representing information in the clearest way.

It is also worth saying that scientific writing is formal writing. This means that the words and language constructions that are used in speaking to someone, writing an email, or even writing for a website should not be used. No shortened English verbs should be used in written form.

- *The experiments won't be finished in class.* – incorrect
- *The experiments will not be finished in class.* – correct

The verb 'will not' has been shortened to 'won't' in the first sentence. This should not be used in scientific writing according to stylistic requirements.

Nevertheless, that scientific writing is formal; some expressive linguistic means are used such as:

- 1) comparative and superlative forms of adjectives;

2) expressively coloured nouns, adjectives, verbs and adverbs such as *dramatically, excellent, successfully, disappointing*;

3) introductory or linking words and particles;

4) emphatic constructions and elements such as *it is the one that - саме той, only that one - тільки (лише) той; that is - а саме, in fact - дійсно*;

5) colloquial phrasal verbs and collocations in special meanings;

6) interrogative sentences (*Could we suppose, answer, consider that?*)

Technical and scientific texts differ from other literary texts in the vocabulary, grammar, syntax, and in the way of representing materials.

Vocabulary. The most striking feature of scientific and technical style is the usage of terms and professional knowledge as well as the presence of lexical structures and acronyms. A special place in such materials are the texts oriented not only for this group language speakers but for representatives of a certain professional group with certain extralinguistic knowledge. Nowadays every branch of science has its own terminology with a set of terms used in a certain field of human activity or knowledge and we can identify this field or knowledge according to the terms.

In general, the science vocabulary consists of a great number of common used every-day words, a wide layer of words stylistically coloured (learned words), and a wide range of special terms. However the words from general vocabulary such as *to work працювати, to know знати, place місце, new новий, obviously очевидно, etc.* are used in scientific and technical texts in their direct referential meaning or in their primary logical meaning. It is hard to find a word in scientific and technical writing that is used in more than one meaning. There are also no words with contextual meaning to avoid the possibility of ambiguity.

Terms are used in the way to be self-explanatory and motivated as much as possible. New terms are often followed (or preceded) with the explanation given in parentheses, attributive phrase or footnote.

Thus, it could be concluded that scientific and technical vocabulary consists of:

1. scientific and technical terminology and common words used in their primary or special meanings;

2. charts, tables, diagrams, maps, mathematical, physical, chemical and other signs, abbreviations, formulae;

3. mainly foreign learned words borrowed from other languages;

4. purely scientific phraseology (*by all means; as far as; in spite of; on the ground that; due to; to put into effect; now and again*).

Grammar. Scientific and technical style also differs from other literary styles in the usage of specific grammar forms, constructions and tenses. It can be vary in such language means, as:

1) the usage of Gerund and Participle constructions to make sentences shorter and precise;

2) the usage of parentheses;

3) the impersonal manner of representing material, impersonal constructions.

Impersonality is required to preserve the character of the style that should be “invariant to all observers”. Impersonality can be achieved by the usage of:

- passive constructions,
- general pronoun *we*,
- mostly a third-person style,
- abstract nouns formed from verbs and adjectives.

The usage of Passive Voice suppresses the author’s role by removing the agent from the sentence and exclusively aims to describe the facts and phenomena. It happens also in the cases where not only the agent but also the activity is irrelevant and the only thing that matters is the affected subject. The first person pronoun *I* is not used in scientific writing. Instead *I* is often used *we*, *the team*, *the research group*, to show that the whole group of people involved in the reported experiments is mentioned which. This is better than using *I*.

It is also possible to use Active Voice in the combination with general pronoun *we* as a subject *we* refers to the author. It is mostly common in the texts of exact sciences. Nevertheless the usage of Active Voice in English sentences they should be rendered into Ukrainian with impersonal constructions:

We deduce, we observe, we define, we obtain, we can express, we see, we note, we consider, we assume, we have experimentally verified, we have found... –

Робимо висновок, спостерігаємо або робимо зауваження, визначаємо або надаємо визначення, отримуємо, можемо виразити або представити, бачимо, звертаємо увагу, вважаємо, припускаємо, дійшли висновків дослідним, визначили або з’ясували...

To avoid personality tentative verb forms (*it seems to, it appears to, it tends to*) and/or modal verbs are regularly used:

This result of the research supports/proves our initial hypothesis. – Over positive statement

This result of the research seems to support/ could prove our initial hypothesis. – Hedged statement

Modal verbs *can, may, might, would* are widely used:

The result proves our method works. – Direct statement

This result could prove our method works. – Hedged statement

To soften statements or to avoid claiming an absolute truth from your result the following adverbs are used: *a little, rather, somewhat, almost, nearly, quite, approximately, about*:

This is a disappointing result to report. – Direct statement

This is a somewhat disappointing result to report. – Softened statement

In addition to using Passive Voice, it is necessary to avoid ambiguous language; especially metaphors that might not be widely understood.

Gerund constructions are often used instead verbs in scientific and technical style, cp. *clean after welding – to do post welding cleaning*:

The device for measuring temperature is called thermometer. –

Пристрій для вимірювання температури називається термометр.

We can increase the current by reducing the resistance in a circuit. –

Можливо збільшити сили струму, зменшуючи опір.

Infinitive and infinitive constructions and participle are greatly used in scientific and technical texts:

Hydrogen and oxygen unite to form water. –

Водень і кисень з'єднуються, утворюючи воду.

They tested various methods with no results meeting the requirements. –

Були застосовані різні методи, але не отримано результатів, які задовольняли б вимогам.

The pump was working without the water level decreasing considerably. –

Насос працював напружено, але рівень води не знижувався.

The verbs in future tenses are used to express actions at present. These English verbs should be rendered with the verbs in present tenses into Ukrainian:

The zinc in the dry cell accumulates great excess electrons that will move to the carbon electrode. –

Цинк у сухому елементі акумулює велике число надлишкових електронів, які рухаються до вугільного електроду.

The filament will be seen in the center.

Нитка розжарення видна в центрі.

Adjectives derived from verbs are used more often than simple adjectives such as *to be destructive*, *to be incidental*, *to be conducive*, *to be responsive to*, *to be tolerant of*:

This system is conducive to high dramatic efficiency. –

Ця система сприяє значній ефективності.

Adverbs are replaced with nominal constructions with prepositions in scientific and technical texts: *accurately – with accuracy*, *very easily – with the ease or the easy way*.

The usage of plural forms instead singular ones signify another grammar feature of scientific and technical writing: *sands пісковики*, *acids кислоти*, *fats жири*, *oils олії*, *molecules молекули*, *clippers ножиці*, *jointers фуганки*, *compasses компаси*.

Syntax. The texts of scientific and technical style differ from the texts of other literary styles not only in their vocabulary and grammar but also in their syntactic constructions. The following formula **IT IS + ADJ + TO + INF** is used in the beginning of the new paragraph in scientific and technical literature: *It is true that ...but; It is obvious that...*

Impersonal sentences of this type bring minimum semantic information and serve only as an introduction sentence presenting the basic thought:

It is evident that investigations should be made for other exposure times. –

Зрозуміло, що дослідження необхідно повторити декілька разів.

It is clear that research lacks experimental findings.

Очевидно, що дослідженню не достає експериментальних висновків.

The presumptions and statements comprise one of the peculiarities of scientific and technical style because they are usually not presented directly. It is mostly caused by the fact that it takes a lot of time to prove the new knowledge or received results. That is why general pronoun *we* is recommended to use not only if the scientific phenomenon is confirmed and proved as a truth. The following example demonstrates the situation where there is no certainty yet:

...it does not appear the difference greatly affects the calculated value – ...різниця між набутими даними ще не з'ясована;

in a research work, it seems impossible to uniquely define the goal of a ...-

у науково-дослідній роботі, не уявляється можливим однозначно визначити мету....

In the impersonal sentences from scientific and technical style the modal verbs *must, should, ought to, can, may, might* are often used with the weaker lexical meaning. In the following examples it is clear that modal verbs lose their lexical meaning used mostly with the verbs *to note, to notice, to remark, to observe, to mention*, partially also with the verb *to say*: “*It may be noted*”; “*It should be noted*”; “*It might be remarked*”; “*It ought further to be remarked*”.

It is necessary to realize that this modality is not subjective author's attitude to the conveyed facts, but it is objectified with clarifying scientific style. Therefore, the usage of modal verbs is convenient for giving indirect instructions. Direct forms in instructions are expressed with imperative mood used also in hypotheses or mathematical formulae, e.g.: *Assume a Cartesian coordinate system; Let us examine a couple of cases; Let V be the vector analytic signal.*

There is also a tendency for shortening information and therefore syntactic constructions with using ellipses in English scientific and technical literature:

a remote operated control – a remote control

a liquid fuelled rocket – a liquid rocket.

These shortened syntactic constructions can cause difficulties at the process of translation.

English personal syntactic constructions should be translated with impersonal ones into Ukrainian:

You might ask why engineers have generally chosen to supply us with a.c. rather than d.c. for our household needs. -

Можливо запитати, чому для домашніх цілей використовується перемінний, а не постійний струм.

We know the primary coil in the ordinary transformer to have more turns than the secondary one. -

Відомо, що первинна обмотка звичайного трансформатора має більше витків, ніж вторинна.

Then you should make a small round hole opposite the screen. -

Потім напроти екрану роблять малий отвір.

Asyndetic conditional sentences when the verbs *should, were, had* are in the beginning of the sentences, are often used in scientific and technical writing. Such asyndetic conditional sentences should be translated in Ukrainian starting with the words *якщо*:

Should the cathode be heated to a higher temperature, more electrons will be emitted. – *Якщо катод нагріти до більш високої температури, то випромінюватиметься більша кількість електронів.*

And finally it is necessary to say about emphatic constructions such as *it is (was) that who, it is not until (till) ... that*:

It is the energy of the motion of the particles in random directions that constitutes heat. –

Саме енергія безладного руху частинок виробляє собою тепло.

The way of presenting material. Another peculiarity of scientific and technical style is the way of presenting material.

The first and most noticeable peculiarity of scientific and technical writing is the logical sequence of utterances with a clear indication of the interrelations and interdependencies. Logical sequence of utterances is definitely important to comply with the following general features.

The second characteristic feature of scientific and technical style is what we may call sentence-patterns. They are of three types: postulating sentence, argumentative and formulative.

There are some other peculiarities of scientific and technical texts such as the use of quotations and references, the frequent use of footnotes, digressive in character, and the impersonality of scientific and technical writing. Another basic and no less important feature of scientific language is objectivity. The objectivity, clarity and formality of scientific and technical writing is connected also with the specific usage of language means named intellectualization or rationalization. It means the direction to a concrete and precise expressing helpful in suppressing emotionality or expressivity.

In his practical manual “The Structure of Technical English” A.J. Herbert considers the following formulae as the basic feature of scientific and technical style in contemporary texts (A. Herbert: 2011, 178). All peculiarities of scientific and technical style can be compared in the given table:

Scientific Texts	Texts of Fiction
Logicity	Lack of argumentative progression
Precision	Vagueness
Reason	Emotion
Truth to particular reality	Truth to the ideal
Generalization	Concretion
Referential meaning	Emotive meaning

Denotation	Connotation
Lexical affixation	Grammatical affixation
Idiomatic expressions are rare	Idiomatic expressions are frequent
Use of abbreviations, acronyms and shortenings	Very few abbreviations, acronyms, and shortenings
Standard expressions	Almost all varieties
Use of scientific terminology, specialized items, and formulae	No use of scientific terminology, or formulae
No use of figurative language elements.	Wide use of figurative language elements.

4.2. LINGUISTIC FEATURES OF SCIENTIFIC AND TECHNICAL TRANSLATION

At present time there is a great necessity to emphasize scientific-technical translation not only as a special kind of translation activity and special theory that investigates this kind of activity but as to assign scientific-technical translation a status of independent applied science. **Technical translation** is a type of specialized translation consisting of rendering documents written for technical aims (for manuals, guides, specifications and etc.) or more specially for the texts of technological subject areas or texts which deal with practical application of scientific and technological information meanwhile **scientific translation** deals with the texts of science and science writing. Scientific texts are conceptually more difficult and more abstract than other types of texts. Scientific texts have more standardized terms, which are easier to look up, and they are better written than other texts. Terminology based texts are more concrete containing scientific information and scientific concepts which are easier for understanding. Unlike technical texts, the texts of science are aimed on the world or background knowledge with the further extension.

The main task of scientific technical translation is to represent information to the reader in the clearest and most precise way. The clarity in representing scientific and technical material can be achieved with logical interpretation of actual information without emotions. Therefore, the main feature of scientific and technical translation is rendering formally logical information.

The type of technical translation has been recognized, studied and developed since 1960's. Stemming from the field of translation studies, the type of technical translation traditionally emphasizes the importance on the source language from which text is translated. However, over the years there has been a movement away from this traditional approach focused on the purposes of the translation and on the intended audience. This is perhaps because only 5 – 10 % of items in technical

documents are terminology while the other 90 – 95% of the texts is the language belonging to the neutral style of the source language though technical and scientific translation is only subset of the different types of professional translation. Currently, technical translators, highlighting the importance and significance of the type of technical translation, do more than 90% of all professionally translated work.

There are some requirements for those who are going to take up scientific and technical translation. According to London institute of Linguistics, to be a scientific translator one should have:

- 1) broad knowledge of the subject matter of the text to be translated;
- 2) a well-developed imagination that enables the translator to visualize the equipment or process being described;
- 3) intelligence to be able to fill in the missing links in the original text,
- 4) a sense of the context to be able to choose the most suitable term-equivalent from the special literature or from dictionaries;
- 5) the ability to use one's own language with clarity, conciseness and precision;
- 6) practical experience in translating related fields.

In short, to be a technical translator one must be a scientist, a linguist and a writer. Some translators define three things that there are vital in order to deal with scientific and technical texts:

1. Knowledge of the text structure in different languages.
2. Knowledge of the subject area.
3. Knowledge of the languages for special purposes.

Scientific and technical translator plays the key role in the process of translating scientific and technical texts. The translator's primary task is presenting information in an appropriate way to make the communication successful and effective by means of the target language. This aim supersedes any intentions to render the text of the SL into the TL. Translator does not interpret words but interprets what people do with these words. The specialized technical vocabulary used by researchers in each discipline demands that the translator of scientific texts have technical as well as linguistic expertise. In this sense, scientific and technical translator becomes intercultural and cross-field writer.

If you want to become a technical translator, that is where you start.

- 1) bear in mind that you are more interested in understanding the description, the function and the effect of a concept rather than in learning laws, particularly axioms, theorems, theories, systems in some of which it is involved.
- 2) When you translate a text, you have to be able to stand back and understand roughly what is happening in real life, not just, or as well as, convincing yourself that the sentence you have just translated makes sense linguistically.
- 3) Even though much scientific and technological language and terminology can be translated 'literally' and in newer subjects contains an increasing num-

ber of internationalisms and fewer false friends, you have to check the present validity in the register and dialect (viz. usually British or American English) of the terms you use.

4) to translate a text you do not have to be an expert in its technology or its topic; but you have to understand that text and temporarily know the vocabulary it uses.

5) in science, the language is concept-centered; in technology it is object-centered. As a translator, you have to know *where* as well as *how* to find information.

When we consider scientific and technical translation, there are some misconceptions:

1. Technical translation includes economics, law, and business.

In reality, “technical” means that something deals with technology and technological texts but does not with specialized terminology. For instance, religion has a very specialized terminology but religious texts are never regarded as “technical”. The tendency among certain theorists to include LSP texts such as legal, financial and economic texts within the field of technical translation is less than helpful not only because each sphere of human activity has its own unique characteristics, requirements and constraints. Simply because a sphere or subject field has unique or specialized terminology, it does not make translation technical and scientific.

2. Technical and scientific translation is all about terminology.

This particular misconception is not unique to those involved in technical and scientific translation. A surprising number of people within technical translation share this belief. Nevertheless, the fact that the vocabulary of scientific and technical texts is the most special, it is remarkably similar to the terminology of non-technical literature.

3. Style does not matter in technical translation.

This is, perhaps, one of the most irritating misconceptions for technical and scientific translators because it assumes that translators of scientific and technical texts do not have the same linguistic and writing skills as other types of translator. The problem stems from different opinions of the nature of style and the popular belief that it relates exclusively to literature.

If we look at the category of style from the literary point of view, then it does not have any place in scientific and technical translation. However, if we regard the style as the way we write, the words we choose, the sentences we use, the style will be as much important in scientific and technical translation as in other literary genres because it is used not for artistic and entertaining aims but for rendering precise information allowing readers to understand it simply and quickly.

4. Technical translation is not creative; it is simply a reproductive process.

In order to render information in appropriate and clear way, translators of scientific and technical texts have to find new and creative language means to en-

sure effective communication. This task makes scientific and technical translation extended in vocabulary and stylistic.

5. You need to be an expert in a highly specialized field.

There is a common belief that in order to be a good scientific and technical translator, you need to be an expert in highly specialized fields of human activities and you cannot specialize in more than one or two fields. However, the reality shows that armed with a good and sufficient understanding of the basic principles and technologies, many translators can succeed in different fields of scientific and technical translation. To be an expert means that translator should have enough knowledge how to deal with the text or to be able to acquire whatever additional information is needed.

6. Technical translation is all about conveying specialized information.

This is not entirely true that the main task for scientific and technical translator is to make sure that information is conveyed precisely. Translator is also responsible for rendering information adequately and correctly in order to use it effectively. That is why scientific and technical translation involves detailed knowledge of the source and target languages, style and genre peculiarities, detailed understanding the subject field and how conveyed information will be used.

There exists a wrong opinion that it is necessary to know only the meaning of terms to translate scientific and technical texts. However, for adequate scientific and technical translation it is needed to know not only the SL and TL well but to be also acquainted with the theme and terminology system the text belongs to. There are at least two main requirements for the translator of scientific and technical texts:

- 1) to know the field of the knowledge to which the text belongs to;
- 2) to avoid unsuitable, unmotivated terms in the texts of translations.

In the end, it can be concluded that the peculiarities of scientific and technical style include the usage of specific vocabulary (terms and scientific notions, learned words), the usage of gerund, participle and infinitive constructions, abstract nouns formed from verbs and adjectives, strictly logical syntax and word order. Scientific and technical translation is as difficult as literary one conveying the content in the most clear and precise way and meet the norms and requirements of scientific and technical literature.

PRACTICAL ASSIGNMENTS

Task 1. Get ready to discuss the following questions.

1. Identify the distinctive characteristics of the scientific and technical style.
2. Name different scientific and technical genres.
3. Characterize the vocabulary of scientific and technical texts.
4. Point out the main grammar peculiarities of scientific and technical texts.
5. Explain why the syntax of scientific and technical texts is strictly logical.

6. Name the most popular syntactic constructions used in scientific and technical literature.
7. Comment on the way of presenting material in scientific and technical texts.
8. Give the summary of the main scientific and technical style features.
9. Discuss the difference between scientific, technical and literary texts.
10. Signify the specifics of scientific and technical translation.
11. Enumerate several requirements for those who are going to take up scientific and technical translation.

Task 2. Find the texts of scientific and technical style; define their lexical, grammatical and syntactic peculiarities. Translate scientific and technical texts into your mother tongue.

TEXT 2.1. SEARCHING FOR THE ORIGINS OF LIFE AND OUR FUTURE

Hollywood is wrong about aliens. They don't have oddly shaped heads, bulging eyes or even an every green hue. Dimitar Sassellov is pretty convinced of that. He's not even sure we'll know them when we see them. Prof. Sassellov, an astrophysicist, thinks that if life exists elsewhere - and he believes it does - it will likely be based on different building blocks than ours, and so may not even be recognizable as life.

A project he's heading at Harvard University, called the Origins of Life, is trying to imagine what life would be like if it were based on different chemicals, conditions and history than we have on Earth. There's no reason life can only form under our set of circumstances, he says - or at least that's what he thinks and hopes the project will eventually prove.

People have been asking questions like "How did we get here?" and "Are we alone?" since the time of Epicurus, around 300 BC, if not earlier. And Sassellov says we probably won't have a definitive answer in the next century either.

TEXT 2.2. AN APOLOGY

The person who sweeps the office, translates letters from foreign countries, deciphers communications from graduates of business colleges, and does most of the writing for this paper, has been confined for the past two weeks to the under the side of a large red quilt, with a joint caucus of la grippe and measles.

We have missed two issues of The Rolling Stone, and are now slightly convalescent, for which we desire to apologize and express our regrets.

Everybody's term of subscription will be extended enough to cover all missed issues, and we hope soon to report that the goose remains suspended at a favorable altitude. People who have tried to run a funny paper and entertain a congregation of large piebald measles at the same time will understand something of the tact, finesse, and hot sassafras tea required to do so. We expect to get out the paper reg-

ularly from this time on, but are forced to be very careful, as improper treatment and deleterious after-effects of measles, combined with the high price of paper and presswork, have been known to cause a relapse. Any one not getting their paper regularly will please come down and see about it, bringing with them a ham or any little delicacy relished by invalids.

TEXT 2.3

Dear Meg,

This letter constitutes HP's conditional offer of employment for the position of President and Chief Executive Officer of Hewlett-Packard Company, reporting to the Board of Directors.

Thank you for your interest in leading the talented team at Hewlett-Packard. We are a company unlike any other. It's a fact underscored by our leadership across customer segments; by our presence and leadership in key regions around the world and by our rich technology portfolio. As proud as we are of these capabilities, we are equally proud of the things that define our character as a company: the dedication of our people, our standards and values, and the depth of our commitment to global citizenship. Based on our conversations, this will confirm your start date was Thursday, September 22, 2011.

Our expectation is that your overall Total Rewards package will be targeted within a competitive range of the market median of HP's peer group.

Your initial base salary will be one dollar (\$1) per year. Base pay is typically reviewed annually as part of HP's performance review cycle.

Yours faithfully,

The Board of Directors.

TEXT 2.4. BLEEDING WILL BE STOPPED WITH PEPTIDE GEL

A new way to fight bleeding, developed by US and Hong Kong scientists, may replace dressings and electro coagulators. A peptide gel created by the researchers forms a thick film on the wounded tissue that stops bleeding in a matter of seconds. After healing the wound, the film begins to dissolve while the body absorbs its components.

During laboratory testing of the new technology, a group of scientists from the Massachusetts Institute of Technology and Hong Kong University were successfully able to stop open wound bleeding on the surface tissue of lab rodents, as well as in the animals' brain and spinal cord, liver and intestines.

According to researchers, on average the bleeding stops less than 15 seconds after the gel is applied to the wound. The research project coordinator Rutledge Ellis-Behnke believes that introducing the new method may revolutionize surgery. The gel, composed of seven different peptides (short protein fragments made up of amino acids), quickly hardens after being applied to the wound and seals openings of the bleeding vessels. As the wound heals, the hard film on its surface gradu-

ally dissolves, breaking up into amino acids that are easily absorbed by surrounding tissue.

TEXT 2.5. A NEW RESOURCE FOR ALZHEIMER’S CAREGIVERS

I have recently reported on a long-running study that found that husbands or wives who care for spouses with dementia are six times more likely to develop Alzheimer’s themselves than those whose spouses don’t have it. The most likely cause for this is the great stress of care giving. Both stress and depression increase the risk of Alzheimer’s, and both are common (well, stress is inescapable!) among caregivers.

There have been several studies showing how counseling and support reduce stress and depression in caregivers. For example, one study found that a six-session counseling and long-term support program had a substantial and long-lasting effect on caregiver depression. The other participants were given three additional types of counseling: two sessions of individual counseling, four sessions of counseling with their family, and then weekly meetings with a support group of fellow caregivers.

Key factors in the success of this intervention were thought to be: having the same counselor for all sessions, the use of multiple types of coordinated therapy and counseling tailored to the individuals.

Caregivers who participated in a program that emphasized a team approach to care also had less stress and depression.

Task 3. Arrange the following words in pairs according to opposite meaning.

- | | |
|--------------|-----------------|
| 1 huge | a. tremendous |
| 2 probable | b. improbable |
| 3 to propel | c. to radiate |
| 4 sufficient | d. small |
| 5 to pick up | e. fast |
| 6 tiny | f. insufficient |
| 7 exact | g. inaccurate |
| 8 slow | h. output |
| 9 input | i. to stop |

Task 4. Define lexical, grammatical and stylistic peculiarities of the following technical and scientific texts. Translate the texts into your mother tongue.

TEXT 1. PERFORMANCE PLAN BASICS

In ETWeb, a performance plan is made up of several components that are managed or evaluated by the various PM roles during the plan cycle.

In addition to the standard plan components that are described below, performance plans can be linked to other ETWeb components, such as developing plans or strengths and needs.

By aligning plans with other areas that assist in monitoring and improving employee performance, you can set more realistic goals and more quickly identify opportunities or difficulties during the process.

This topic gives a quick overview of the standard performance plan components and what kind of information you will find in each.

See *Aligning Evaluations with Performance Indicators* for a description of other ETWeb components that can be linked to performance plans.

TEXT 2. EVALUATION TYPES

When defining goals, the evaluation method you choose for rating evaluate progress is critical to measuring the outcome.

While a goal for completing training course can be evaluated with a simple “Yes” or “No”, another goal such as increasing sales revenue may require multiple parameters that define levels of progress or failure.

TEXT 3. THE CASE FOR SCIENCE IN AFRICA

Africa is plagued by poverty but can't afford not to invest in science. Africa faces serious problems – droughts and famines, infectious diseases and a shortage of good housing, to name a few. Each country also faces unique challenges, from the recent conflicts in Sudan and the Democratic Republic of the Congo to exceptionally high HIV infection rates in South Africa.

Earlier this year, science ministers from the continent agreed to start an “African decade of science”. Financial resources are scarce, however, and the need to address critical problems urgent. How do governments juggle spending on science with humanitarian needs?

There are examples of excellent science in Africa which may provide the answer. The UK's science academy, the Royal Society has recognized the work of young scientists from the continent through its Pfizer award for the past six years. This year's winner, Julie Makani, is working to save thousands of Tanzanians from sickle-cell disease (SCD).

Something that has struck me about Makani is her extensive links to researchers inside and outside Africa. Such collaboration is likely to be the linchpin of further scientific success in Africa: researchers there need to be able to identify problems and then engage with peers in Europe, Asia and the US to find solutions. The Royal Society Africa Awards for collaborative research projects between the UK and research institutions in Ghana or Tanzania help support this.

Task 5. Give the equivalents of the following word combinations.

Artificial horizon, remote control, direct current, acrobatic maneuvers, parasitic antenna, aerodynamic missile, original equation, straight angle, low-flying, short-circuit, rapid change, low water.

Task 6. Translate the following sentences paying attention to terminological meaning of the words.

1. Work is measured by the product of the moving force times the distance through which the force acts in overcoming the resistance. 2. It is best to have the value of an alternating current or varying voltage with time according to the sine wave. 3. The word "phase" when properly used in a.c. terminology, refers to time. 4. The experiment was repeated many times, and the temperature conditions varied slightly. 5. With metal filament lamps the power radiated as light is nearly three times as great as the power radiated heat. 6. We could study the reaction mentioned above very thoroughly because it lasted over a long time. 7. Large turbines have an economy of three or four times that of steam units in a small plant. 8. We know that iron molecules are magnets at all times.

Task 7. Translate the following phrases used in scientific and technical style.

In advance, on no account, after a while, all the more, as relating to, up to date, the point of view, it stands to reason, to put into effect, to a certain extent, for granted, as regards, at any rate, along with, right way, with regard to, in no respect, in all respect, without respect, hardly ever, to give rise, to inquire issues, at the expense of, aside from, let alone, for even (for good), but for, the theory in question, the idea under discussion, the hypothesis under reconsideration, the subject under study, the research in progress, to reach an agreement on the problem, the results have been obtained, to succeed in formulating.

Task 8. Translate the following sentences, paying attention on the word "provide" (поставити) as the verb and "provided" (за умови, як що тільки) as the conjunction.

1. Solar batteries provided much energy for this system operation. 2. A cell supplies electric energy provided its electrodes are different materials. 3. The electrical properties of germanium may be changed, provided germanium is exposed to light. 4. A capacitor stores electric energy provided that a voltage source is applied to it. 5. These experiments provided necessary data for studying this phenomenon. 6. Provided the laboratory is equipped with up-to-date instruments we shall be able to carry out the important scientific researches. 7. A direct current flows provided a direct voltage source is applied to the circuit

Task 9. Comment the following misconceptions.

1. Technical translation includes economics, law, and business.
2. Technical and scientific translation is all about terminology.
3. Style does not matter in technical translation.
4. Technical translation is not creative; it is simply a reproductive transfer process.
5. You need to be an expert in a highly specialized field.
6. Technical translation is all about conveying specialized information.

Task10. Translate the following word combinations paying attention to terminological meaning of the given words.

1. at a great height; 2. at the height of 3 miles; 3. a thick layer; 4. a thin semiconductor layer; 5. to bend at right angle; 6. waves bending in the ionosphere; 7. to lose weight; 8. to lose electrons; 9. to supply considerable energy; 10. to supply modern equipment; 11. at low pressure; 12. at low frequency; 13. in the surrounding medium; 14 medium radio waves; 15. the main quality of the semiconductor; 16. to leave atmosphere; 17. to leave the ground; 18. to change the direction of travel; 19 to move in upper layers of the atmosphere; 20. to consist mainly of neutral molecules.

Task 11. Translate the following sentences paying attention to the constructions “as high as”, “as low as “ before numbers.

1. Some people can hear sounds as high as 20,000 cycles. 2. In the chemical reaction the temperature of gases may be as high as 3,500 Centigrade. 3. The voltage dropped to as low as 25 volts. 4. The possibility of discharge large amounts of energy was demonstrated as early as 1919 by Rutherford. 5. The planet Pluto was discovered as recently as 1930.

Task 12. Translate the following word combinations into Ukrainian. Identify which of them belong to scientific or technical styles.

To found a city; a great number of pictures; room number 14; to study the materials carefully; the capital of a country; construction work on a large scale; recent years; to carry out necessary work; successful research; to give much attention to education; further achievements; major invention; the increase of speed; to facilitate the construction; rapid development; numerous channels; to solve the question; although it was late; the population has grown considerably; important reason; to improve the system of education; a convenient way; a safe means of transport; the length of the river; to link several countries; to use electricity: instead of steam; to unite peoples; main discovery; within .the traffic system; valuable knowledge.

Task 13. Read the text, identify the type of knowledge that needs to understand it clearly, then translate the text into your mother tongue.

ECOLOGY

FROM ONE EARTH TO ONE WORLD

The key to sustainable development is the realization that we are all citizens of one earth, dependent on common resources and on one another. In particular, the pollution of the atmosphere and the oceans, our most precious shared resources, has made people begin to see the world as one. There is no longer any place to send wastes away, into the oceans, the atmosphere, or to other countries. We will eventually get it back again. And we can no longer isolate ourselves from the prob-

lems of people in distant parts of the world, for their actions affect our shared resources and therefore our own future.

Pollution does not respect political boundaries, and we must now recognize that even small local events can have global consequences. A tree felled in one part of the earth, an automobile started, a refrigerator thrown on the garbage pile, a ship's tanks dumped into the bay, human error at a nuclear reactor: all of these events are no longer each country's and each person's "own business" but have become everybody's business. Out of a common concern for our shared resources on the earth emerge a common responsibility and a new commitment to co-operate internationally as a global community. This is the meaning of the saying "from one earth to one world".

Ecology is defined as the study of interactions in nature at all levels, from an individual plant or animal up to the ecosystem. Ecology gives an understanding of nature's structure and function, changes over time, and reaction and recovery from various kinds of disturbances. In Europe, more attention has been given to identification and description of organisms and ecosystems (natural history) than to ecological dynamics (production and decomposition; food chains and energy flow; nutrient cycling; population growth and regulation; soil ecology; succession; evolution; and so on). Natural history is an important element of ecology, but it is not sufficient to give an understanding, even in general terms, of the impact of humans on nature and what comprises good ecological management. Knowledge of the ecological interactions and dynamics mentioned above is needed.

Ecology is not synonymous with environmental science, environmental management or environmental education. Ecology is usually treated as a "pure" natural science "discipline and does not include questions of economics, politics, behaviour, ethics, or culture (even though these are the forces steering most ecosystems). Ecology could therefore be taught as a part of a biology or natural sciences curriculum.

Task 14. Render the article "Ecology. From one Earth to one World" and find equivalents to the following word combinations.

Наука про екологію, може вивчатися, атомний реактор, забруднення, загальні ресурси, мати глобальні наслідки, вивчити взаємодію у природі на усіх рівнях, ідентифікація та опис екосистем, харчовий ланцюг, приріст населення, вплив людства на природу, кругообіг поживних речовин, науковий план вивчення природничих наук, екологічний менеджмент.

Task 15. Read the the article, identify its stylistic and lexical peculiarities. Translate the article into your mother tongue.

Scientists Weigh Tiny Bacterium

(By Dr David Whitehouse, BBC News Online editor)

Scientists have developed a device able to measure the weight of a single cell, and they intend to weigh a virus next.

Made at Cornell University, it is a small cantilever, whose vibration depends upon tiny masses placed on it. The mass of a single cell of the *E coli* bacterium, the researchers say in the *Journal of Applied Physics*, is 665 femtograms. A femtogram is one-thousandth of a picogram, which is one-thousandth of a nanogram, which is a billionth of a gram.

Zepto science

The scale of the researcher's work is straining the number of prefixes needed to describe the world of the very small. They have moved beyond the prefixes "nano", "pico" and "femto" to "atto", and now they have "zepto" in their sights. Officially, zepto means one sextillionth of something, or one prefixed by 20 zeros.

The Cornell University group, headed by professor Harold Craighead, report that they have used tiny oscillating cantilevers to detect masses as small as 6 attograms by nothing the change an added mass produces in the frequency of vibration.

An attogram is one-thousandth of a femtogram, or a thousandth, millionth, billionth of a gram. Their submicroscopic devices, measured in nanometers (the width of three silicon atoms), are called nanoelectromechanical systems, or Nems. The attogram precision is important to weigh objects smaller than cells. The mass of a small virus, for example, is about 10 attograms.

The work is an extension of earlier experiments that detected masses in the femtogram range, including a single *E. coli bacterium*. Eventually, the researchers say, the technology could be used to detect and identify micro-organisms and biological molecules (<http://news.bbc.co.uk/2/hi/science/nature/3607993.stm>).

Task 16. Translate the following sentences paying attention to the meaning of the verb to fail and the noun failure.

1. If the power-assisting mechanism should fail, or if the engine stalls, the brakes will not fail completely, although greater pedal pressure will be needed.

2. Cosmos 419, launched May 10, 1971, appears to have been a Mars probe, but it failed to leave its parking orbit around the Earth.

3. The agency has been criticized for failing to take prompt action where nuclear plants were found to be violating the Nuclear Regulatory Commission's own standards; for failing to ensure that workers were properly trained; and for lagging in its investigations of mismanagement and criminal activities at nuclear plants.

4. By the end of the 1980s more than 12,000 products were being introduced annually, although some 80 percent of them failed to sell profitably and were withdrawn.

5. Although he performed successfully eight more such operations during the next four years, he failed to announce his results until 1849.

6. In 1931 Pauli, in order to explain the apparent failure of some conservation laws in certain radioactive processes, postulated the existence of electrically neutral particles of zero or near-zero mass that could carry away energy and momentum.

7. Cruelty to animals can amount to any of several offences, including failure to take action to alleviate an animal's suffering.

8. Some of these price increases were to a large extent the result of natural conditions that have resulted in crop failures and crop surpluses.

9. A solar eclipse is called annular when the tip of the umbra fails to reach the Earth; then only the center of the Sun is obscured, leaving a bright ring, or annulus.

10. Access time is normally measured in milliseconds and covers the interval between the time the read\write command is issued and the time information indicating the success or failure of the operation is received.

Task 17. Translate the following sentences paying attention on the words in bold.

1. It was very difficult in the early days of the atom smashing **to deliver** a hit on the nucleus. 2. Storage batteries do not **deliver** their maximum output at extremely low temperature. 3. A simple radio telescope consists of a directional antenna, which collects incoming radio waves and **delivers** the collected energy to a reserve. 4. Radioisotopes constitute a potential danger and we must **handle** them carefully. 5. Using this device, the Geiger counter is able **to handle** signal at a rapid rate. 6. It is much more difficult to **handle** radiation received from reactors in indirect ways.

Unit 5

PROFESSIONAL TERMINOLOGICAL VOCABULARY OR LANGUAGES FOR SPECIAL PURPOSES (LSP)

- 5.1. General characteristic of Languages for Special Purposes (LSP).**
- 5.2. Classification of English for specific purposes (ESP).**
- 5.3. Terminology systems and their classification.**
- 5.4. The linguistic processes that influence the existence of terminology systems.**

5.1. GENERAL CHARACTERISTIC OF LANGUAGES FOR SPECIAL PURPOSES (LSP)

The progress of science and technologies today has caused the appearance of new requirements to translator's profession. There have been organized several European projects working on the new objectives, criteria and characteristics of translation competences. According to PACTE group (2000), the project of European Master's in Translation (EMT) started in 2009, and the European Commission, which has developed a list of professional translation competences, new criteria for the formation of future translators' knowledge and linguistic skills were offered (https://ec.europa.eu/info/european-masters-translation-emt_en; http://www.iso.org/iso/catalogue_detail.htm?csnumber=59149). The main result of this work was the introducing a single international standard ISO 17100 in 2015 on translation activities and services, Modern Professional Translator's competences and Translation service requirements caused immediate integration in translators' teaching. Under this standard, the list of the professional requirements for the modern translators and professional competences was analyzed and published, including language and technical competences, the knowledge of modern information technology, computer aided translation technologies (Trados, MemoQ, SmartCAT, Memsources cloud technology and others). It was noted also that among the most important professional translators' competences there was the deep knowledge of modern terminology (general and specialized), ability to use terminological dictionaries, Glossaries especially electronic ones, and different search systems for fast, highly qualified and skilled translation. Moreover, the list of translators' required IT skills included the abilities to use computer graphics, desktop publishing, and computer software to produce and process the material for translation, Web design, skills in technical writing, revision, terminology management, pre-translation, network management.

Therefore, students studying at language faculties, namely those enrolled in the specialty “Translation” should be taught not only with basic philological disciplines enabling to master languages and linguistic skills, but with the following disciplines generating their knowledge of terminology, scientific and technical, special ones, and ability to skillfully use computer aided technology and machine translation tools. Teaching such subjects as “Terminology”, “Scientific and technical translation”, “Methods and practice of written translation” and even preparing for international exams for certification of knowledge of specific languages or languages for special purposes (LSP exams) create conditions for high quality mastering translators’ professional competence. Practical work on terminology and terminological texts in learning process allow students to explore new terms appear almost daily, to analyze current tendencies in terminology and term formation, investigate and, in some cases, even offer the adequate translation variants of new terminology constructions that will certainly require careful interpretation and identification in the TL.

People use the expressions and notions of special language that are not part of their everyday language in every subject field of human activity. They are not familiar with these subject fields and as a result may not understand what experts mean. Linguists call this special language ‘*technical jargon*’ or even ‘*mumbo-jumbo*’. Some people name this special language foreign. Surprisingly, when people are asked which subject field special language belongs to, only a few of them can name their own one. Medicine, science, engineering, and economics are said to be the most common subject field.

When we talk about special languages people refer to what linguists call terminology. Terminology is a special language used in a particular subject field of human activity also called Language for Special Purposes (LSP). It explains the reason why people are asked to identify the subject field where special languages are used before translation. Specific terms have become the part of everyday language so they are no longer seen as specific terms. Often the experts are not aware of this linguistic layer in vocabulary. Moreover, they are surprised when they talk to people who are not acquainted with their subject field. Misunderstandings and confusions can be the obvious results of this unawareness. Additionally, in a business context people, talking about different things can increase the amount of money needed to accomplish a task, for example, developing a new product.

Professional terminological vocabulary occupies a special position in national language, consisting of a huge amount of sublanguages. Each sublanguage is used in one particular subject field or sphere of human activity. Stylistically limited (or stylistically coloured vocabulary) or special vocabulary consists of the words, that, except of denotative meaning, have also professional special or narrow special one. The words composing synonymic groups in general vocabulary, do not take the same place in special one. Therefore, the term “sphere of communication” is vital not only for functional linguistics but also for the theory of translation.

The problem of existence of the languages for specialists or, in other words Languages for Special Purposes (LSP) appeared in the contrast to the literary form of language arising in different countries in different times. Although the exact time of the appearance of literary form of languages is hardly dated, the appearance of the language for special purposes is dated easily. The term "Language for Special Purposes" was created in the 1960's in German-speaking countries in Europe. Nevertheless to the significant phonetic, orthographic, lexical divergences of the unique special language on the territory of Austria, Belgium, GDR, FRG, Switzerland, those, who worked in the sphere of terminology, raised the question about the necessity to preserve the unity of the language at least in the area of special knowledge.

The term "sublanguage" was introduced by Zellig Harris in his article "Mathematical structures of a language" in 1968, which published in New York. Harris considered a term and terminology or sublanguage as a part of national language differing from other parts of language syntactically and/or lexically. Hirschman and Sager, working on the creation of the sublanguages in their book "Automatic information formatting of a medical sublanguage" in 1982 changed the definition of a term and offered the concept "sublanguage" as a particular language, used in the subject field professional texts, reports or articles of technical specialties or scientific subfield where the authors of the documents share a common vocabulary and common habits of word usage (M. Cabre: 1999, 82). Thus, the concept "Language for Special Purposes", which received the abbreviated designation LSP from English (Language for Special Purposes) was formed.

The concept LSP was explained on the pages of an Austrian journal "Fachsprache", as well as in other special publications, issued abroad. This concept is close to the applied in linguistics concept "sublanguage", because the basis of any LSP composes special vocabulary. In the connection with the ideas of western scientists, there was a tendency to consider LSP as a certain fragment of a national language included. For instance, G. Rondeau writes that the entire totality of the vocabulary of national language can be divided into the general vocabulary and the vocabulary of languages for special purposes (M. Cabre: 1999, 122). The totality of words and expressions, which do not relate in the texts (in which they are included), belongs to the special activity. General vocabulary occupies central position, while special one focuses on periphery. According to G. Rondeau there is the general scientific and technical style, which makes it possible to distinguish scientific and technical communication from the non-scientific-technical ones, depending on subject fields and linguistic levels.

Other linguists identified LSP as one of the types of sublanguages, used for special communication in the sphere of science and technology, even the concept "sublanguage" is equal to the applied in Europe the concept LSP but in this sense the concept "sublanguage" can be applied not only for scientific, technical, commercial, but also for regional and other non-standardized languages.

The study of contemporary theory of LSP, the research of national and foreign LSPs, and also the numerous scientific works on terminology made the attempts to develop the LSP theory. The great amount of the research in this field seems to be of German origin. In 1997 Hoffmann, Kalverkaemper & Wiegand have published the major handbook in this field titled "Languages for Special Purposes: An International Handbook of Special Languages & Terminology Research". The number of objects, which attract special attention of researchers (e.g.: Albrecht & Baum (1992); Dietz (1995); Grindsted & Wagner (1992); Gopferich (1995); Hahn (1981); Kretzenbacher (1990); Schaefer & Bergenholtz (1994); Timm (1992) and Wendt (1997)), includes the enumerations of morphemes, syntactic structures and syntagmas, which exist in special texts, complete schemes of word formation for designation of new concepts. The fundamental principles of LSP are determined on the one hand, by different communicative needs of specific groups, and, on the other hand by an economic principle, which reduces the rate of missed information.

Language for special purposes just as any national literary language is a historical category, which has its periodization and is still being developed. The appearance of LSP was caused by the development of crafts, trade, long before the formation of literary languages, and with the formation of them LSPs preserves their isolation, practically do not influence their contents. Terms of LSP can enter into general vocabulary, describing notions, while the most typical and frequent used words of general vocabulary can be found in LSP. The main aim of the appearance of LSP is a professional standardization and adequate use of lexical means. In the connection with the appearing new areas, there are considerable difficulties in distinguishing between general, scientific, technological and highly specialized terminologies.

Language for special purposes can be created for the new field of knowledge on the base of national language with a certain participation of the borrowed elements. If meanings of the words of the national language are formed during centuries, language for the special purposes can be arbitrarily designed and assigned with specific units on condition of applying these terms by all specialists, who use this LSP. Thus, neologisms of LSP are different from neologisms of common language, first of all, in their artificiality and absence of general use. The genres, in which the language for special purposes exists, are different from the genres of literary language. Terminological dictionaries, terminological standards, descriptions of terminology systems, scientific articles, specifications, thesis, scientific reports, instructions, technological processes, constructions, etc. consist of languages for special purposes. To exemplify, the following texts could be compared:

1. Фотони – частини цілком іншої будови. Їх швидкість завжди дорівнює швидкості і світла. Наявність таких характеристик, як частота та поляризація, яких нема в електронах, розмірює їх інформаційні можливості.

За всіма параметрами потік електронів легко піддається регулюванню за допомогою вже наявних оптичних і оптоелектронних приладів.

2. «Фотони», «Електрони», «Берізки» - це вся техніка минулих часів, яка була знаковою для свого хазяїна. (Мається на увазі назви телевізорів радянських часів).

The difference in styles and genres of the two fragments is evident.

The genres of LSP often have special limitations in syntax. Syntactic constructions of literary languages are completely unlimited. Viewing grammatically, the term LSP is poorer than the literary language, whose syntax is especially developed. LSP is characterized by the frequent repetition of some syntactic constructions. Moreover, the words of literary language are connected with the concepts, which do not have clear boundaries in general use. The words of LSP are often met in different subject fields, and each of them has a specific concept.

Language for special purposes is poor in expressive means, different syntactic constructions used for expressivity, so typical for literary language, are absent in LSP. In addition, stylistic means as metaphors or synonyms are not represent in LSP. They only connect with concepts and with creating new terms: *columbine* (this is not a bird that relates to another biological form), *umbrella* (it is a form of flower), and *hairspring* (it is a thin wire). All these words in the language for special purposes have different meanings, acquiring additional semantic component, which designates special scientific concepts.

Professional terminological vocabulary or language for special purposes will not serve most people who have to work with a language (such as linguists, teachers, translators and language planners). It can be used in different spheres of professional activity (terminology system), on the territories where language exists (dialects) and in the groups formed with different signs of social activity (social dialects, jargons). But only terminology belongs to the literary type of vocabulary. The number of subject-oriented terms of knowledge and sphere of human activity comprises the concept of terminology system.

Professional sublanguage is the form or variant of languages for special purposes. For example, if an instructor in gymnastics tells his/her student, that he/she has made "a sparrow" instead of "a swallow" or she has made "a string" instead of "a split", it is not only because of the various expressive means, but also because of a certain degree of estimation. After this, it can be understood that she has made these gymnastic figures badly.

Professional sublanguage is considered as non-standardized form of existence of special linguistic means in literature. It can be caused with several reasons: psychological, psycholinguistic and actually linguistic ones. Different kinds of metaphorization or metonymization remained far from the boundaries of the normative use belong to the psycholinguistic reasons for the appearance of professional sublanguage. For example, the text corrector can say about the text that it has done like cucumber. The expression "soup with shrapnel", "porridge from

shrapnel” was born during World War I in the common speech of soldiers and military chefs. Frequently the linguistic source of professional sublanguage is a tendency to save time, using reduced form. As a result, the following syntactic constructions as ellipses appeared

Although sublanguages are different from national language functionally, they, furthermore, cannot be considered as the functional varieties of national language. It is possible to speak about the unique bilingualism: almost all professional subsystems, based on the grammatical system of national language, have larger or smaller differences from it in the word-formation and word-changing and significant differences in vocabulary. There are many words unknown to literary language, and a great number of words are used in completely different meanings. Moreover, professional words can be created new ones with the use of native or borrowed word-forming means on general linguistic principles reconsidering everyday words. Every subject field and every school of science develops special terminology with its methods and principles of word formation, and future translators should clearly understand them.

It is needed to conclude that professional terminological vocabulary can be in different variation depending on its use: mathematical, physical, chemical, biological, medical, legal, philosophical, economic system with further identification. Languages for special purposes are used in particular communicative spheres, they do not have general use and are not extended, similarly to literary languages, and they spread throughout the entire territory of the country. In recent decades, the normal Internet space has given the opportunity to use electronic terminological dictionaries such as MultiLeks, Lingvo, TERMIUM, TERMIUM Plus, INTENT and others. The newly created dictionaries fully reflect the core concepts, comply with rules and regulations of the modern Ukrainian literary language; standardize terminology in compliance with all requirements of integrity, completeness and consistency, to make automated bank terms, unify and manage the massive amounts of factual data.

5.2. CLASSIFICATION OF ENGLISH FOR SPECIFIC PURPOSES (ESP)

As terminology of other languages, the history of the ESP (English for Specific Purposes) is traced back to the 1960s, though several books and materials designed to teaching English for specialists in different fields (especially business and economics) were published even in the first decades of the 20th century. In English several terms are used, among which specialized languages, special languages, specialized communication, technical English, scientific English, English for special or specific purposes or ESP, English for Occupational Purposes, Professional English or, more recently, Academic and Professional Languages. There is no consensus among scholars regarding the boundaries of concepts transmitted by oth-

er terms such as 'Language for Specific Purposes' or 'Specialized Language'. In order to avoid any controversy, the term 'Academic and Professional Language' will strictly be used here to refer to any type of language used in specialized communication, in an academic or professional setting and characterized as having a restricted number of users [

Today ESP has its own developed methodology not only for researching but also for teaching. The emphasis of ESP is always on practical aims to help people communicate in different subject fields in English. It explains the fact that English is in the great demand for specific professional needs and for developments in the linguistic fields.

ESP designed to meet specific needs is based on the language (grammar, vocabulary and style), skills, discourse and genres appropriate to professional activities. ESP has the same grammar, pronunciation and spelling as are found in all kinds of English. It includes much of the general vocabulary of English, though with a large number of specialized items or of familiar words used in specialized ways; linked symbols and visual symbolizations, which nevertheless can be verbalized by professionals. Moreover, ESP may be related to specific disciplines such as linguistic, economy, marketing, IT-technology, social science and others. ESP may use irrespectively on the level of learners (from in intermediate to proficiency). For example, most ESP courses assume basic knowledge of the language system, but it can be used with beginners. ESP learners are also becoming increasingly involved in intercultural communication and the development of intercultural competence.

In modern linguistics, there are several classification of ESP. According to traditional classification ESP is y divided into two main types on the base of its usage:

- 1) **English for Academic Purposes (EAP)** involving preparing, experienced and postexperienced courses, and
- 2) **English for Occupational Purposes (EOP)** for study in a specific discipline (pre-study, in-study, and post-study) or as a school subject (independent or integrated).

ESP of two types EAP and EOP is related to the actual discipline or work when learners have abilities and skills for specific or integrated study.

Another classification of ESP divides EAP and EOP according to discipline or professional subject field into:

- 1) EAP involves English for (Academic) Science and Technology (EST), English for (Academic) Medical Purposes (EMP), English for (Academic) Legal Purposes (ELP), and English for Management, Finance and Economics;
- 2) EOP includes English for Professional Purposes (English for Medical Purposes, English for Business Purposes – EBP) and English for Vocational Purposes (Pre-vocational English and Vocational English).

The academic study of business, finance, banking, and economics has become increasingly important recently, especially Masters in Business Administration (MBA) courses. The learners of EOP courses deal with English for professional purposes in administration, medicine, law and business, and vocational

purposes for non-professionals in work (language of training for specific trades or occupations) or pre-work situations (concerned with finding a job and interview skills).

Nowadays there are sublanguages of ESP:

EAP (English for Academic Purposes);

EBP (English for Business Purposes);

ESAP (English for Specific Academic Purposes);

EGAP (English for General Academic Purposes);

EMP (English for Medical Purposes);

EOP (English for Occupational Purposes);

EPP (English for Professional Purposes);

EST (English for Science and Technology);

EVP (English for Vocational Purposes);

EWP (English for/in the Workplace).

If in the early years of developing ESP, the interest was oriented towards English for Science and Technology and English for Business and Economics, in the 1990s a new branch of science emerged and gained importance, thus English for Information Technology and English for the Internet became in trend. In the 2000s, due to the spread of mass tourism and changes that occurred in the world market, which made more and more people take up jobs (even if only summer jobs) abroad, It caused the rise of other “Englishes” for special purpose.

ESP teachers need to have considerable flexibility, be willing to listen to learners, take interest in the disciplines or professional activities the students are involved in, and to take some risks in their teaching. This involves selection of published material, adapting material if it is not suitable, or writing it. ESP teachers also need to assess the effectiveness of the teaching material used whether it is published or produced. However, since the teachers are encouraged by their employees to write new material there is a danger of constant re-invention of the wheel; advantages of published materials are ignored even when they are suitable for a given situation.

It can be concluded that ESP (English for Specific Purposes) can be divided into several types according to the content and aims determined by the needs of a specific group of learners. ESP is often divided into EAP (English for Academic Purposes) and EOP (English for Occupational Purposes). Further sub-divisions of EOP are sometimes made into business English, professional English (e.g. English for doctors, lawyers) and vocational English (e.g. English for tourism, nursing, aviation, and building).

5.3. TERMINOLOGY SYSTEMS AND THEIR CLASSIFICATION

Terminology systems are characterized with the following basic peculiarities such as systematization, the presence of standardized terms having the tendency to monosemy (within the boundaries of this terminology system), the absence of

expressive and connotative meanings (in the condition of determinologization or in the use of other style of speech where terms can be very expressive). Almost every terminology system or field nowadays is fixed and analyzed in glossaries, approved by the authorities, special committees and eminent scholars.

There are two kinds of terminology systems in the structure of professional vocabulary: **special (professional) terminology and narrow special or specialized terminology (actually professional)**. Special terminology (professional) is a system of terms used in different types of speech in a definite terminology field of human activity. It can be explained by the situation when a patient hears medical diagnosis. Some words can be clear for the patient (the *flu*, *temperature*, *pressure*). However, there are also words like *sepsis*, *alopecia*, *asphyxia*, *ventilation* that are unfamiliar for the patient (narrow-specialized terminology, actually professional).

In connection with the new sciences appearance, or new phenomena discovering, there are considerable difficulties in distinguishing **scientific, general technological and narrow specialized terminologies**. Professional terminological vocabulary or LSP has many varieties according to the sphere of its usage. It is possible to select mathematical, physical, chemical, botanical, medical, legal, philosophical, economic LSP and others. The words comprising LSP are quite often included into special dictionaries, sometimes with professional identification to emphasize non-official character of these words. These words are characterized by greater differentiation in denotation of special concepts, instruments and means of production, in the name of objects, actions.

Special professional terminology system and sublanguage words and expressions which are not strictly legalized, scientifically determined notions of technical, agricultural, sporting and other professional concepts belong to. For example, in meteorology, in accordance with the different types of snowflakes, there exist of few terms narrowly special: *asterisk*, *needle*, *hedgehog*, *plate*, *bit of fluff*, *column*.

Other professional words and expressions remain narrow-special, used in a colloquial speech of people, united by a certain kind of work. There are such idioms and words as “*Jack and Jill*”, “*Black Jack*”, “*jack*” (flag on a mast) in the English professional slang. These words sometimes have the mark “professional-slang” or “sublanguage” and are placed in special dictionaries with professional identification. Boundaries between semi-official and professional-slangy terms are unsteady and determined only conditionally according to the context.

Terminology systems may be regarded as intersecting sets, because some terms belong simultaneously to several terminology systems. There is no harm if the meaning of the term and its definition remains constant, or it can cause the opposite phenomenon, i.e. the synonymy of terms, which is no less dangerous for very obvious reasons. The interesting point of view is offered in one of the most contemporary world sciences, cybernetics. It offers a single vocabulary and a single set of concepts suitable for representing the most diverse types of systems: in linguistic or biological aspects of communication no less than in various engineer-

ing professions. This fact is of a great importance, as it has been repeatedly found in science that the discovery of analogy or relation between two fields of science leads to developing one of them.

Sometimes in scientific and technical texts there are words and word-combinations, which are similar in their forms but belong to different terminology systems. Such notions and terms are used in word stocks of various disciplines, for example, military terminology can be used in the medical sphere (heart attack – серцевий напад, aggressive – агресивна хіміотерапія), political lexis exists in economics (investment strategy – інвестиційна політика, captain of industry-промисловий магнат). There is no harm in the process of transferminologization of terms (transition of terms from one terminology systems into another one), because their meanings are kept in dictionaries and terminology glossaries with the pointed terminology system they belong to.

The great amount of work done on chemistry terminology, and the principles governing this work seem impressive and more “realistic” than problems related to the terminology of, for example, social sciences. In chemistry, the principles of nomenclature are described and highly standardized by organization IUPAC (*International Union of Pure and Applied Chemistry*). This organization has developed a system of principles or recommendations for the naming chemical elements and compounds. According to this system, chemical names, built on the elements based on those recommendations, are termed systematic names. These principles are realistic from the point of view of reflecting the structures of chemical substances themselves. In chemistry, there are also trivial names which do not reflect the composition of the substance, but, for example, its origin. Trade names for chemicals form a well-know subclass of trivial names (e.g. “Mediterranean salt”).

Although there are organizations comparable to the American Chemical Society that develop databases and thesauri for social sciences, the problems seem different. Organizations such as the American Psychological Association actually publish impressive databases (like PsycINFO) and corresponding thesauri. There are, however, no international guidelines for psychological terminology and no real research efforts either. Competent researchers very rarely publish scientific works about psychological and social scientific language. There is no indication of a relation between works about psychological language and the work done by the staff of PsycINFO. Linguistic works on psychological language are also absent.

Legal studies are the discipline in which Civil Service style or *officialese* is a rather well known concept, and it has been written much more about this than about the languages of other social sciences. Legal language is often accused of being very difficult for understanding, and many efforts are done in order to reduce this problem. The problems addressed to legal language seem thus to be different from the problems discussed above in both chemistry and psychology.

Terminology management nowadays is becoming the most important problem in linguistics. It includes the creation of subject-field specific terminologies and terminography recording terminological information in the form of terminology databases, dictionaries, lexicons, specialized encyclopedias, thesauri etc. Today linguists, no less than other scholars, must be aware of the current processes in each field of knowledge and be in touch with general progress.

5.4. THE LINGUISTIC PROCESSES THAT INFLUENCE THE EXISTENCE OF TERMINOLOGY SYSTEMS

When we define terminology as a structured set of concepts of a particular subject field, it can be considered as the infrastructure of specialized knowledge. Whenever and wherever specialized information and knowledge are created, communicated, recorded, processed, stored, transformed or re-used, terminology is involved in one way or another. Technical writing and technical documentation are thus impossible without properly used terminological resources. Since the creation of technical texts, high-quality multilingual terminologies have become scarce and much desired on the present markets of language and knowledge industries.

Terminology systems are constantly renewed and completed with new terms. There are terms for all the different specialties and their variety is huge, e.g. *amplitude* (physics), *antibiotic* (medicine), *arabesque* (ballet), *feedback* (cybernetics), *acid* (chemistry), *frame* (cinema). Most terms in the first period of their existence are known to a few specialists, later they become familiar to a wider circle of people. Some of these terms are of comparatively recent origin: *stratosphere* (1908), *gene* (1909), *quantum* (1910), *vitamin* (1912), *isotope* (1913), *behaviorism* (1914), *penicillin* (1929), *cyclotron* (1932), *ionosphere* (1931), *radar* (1942), *transistor* (1952), *tows* (1960), *white hole* (1972), *beam weapon* (1977), *computer mouse or mice* (1984), *nanotechnology or nanotech* (1986); *internet* (1999), *3G image* (2001), *search engine* (2005), *Large Hadron collider* (2008), *netbook* (2010), *gastropub* (2012), *polar vortex* (2014) and others.

Terminology systems are expanded in various ways, for example with the use of everyday words or with the help of terms from a certain terminology system, used to express concepts of another one. The process of creating new terms on the base of reconsideration of everyday words meanings as a result of which the second, special-terminology meaning appears is called terminologization. Thus, a terminologized unit is a former word of general language acquired in the result of reconsideration another to its general one a new terminology meaning to define a new concept. This method of word formation allows creating terminology names with semantic elements, cp. *wormy image*, *dead time*, and *foreign atom*.

The penetration of special vocabulary into the literary language is achieved selectively, non-systematically. Terms, which are as a rule, affected by the process of determinologization, appear now and then to be converted into trendy words. In this case, they lose their basic terminological meaning and comprise **subjectively organized vocabulary** in literary language. However, it is necessary to remember that the use of special vocabulary in literary language may lead to its serious destructions. It could destroy language systematization and make it practically unsuitable for special use. This fact exactly composes the basic specific peculiarity of terms and the way to distinguish terms from everyday words.

Despite the fact that **term is based on the principle of monosemy, a great variety** of terms is used in different spheres of science and technology and acquires several meanings. The theory and practice of investigation of various terminology systems, and also the experience of number of lexicographical works emphasize that term as a lexical unit, which main function is determination of a concept, can be **polysemantic**. Compare some meanings of the two widespread terms “*level*” and “*density*”:

level – рівень, нівелір, проектна відмітка;

density – щільність населення, комп’ютерний диск з одинарною/подвійною щільністю.

Polysemy of terms (ср. *monosemy* “однозначність”), as well as their synonymy, homonymy and antonymy (ср. *monosemy* – *polysemy*) is usually registered in the number of lacks of many modern terminologies. There are two terms used for the description of this lexical process in terminology: **polysemy and semantic variation**. According to O. Akhmanova and A. Superanskaya one of the reasons for term polysemy is its “intercategory” which lies in the fact that the concept has its own content, represented in the term, and indicated with several categories (for example, its procession and quantity). Other reason for polysemy of terms is explained by the specifics of term which unites peculiarities of a word and a sign to express the content of definite concept.

System of terms, i.e. terminology of any science does not appear by itself. It is created in the process of human activity. Therefore, to reflect the system of concepts of a certain science, it is necessary to observe full system of these concepts which they define. In the boundaries of definite terminology system certain term may express only one concept, in other words - present monosemantic information. Monosemy is understood here as «**a logic principle of a sign construction**” (or «the law of sign») because the main principle of general semantics is the correspondence of “each unit of the content to one certain unit of the expression or form” (O.Akhmanova: 1974, 26). Many terminologists consider that the tendency to monosemy is a vital criterion of a term existence as every term is used as **a sign**.

However, **term is a word**, which instead of a simple sign specified as a definite element of terminology system, is used for a professional and scientific communication. It expresses a scientific concept and, in the essence of each word, the

boundary of scientific concept must be clearly defined in accordance with its etymology. In this fact, there is a principal difference between a term and every day word. At the same time, terminology is not isolated from the literary language, and those processes of literary language are reflected in terminology.

What happens with the term when it actually functions in scientific speech? In reality, the logical principle of sign is not frequently observed in everyday speech, and as a result we encounter the disturbance of “the law of sign” or often meet **interscientific homonymy**. The phenomenon of interscientific terminological homonymy could be considered as one of such disturbances, when the same term can enter into different terminology systems of a certain language. And when we try to translate these terms it causes certain difficulties.

The peculiarity of this phenomenon could be illustrated with the following examples. In the English language the word “plate” is polysemantic. Its main meanings can be translated as «тарілка», «металевий посуд», «плита», «лист», «смуга» (металу), «платівка», «дощечка» and so on. The word “plate” in the meaning «пластинка», «плита» was borrowed by specialists from literary language into all spheres of knowledge. And when this word became a term it expressed a definite concept in each sphere of knowledge, cp.: “plate” in the building industry means «підкріплювальна в’язка», in the mining industry it means «сланцева порода», «плитняк», in the electric technology — «анод» (лампи) or «електрод» (аккумулятора), in the metallurgy — «листовая сталь». Of course, «plate» as «підкріплювальна в’язка», and “plate” as «сланцева порода» are interscientific terminological homonyms because they are used in different terminological systems and it is the main criterion to distinguish these words.

Thus, unlike non-terms, many of which are polysemantic, terms within the boundaries of one science or technology must be monosemantic. The expressively limited, mainly motivated specialization and absolute semantic precision must be inherent by them. However, the absolute distinguishing criterion of terms is relative. It is a requirement to the ideal term because there are not many terms in the existent terminologies that are monosemantic.

It is evident that all lexical processes happening in a certain language could also be reflected in a certain terminology system. There are three lexical processes distinguished in the development of professional terminological vocabulary: **terminologization, transterminologization and determinologization**. All these processes of term polysemy are caused by linguistic reasons. Everyday words are involved in the term migration.

Terminologization is a process of creating new names or terminological notions by the use of everyday words. As a result, the second, special meaning of everyday word arises. That is why, the issue of terminologization is fundamental to the description of a special language.

Firstly, we can mark special communication: particular grouping of lexical items must be clearly assigned to free compounds or term-combinations, phrases,

idioms used by specialists are terminologized. The main aim of lexicographers is to distinguish terminological meaning of one lexical unit from collocation. Thus, several difficulties appear before terminologists. Among them:

- recognition of terminological units in the texts,
- lexicalization of new terms,
- recognition of terminological units by special language users with the aim to know the appropriate concepts.

Moreover, there are conceptual units called “terminology phraseology” which are often met representing a definite concept and there are terms, which are determinologized and become lexical units of general language.

Determinologization of terminological vocabulary is a process of transition of terms from a certain special, professional sphere to the sphere of general use. Such determinologized terms are not deprived with the belle letters and official elements. These kinds of terms can be met and in the colloquial speech (mainly of educated people). As a rule they are used ironically.

Ср.: *So, armed with all this intelligence, she dialed the third girl wanted a lovely flat, near park (Binchy).*

Ukrainian translation of this sentence shows that the words “*armed with all this intelligence*” are not used in their direct meaning: *Озброєна усіма даними розвідки, вона зателефонувала третьої дівчині, бажаючи улюблену квартиру поруч з парком.*

What are the reasons for determinologization? In a great deal it depends on the sphere of activity where the term is used, i.e. on different functional styles of speech (colloquial and belles letter). On the other hand, it is closely related to the intensity of borrowings from one or other levels of vocabulary limited on the sphere of use or their distribution. Many words, idioms and phrases quite often have other metaphorical, lexical or phrasological meaning. Ср.: *каталізатор* (спец.) — «речовина, що прискорює, уповільнює або змінює протяг хімічної реакції» і *каталізатор* (перен.) — «стимулятор чого-небудь»; *контакт* (спец.) — «з'єднання електричних проводів» і *контакт* (перен.) — «зв'язок, взаємодія», «узгодженість у роботі» і т.п.

As the example shows, the special meaning of terms is lost at the process of determinologization, but the terms obtain expressive-emotional meaning. So, this method could be considered as the way of creation of new names with the elements of semantic expression.

Modern researches prove there is no clear borderline between scientific-technical categorization and classification where meanings of words and utterances show a high degree of ambiguity. However, different types of meaning and parallel ‘processing’ at different fields are highly productive in coping with any communicative situation. Usually narrow professional words are not highly distributed in literary language; i.e. terms with limited usage are not used. Moreover, professional speech is often colloquial. That is why the secondary terminologiza-

tion of professional words and expressions appears quickly: terms existing in the boundaries of one terminology system pass to another one. The terms can modify the meaning in a new subject field, so the reader can not understand them in the sense he knew them before, (in that science, from which they were borrowed). Sometimes the clear division between these factors is practically impossible.

This process is called **transterminologization** and the terms that obtain other semantic meaning are called **transterms**. In the case of transterminologization transterms become the unique officially legalized names. The analysis of transterminologization as the process of creating new special meanings of terms in other terminology systems presents a particular and increasing interest for the modern science, stimulates the linguistic study of terminology in this aspect. The subject of the research occupies the terms of different sciences, fixed in linguistics as homonymy and polysemy having two or more meanings in different terminology systems.

The objective process of transterminologization consolidates the influence of such factors as scientific, technological, economic development of the countries, mass media, political situation in the world, extension of multilateral cooperation in the economics and science. Verbal speech, systematic rendering proper themes on radio and television promote the processes of determinologization and **transterminologization** of professional and technical terms. The reasons for the secondary terminological nomination are explained with the influence of such intralingua facts as phonetic convergence and process of word-formation. The other reason for the secondary terminologization is the integration of scientific knowledge realized by the different ways and implicated in various forms, the unification of conceptual meaning and formation of the synthetic sciences. The instance of the term borrowings without any semantic transformations can explain the presence of the same terminological units in certain close subject science research. Interfield sciences (biochemistry, biophysics, radio astronomy, geophysics, geochemistry, etc.) often demonstrate the usage of the terms from exact initial sciences, including different subsystems of suitable concepts. The main characteristic linguistic reason for transterminologization is the tendency to economize language material.

Specific character of polysemy of terms allows creating and appearing of synonymic terminology groups. The following example clearly shows this linguistic phenomenon. There are two synonymic groups of the word "*alphabet*": 1. «*абетка, алфавит, буквар*»; 2. «*буквар, начала, основи, підстава, початок, абетка*». The problems of polysemy and synonymy become urgent with the necessity of compelling opposite dictionaries, concordances where the method of synonymic correlation is used.

Synonymy of terms, so called the coincidence of basic meanings (usually with the retention of differences in the nuances and the stylistic characteristic) of terms, morphemes, constructions, phraseology units and etc. has been investigated in modern linguistics. The question of choosing appropriate terminological

meaning attracts the interest of the following Ukrainian linguists as T. Rybak, T. Leshuk, L. Kucherenko, B. Rytsar working on the problem of terminological synonymy.

Synonyms in terminology are terms being close in their semantic meaning and sphere of usage and differ in spelling. Terms-synonyms are included in a termbank generally in the same way as abbreviations and short forms with their full form. Due to their inner structure, every concept gets a single set of data and can be found in the same record, with their grammatical features, pronunciation and additional information in special literature. What is more, terms-synonyms are classified according to their subject fields and the level of frequency in professional speech.

The phenomenon of synonymy in terminology is traditionally thought as negative that is why terminologists and terminographers always try to avoid of using synonyms and chose only a standard variant. One of the most important requirements for a term in the linguistic opinion is the absence of synonyms in one terminological system (А. Реформатский: 1968, 104). But there is an opposite point of view in terminological literature according to which synonymy in terminology is a natural expression of lexicological development (Т. Журавлева: 1999, 57).

The appearance of synonymous terms is caused by several reasons.

1. Synonymous terms appear in the process of borrowing which is the main source of extending and enriching national scientific terminology. Thus, most terms in Ukrainian were borrowed from other languages and with the Russian language as an intermediary during the last century and coincided with their variants. Such terms were borrowed according to the rules of Russian not Ukrainian grammar, ср.: *ажурний – прозірчастий, буферний – вирівняльний, інфлюентний – впливовий, горизонтальний – поземний, декоративний – оздобний, дистанційний – віддальний, дистиляційний – перегінний, кінетичний – руховий, пульверизаційний – розпорскувальний/ прискальний, рольковий – коточковий, селективний – вибірчий, термічний – тепловий, шунтовий – узбічниковий.*

2. Synonymous terms appeared in the certain period of national terminology formation. There was a tradition due to that foreign terms and calque occupied a dominant position in TL. For example, there is a term *автоматичний* borrowed from Greek *automatos* next to Ukrainian *самочинний*, or *свердловий* and *буровий*, *очеретяний* and *тростинний*, *броварний* and *пивоварний*.

3. It is possible to suppose that the basic reason for the appearance of synonymous terms is the desire to avoid of repetition, in other words a tendency toward the variation, the ability of polysemy terms to enter into different synonymous groups. In order to present this problem more widely, it is possible to turn both scientific definition and synonymous groups. If we compare three words from different terminological dictionaries, where they appeared simultaneously: *area*, *circle*, and *graph*, we observe the following:

Area is the measure of the region enclosed within bounding lines, or the measure of the surface of a geometric solid. Bearing in mind scientific definition given in the dictionary and comparing every meaning in the English-Ukrainian and Ukrainian-English dictionaries, it is possible to build the following synonymous group: *area, space* — площа, простір.

Circle is the closed curve lying in space and constructed in such a way that all its points are equally distant from a fixed point in space. Sometimes, however, a circle is regarded as a plane figure bounded with a curve. It follows that a term is ambiguous, referring sometimes to a boundary, sometimes to a disk. If we consider terms “*коло*” and “*окружність*” as synonyms, it is possible to build two synonymous groups:

1. *circle, disk* — коло, топологічний образ кола, диск and
2. *periphery* — коло, окружність кола, межа фігури, кордон замкнутої криволінійної фігури.

Thus, a synonymous group includes the following elements: *circle, disk; circumference, periphery*.

The definition of the term “*graph*” is more strict, and one synonymous group is easily separated: *graph, diagram, chart, scheme* — графік, діаграма, карта, схема.

Graph is a diagram showing the relationship between two or more variable quantities. Compare: *diagram* — діаграма, схема, графік; *scheme* — scheme, plan, diagram, circuit; *графік* — graph, diagram, chart, schedule. How can we distinguish and select the necessary meaning in the number of synonyms? If only we use a contrastive method to oppose meanings of the words or compare them with antonyms, *circle – square; periphery – line*.

In most cases, related terms are not antonyms -- they are not one of two in a direct antonymic pair. In fact, most of them differ from each other with very small differences only, making them even partially synonymous. Nevertheless, they are related to one another with the same superordinate concept, consequently they are characterized as related terms only. In general, it is impossible to give a grade of relation that can be individually and subjectively distinguished. Related terms, not denoting the same concept, are not placed in the same data record, but they point to each other mentioning the other term as a representation of a related concept.

Synonymy of terms exists notwithstanding the requirements for a term. Contemporary terminological dictionaries have a great variety of synonymous terms, so the researchers can choose a more suitable word. On the examples mentioned above we can define the basic principles of synonymy: the concept of synonymy is usually associated with the concept of antonymy. Some linguists claim that the concepts of synonymy and antonymy are very considerably parallel.

The linguistic term of “*antonym*” defines an approximate and vague concept of polarity. But, on the other hand, there are words which, while not being different in their forms, quite frequently, especially in the field of terminology, are

polar, or, at any rate, may be regarded as polar so far as their meanings are concerned. For example, the opposition of “*acid*” and “*base*”:

Acid is defined as “a chemical compound which yields hydrogen ions when dissolved in water; the hydrogen of which can be replaced by metals or basic radicals, or which reacts with bases to form salts and water”.

Base is “a compound which yields hydroxyl ions in aqueous solution, and which reacts with an acid to form water and salt”.

The definitions mentioned above may not support an adequate basis to make up the decision of antonymy. Nevertheless, we clearly associate these terms with the two classes of chemical substances with polar properties.

Finally, we can emphasize that such linguistic processes as terminologization, determinologization, transterminologization and other specialization caused by the following lexical processes such as borrowing, calque, and reconsideration of terminological meaning are the basic sources for developing terminological polysemy, synonymy and antonymy.

To sum up all the issues presented above, it is necessary to enumerate the peculiarities of LSP. Languages for special purposes are used in particular communicative spheres, they do not have general use and are not extended, similarly to literary languages, they spread throughout the entire territory of the country. The role of studying professional terminological vocabulary or Languages for Special Purposes (LSP) has become of a great importance. Studying scientific and technical terminologies will help to form not only translators’ linguistic competence, but also the ability to work effectively in computer-aided translation using electronic dictionaries, modern search systems and other technologies. Studying Languages for Special Purposes (LSP) should be seen as a separate activity within linguistic study and language teaching with its own methodology and research principles. The emphasis should be on the practical aims more than theoretical ones. It will allow future translators communicate without barriers and work more effectively.

PRACTICAL ASSIGNMENTS

Task 1. Get ready to discuss the following questions.

1. Identify professional terminological vocabulary; explain its particular position in national languages.
2. Explain the term “sphere of communication” from the point of view of its value in the field of functional linguistics.
3. Give definition to the term “Language for Special Purposes”, compare it with the term “sublanguage”, exemplify, whether there are any differences between LSP and sublanguage.
4. Comment on the origin of the term ESP, signify where and when the term “LSP” was firstly used.
5. Enumerate different divisions of ESP.

6. Tell about different terminology systems and illustrate their peculiarities.
7. Classify terminology systems. Which terminology systems do you know?
8. Identify the processes influenced the existence of terminology systems.
9. Try to explain whether there are terms used in literary language via non-terms used in LSP.
10. Highlight the development of different terminology systems.
11. Define the process of term polysemy.
12. Identify the concept of interscientific homonymy; give examples.
13. Give definition to the word “transterm”.
14. Enumerate the reasons for the appearance of polysemantic terms.
15. Comment on the processes of terminologization, determinologization and transterminologization; exemplify your answer.
16. Point out the reasons for synonymy of terms and antonymy of terms.
17. Explain why it is very essential to investigate lexical processes in terminology.

Task 2. Read the following terms, define which terminology system they belong to, translate them into English.

- Речовина, суміш, відносна маса, збереження маси речовин, кисень, іржавіння, бінарна сполука, дистиляція, реакція розкладу\сполучення;
- боєприпаси; авангард, піхота, атака, бійці, старшина, штаб, штурм, полковник, рухатись кроком, команда «струнко», дислокація;
- запуск, вивести на орбіту, космодром, ракетноносій, стартувати, стиковатися, скафандр, космонавт, невагомість, перевантаження;
- біг з перешкодами, випад, забити гол, штанга, боротьба, спринтер, естафета, нападник, тренування, кидок, двоборство, ліга чемпіонів ;
- сходи, теплиця, посів, саджанець, зрошення, дренавання ґрунту, птахоферма, доїти, збор врожаю, зернові культури, зерносховище;
- агонія, аритмія, артерія, бацили, істерія, хронічний, ерозія, чума, перелом, окуліст, протизаплідні пігулки, масажист, головний лікарь;
- акт, антракт, декорації, диригент, звукорежисер, освітлювач, рампа, заспівувач, балкон, генеральна репетиція, лаштунки;
- мелодія, гармонія, швидка гра, труба, нотний стан, вокал, аранжування, артикуляція, варіації з теми, ключовий знак, інтродукція з опери, лейтмотив.

Task 3. Analyze the following sentences paying attention on the meaning of the word in bold. Decide which words are terms, define their terminology system.

1. Дорогі – це **артерії** нашого міста. Головний мозок отримує живлення від двох сонних і двох хребетних **артерій**, що відходять від підключичних.
2. При температурі повітря 18-20 градусів **сходи** капусти з’являються днів через п’ять. Пам’ятай, в нашій владі і грози, і вітер, ми за щастя і сльози у

відповіді, пам'ятай, щоб шуміли весняні **сходи**. 3. На силу і тембр звуку **скрипки** значно впливає матеріал, з якого вона виготовлена, і склад лаку. Якщо вводити ринок землі, треба зробити, щоб держава відіграла першу **скрипку** в цьому процесі. 4. Норвезька сім'я пережила **атаку** арктичного полярного ведмідя і **знаходиться** зараз у лікарні. **Іранські сили безпеки** пережили **атаку** і заарештували **опозиційних активістів** у Тегерані на початку серпня цього року. 5. В газетах було опубліковано інформацію про **запуск** нового проекту, який підтримує президент. Над **запуском** першого космічного корабля працювали фахівці з різних галузей науки. 6. У 1981 році МОК визнав **боротьбу** самбо олімпійським видом спорту, але в програму Олімпіад цей вид боротьби до цих пір жодного разу не був включений. **Боротьба** з курінням стає державною проблемою.

Task 4. Find appropriate English equivalents to the following words, define their general and special terminological meanings, point out the terminology systems they belong. Make up combinations with these words.

Хвиля, матерія, лінійка, ручка, рукав, косинка, ребро, трубка, колонка, виделка, апарат, стрілка, орган, кран, джерело.

Task 5. Read the text, find the terms, and define their terminology systems. Translate the text into your mother tongue and identify the type of ESP.

The air surrounding the Earth is really a mixture of well-known gases: about 77% nitrogen, 21% oxygen, and 1% argon. The remaining 1% includes small quantities of such gases as carbon dioxide, hydrogen, neon, krypton, helium, ozone, and xenon. The atmosphere is the densest at sea level. For measuring the atmospheric pressure a device, called a barometer, is used. In common use, there are today two kinds of barometers – the mercury barometer and the aneroid barometer.

Some barometers work on a different principle from the mercury “weather glass”. They are known as aneroid barometers. An aneroid consists of a thin metal box from which the air has been removed. The atmospheric pressure pushes in (presses) the sides of the box. As the pressure decreases, they spring outwards. This movement is magnified and communicated to a pointer by a system of levers. Some aneroid barometers are self-registering (they are called barographs). This carries an inked stylo, which moves over a roll paper fixed to a drum, which is slowly turned by clockwork. In the way continuous records of the atmospheric pressure can be taken for periods of a week or longer.

If you look at the dial of a household barometer, you can see the following readings: “Very dry, fair, rain, much rain, change, stormy”.

Task 6. Read the following terms and analyze different linguistic processes, which these words illustrate.

1. Важка вода

важка доля

- | | |
|----------------------------|--------------------------------|
| 2. Вільний пробіг молекул | вільний рух |
| 3. Електропостачання | добре постачання |
| 4. Бомбардування ізотопами | бомбардування житлового району |
| 5. Материнська плата | материнська любов |

Task 7. Read the following abstracts and define to which terminology system each of them belongs. Translate the text into your mother tongue and identify the type of ESP.

a) Simple feedback system - information from the output - is fed back and combined algebraically with the input to control the flow into the reservoir. With positive feedback (+), as the output increases (decreases), the information passed back via the feedback loop is added to the **input, causing the inflow to the reservoir to increase (decrease)**. With positive feedback, the modification of the Input is in the same direction as the behavior; in general, this leads to instability. With negative feedback (-), as the output increases (decreases), the information passed back via the feedback loop is subtracted from the Input, causing the inflow to the Reservoir to decrease (increase). With negative feedback, the modification of the Input is in the direction opposite to the behavior; in general, this constrains the system and leads to stability.

b) Life science industries such as pharmaceutical and medical technology are especially subject to regulatory specifications, also with respect to their product and corporate communications. From clinical studies and treatment protocols to trade information and package inserts on through to labeling, various kinds of content must be adapted efficiently and in compliance-conforming fashion for foreign language versions. The use of language technology is indispensable for exploiting the entire approval period and being able to put pharmaceutical products on the market in timely fashion despite distributed processing by mother-tongue translators, short update cycles, and time-consuming validation and review processes.

c) Federal judges abide by the Code of Conduct for United States Judges, a set of ethical principles and guidelines adopted by the Judicial Conference of the United States. The Code of Conduct provides guidance for judges on issues of judicial integrity and independence, judicial diligence and impartiality, permissible extra-judicial activities, and the avoidance of impropriety or even its appearance. Judges may not hear cases in which they have either personal knowledge of the disputed facts, a personal bias concerning a party to the case, earlier involvement in the case as a lawyer, or a financial interest in any party or subject matter of the case. Many federal judges devote time to public service and educational activities. They have a distinguished history of service to the legal profession through their writing, speaking, and teaching. This important role is recognized in the Code of

Conduct, which encourages judges to engage in activities to improve the law, the legal system, and the administration of justice.

Task 8. Read the text, find terms and identify to which terminology system they belong. Translate the text into your mother tongue.

ANTIBIOTIC «SMART BOMB» CAN TARGET SPECIFIC STRAINS OF BACTERIA

Conventional antibiotic treatments kill both ‘good’ and ‘bad’ bacteria, leading to unintended consequences, such as opportunistic infections,” says Dr. Chase Beisel, an assistant professor of chemical and biomolecular engineering at NC State and senior author of a paper describing the work. “What we’ve shown in this new work is that it is possible to selectively remove specific strains of bacteria without affecting populations of good bacteria.”

The new approach works by taking advantage of a part of an immune system present in many bacteria called the CRISPR-Cas system. The CRISPR-Cas system protects bacteria from invaders such as viruses by creating small strands of RNA called CRISPR RNAs, which match DNA sequences specific to a given invader. When those CRISPR RNAs find a match, they unleash Cas proteins that cut the DNA.

The NC State researchers have demonstrated that designing CRISPR RNAs to target DNA sequences in the bacteria themselves causes bacterial suicide, as a bacterium’s CRISPR-Cas system attacks its own DNA.

“In lab testing, we found that this approach removes the targeted bacteria,” Beisel says. “We’re still trying to understand precisely how severing the DNA leads to elimination of the bacteria. However, we’re encouraged by the ease in specifically targeting different bacteria and the potency of elimination.”

The researchers tested the approach in controlled cultures with different combinations of bacteria present, and were able to eliminate only the targeted strain. “For example, we were able to eliminate *Salmonella* in a culture without affecting good bacteria normally found in the digestive tract,” Beisel says. The researchers were also able to demonstrate the precision of the technique by eliminating one strain of a species, but not another strain of the same species, which shares 99 percent of the same DNA.

Another benefit of the approach, Beisel says, is that «by targeting specific DNA strands through the CRISPR-Cas system, we’re able to bypass the mechanisms underlying the many examples of antibiotic resistance.»

The researchers are currently working to develop effective methods for delivering the CRISPR RNAs in clinical settings. «**This sets the stage for next-generation antibiotics using programmable CRISPR-Cas systems,**» says Dr. Rodolphe Barrangou, an associate professor of food, bioprocessing and nutrition sciences at NC State and co-author of the manuscript.

Task 9. Translate the following words, paying attention on the meaning of prefixes and roots.

Definability, non-resistance, deconstruction, antibody, disjoin, extraterritorial, non-inductivity, rearrangement, ultramodern, antiparticle, invariable, reconstruct, prewar, supersonic, prefabricate, permeability, closure, subtraction.

Task 10. Read the sentences and define terms. Translate the sentences paying attention to the meaning of the words in bold.

1. Electric **power** requirement is 220 volts. When a number is used a few times as a factor, the product is called a **power** of the number. The scientists did not have any **power** to conduct the experiment. 2. After planting the sapling cover the **roots** with the earth and water it. Find the square **root** of 49. The word “progression” has a double “s” in its **root**. 3. The **double** operation, by means of which we receive a number, is called a power of the number. **Double** the number 5 and you will have the second power of 5. 4. In this process concrete should be placed in the **forms**. Gas, steam and liquid are different **forms** of substances. The general **form** of quadratic equation is as follows: $ax^2+bx+c=0$. 5. The gramme is a **unit** of weight, the metre is a **unit** of length. The drilling **unit** must be changed. 6. Use a piece of copper **wire** to repair the instrument. **Wire** the day of your arrival. **Wire** is made of metal. 7. She brought in a **plate** of soup. The voltaic cell consists of two **plates**, one is made of copper, another – of zinc.

Task 11. Translate the following literal abbreviations into your mother tongue. Pay attention that some abbreviations have more than one meaning.

A-bomb, e-book, A-waste, T-beam, I-section, V-pipe, V-strip, X-type, x-particle, A-fission, x-member, X-ray, T-antenna, V-belt, U-shaped, e-form, h-beam, H-fixture, Y-junction, y-piece, U-turn, UV-filter, IT-technology.

Task 12. Check the meanings of the following polysemantic terms in a dictionary.

Altitude, bunker, hawk, lozenge, rib, trinomial, tumbler, spot, well, wire, jacket, opposition, set, time, unit, device, appliance, degree, stimulate, calculate, destination, sum, accurate, completion, tool, plate, circle, production, radius.

Task 13. Read the following term-combinations and analyze their structure. Translate them into your mother tongue.

General use, temperate scale, boiling point, molecular motion, mercury thermometer, temperature reading, room temperature, blood heat, heat measuring instrument, top end, a glass bulb, temperature extremes, the temperature recording device, in boiling water, melting point temperature.

Task 14. Read the text, find the terms and term combinations, give them short characteristics.

ІНСТРУКЦІЯ З ТЕХНІКИ БЕЗПЕКИ

Ця пральна машина призначена виключно для побутового використання. Професійне (комерційне) використання цієї пральної машини забороняється. Виробник не несе жодної відповідальності за неналежне користування або неправильне налаштування елементів керування.

Обережно! Ця пральна машина не призначена для експлуатації із зовнішнім таймером або окремою системою дистанційного керування.

Машина має використовуватися тільки повнолітніми особами і згідно з інструкціями, наведеними у даній брошурі.

Ця пральна машина призначена виключно для прання білизни, яку дозволяється прати в машині, в об'ємі, що є звичайним для приватного домогосподарства

Установлення пральної машини мають здійснювати принаймні дві особи. Під час установлення діти мають бути на безпечній відстані від пральної машини.

Не тягніть за шнур живлення приладу. У разі пошкодження шнура живлення замініть його ідентичним. Заміняти шнур живлення повинен лише кваліфікований електрик із дотриманням вказівок виробника та поточних правил техніки безпеки. Звертайтеся в авторизований сервісний центр. Забороняється користуватися цією пральною машиною в разі пошкодження шнура живлення або штепсельної вилки, неналежної роботи або пошкодження чи падіння.

Будьте обережні: вода, що зливається, може мати високу температуру. У жодному випадку не застосовуйте силу до дверцят люку: це може ушкодити запобіжний механізм проти випадкових відкривань.

Якщо машина не працює у разі поломки, у жодному випадку не намагайтеся дістатися внутрішніх механізмів з метою самостійного ремонту.

Перш ніж завантажити білизну, перевірте, щоб барабан був порожній.

Task 15. Match the following terms to their Ukrainian equivalents from the text above.

Remote control system, household use, power supply, to be at a high temperature, to be instructed in the safety regulations, to come into contact with, to feed the lining, a tumbler, the device which prevents the door from being opened.

Task 16. Read the following sentences, find international words and define their terminology system. Translate the sentences into your mother tongue.

1. All examples are taken from actual texts. 2. The manuscript was apparently completed in 1990. 3. This is dramatically illustrated by Ecrics. 4. Thus, the issue that this addresses is far from trivial. 5. Both contributions to this jubilee publication are appropriately authoritative. 6. Several indexes in the book make the wealth of infor-

mation easily accessible. 7. The merit of this book lies in its rich collection of empirical data. 8. The articles are arranged according to subject matter rather than chronology. 9. **In addition to the work mentioned above, the volume contains six studies originally published in English.** 10. **Each volume contains a «List of words cited» and an «Index of names».** 11. **Bateson's description is elegant and accurate.** 12. **The present notation is inaccurate and, in some cases, confusing.** 13. The defects of Cowie's analysis are typical of illuminating but unformalized descriptions. 14. **The second article illustrates receptivity to date of whatever source.** 15. In physics, a theory is often the limit of a more general theory as some parameter vanishes. 16. Progression from treatment of a selected individual problem to that of a broad question may also suggest the direction of these studies. 17. The book concludes with a brief account of the renewed interest in Newton during recent decades. 18. **Skenstrom's analytical framework is a rather extensively modified version of the modal introduced by J. Sinclair.** 19. There is something for everyone in this book, but perhaps not enough of any one thing to make it indispensable to a specific audience. 20. However, for lack of a strong theoretical overview, or of effective introduction to its different sections, this work falls short of its promise. 21. Aside from these caveats, this work is a careful and detailed illustration of how to deal with the enormous complexity of data. 22. **The studies here range from the Middle Ages to the present, and offer a combination of general surveys along with detailed investigations of specific aspects.** 23. The new work, however, is considerably broader in scope and is an ambitious successor to that still valuable first collection. 24. With the exception of the paper written in 1991, all the articles contained here were included in their original languages of publication. 25. The monograph is essentially significant in that it includes English translations of articles originally published in German. 26. This theme will startle few readers; as usual, Robins brings to its exposition the twin merits of a clear prose style and a wealth of wide-ranging citations. 27. **Bates offers these discussions and associated theoretical contributions with characteristic modesty.** 28. The quality of the contributions is very uneven: some scholars have taken this opportunity to publish rather trivial thoughts or highly speculative hypotheses. 29. The argument as an addendum by Wittgenstein to Waissman's notes of discussion with Wittgenstein, in which Wittgenstein reports a form of argument he had used in his lectures in Cambridge at that time. 30. **Nevertheless, these pages contain radical critiques of dominant, received theoretical stances, as well as contributions that go beyond predecessors.** 31. Though I do not intend to propose anything near a comment or a criticism of Mr. Dummet's point of view, I would like to show this must be a false point of view. 32. Hilbert gives historical examples of the fruitfulness of such a procedure; this has been seen as a defense of formalism. 33. **For each expression there is a floor of definition below which its value is nil.** 34. **However, a potential model of knowledge might be experimentally verified.** 35. He is surely among the few who subject their data to systematic and quantitative analyses in order to shed light on these controversial issues. 36. This is a fine piece of scholarship - clear and accessible to the non-specialist, and a significant work for specialists. 37. Most of his arguments are quite persuasive - especially since he

does not reject this type of evidence, but only cautions against too free use of it. 38. Aston's work, which was accurate to 0.1 per cent, was the first quantitative study applicable to all the elements. For his discoveries, he received many honours, including the Nobel Prize for Chemistry in 1922. 39. Hilbert was a professor at Gottingen, the former academic home of Gauss and Riemann. 40. Computers are sometimes thought to demand deep technical knowledge or proficiency in mathematics and electronics. In actuality, computers, like any other discipline, inspire different levels of expertise. 41. The rapid transmission of information over long distances and ready access to information have become conspicuous and important features of human society, especially in the past 150 years, and in the past two decades, increasingly so. 42. The designers of other artifacts such as cradles, the baby bottle, buttons and buttonholes, and slings that permit agricultural work while carrying an infant remain anonymous, but the probability is strong that they originated with women. 43. Through the power to allocate funds, a legislature can influence the course of government. 44. In 1924, the navy received delivery of the ZR3 airship, later christened the *Los Angeles*, made by the Zeppelin works in Germany in partial payment of war reparations. 44. As a result, industries in industrialized countries have replaced chlorofluorocarbons in all but essential uses. Results of subsequent atmospheric studies are inconclusive about the actual threat to the ozone layer by human activities. 45. The beliefs and customs of the groups may merge almost equally and result in a single culture.

Task 17. Read the statements and put "T" when the statement is true and "F" when the statement is false. Correct the wrong statements.

1. All experts agree that terminology constitutes a separate discipline.
2. The direct users of terminology are the specialists in each subject field.
3. The term "Language for Special Purposes" appeared in the 70's of the 20th century in the English speaking countries of Europe.
4. Terminology deals mainly with the written form of national language, including signs, shortenings, abbreviations, which are rarely studied by linguists.
5. The amount of subject-oriented terms of knowledge and sphere of human activity comprises its terminology system.
6. Terminology systems are rarely renewed and completed with new terms.
7. The penetration of special vocabulary into the literary language is called terminologization.
8. The transition of terms from one terminology systems into another is destructive/ harmful for terminology systems.
9. Languages for special purposes do not have general use and are not extended, similarly to literary languages.
10. Almost every system of special terminology is nowadays fixed and analyzed in glossaries approved by authorities, special commissions and eminent scholars.

Unit 6

INTERNATIONAL SCIENTIFIC VOCABULARY. ENGLISH FOR SCIENCE AND TECHNOLOGY

- 6.1. Linguistic peculiarities of International Scientific Vocabulary (ISV).
- 6.2. English for Science and Technology (EST).
- 6.3. Translation of new terminological vocabulary.

6.1. LINGUISTIC PECULIARITIES OF INTERNATIONAL SCIENTIFIC VOCABULARY (ISV)

International scientific vocabulary (ISV) comprises scientific and specialized words borrowed from various classical languages that now are in current use in modern languages. As the process of borrowing is mostly connected with the appearance of new notions expressed with the words from different languages, it is natural that borrowing is seldom limited with one language only. The growth of international vocabulary in modern languages, especially English, consequently reflects expanding global contacts in the world.

International vocabulary consists of the words identical in origin used in several languages because of simultaneous or successive borrowing from one ultimate source language. Philip Gove in Webster's Third New International Dictionary firstly used the term international vocabulary or ISV in 1961. According to Webster's Third addition, some ISV words like "soda", "oxide", "carbonate" are the words borrowed with rather general and simple meanings from one of the languages, usually Latin and Greek, accepted very specific and complicated meaning for the purposes of modern scientific discourse. The online version of Webster's Third New International Dictionary, Unabridged (Merriam — Webster, 2002) adds that the ISV consists of words or other linguistic forms current in two or more languages being adapted to the phonetic and morphological structure of the borrowing languages.

ISV terms are often borrowed from Greek, Latin or other classical languages like French and Spanish, changing phonetic forms and morphological structures according to the rules of the TL. ISV words and morphemes are considered as translinguistic or international and used in many languages to serve education, cultural, scientific and technological professional terminologies. Besides European languages, such as English, French, Spanish, ISV terms also function in Japanese, Malay, Filipino, and other Asian languages but not in each terminology system. It illustrates that terminologies of many languages are still being developed (Ukrainian, Russian, Lithuanian, Greek etc.).

ISV is one of the concepts of the development and standardization of *Interlingua*. The morphemes (root, prefix and suffix) used for creating new terms are often of Greek and Latin origin, but like most Interlingua words, they are borrowed into a wide range of languages:

avia-, auto-, aero-, bio-, geo-, hydro-, hyper-, inter-, iso-, macro-, micro-, para-, radio-, tele-, video-, ultra-, electro-, -itis, -mus, -aurus, -terium and others, cp. *aviator, autoimmune, aero physics, biogenic, geography, hydraulics, hyperbola, intercontinental, isotherm, macro space, microns, parallelism, radiolocation, telescope, video recorder, ultrasonic, electromagnetic, bronchitis, terminus, argentinosauros, bacterium*.

Mixed terms borrowed from Latin and Greek like *aerodrome, aerodynamics, cyclotron, micro film, telegraph, thermonuclear, telematics, supersonic*) are common in terminologies of many languages. For instance, there are some Greek and Latin prefixes used in forming many terms especially of English origin:

- deca, deka 10
- hecto 100
- kilo 1000
- deci 0,1
- centi 0,01
- milli 0,001
- myria 10,000
- Mega 1,000000
- Micro 0,000001

Many English terms and word parts can be also traced back to Latin and Greek. The following table lists some common Latin roots.

• Latin root	• Basic meaning	• Example words
• -dict-	• to say	• contradict, diction, dictate
• -duc-	• to lead, bring, take	• deduce, produce, reduce
• -gress-	• to walk	• digress, progress, transgress
• -ject-	• to throw	• interject, project, reject, subject
• -pel-	• to drive	• compel, dispel, impel, repel
• -pend-	• to hang	• append, impend, pendant, pendulum
• -port-	• to carry	• deport, export, import, report, support
• -scrib-, -script-	• to write	• describe, description, prescribe, prescription, subscribe, subscription, transcribe, transcription
• -tract-	• to pull, drag, draw	• distract, contract, detract, extract, protract, retract, traction
• -vert-	• to turn	• convert, divert, invert, revert

The words in the above table show how roots combine with prefixes to form new words. For example, the root *-tract-*, meaning, “to pull,” can combine with a number of prefixes, including *de-* and *re-*. *Detract* means literally “to pull away” (*de-*, “away, off”) and *retract* means literally “to pull back” (*re-*, “again, back”).

The following table gives a list of Latin prefixes and their basic meanings used in English terminology.

Latin prefix	Basic meaning	Example words
co-	together	coauthor, coedit, coheir
de-	away, off; generally indicates reversal or removal in English	deactivate, defrost, decompress
dis-	not, not any	discredit, disrepair, disconnect
inter-	between, among	interface, interlink, interject
non-	not	nonmetal, nonresident, nonstick
post-	after	posttraumatic, postnasal, postnatal
pre-	before	prehistoric, preventive, preterm
re-	again; back, backward	rearrange, reconstruct, reform
sub-	under	sublanguage, subculture, substandard
trans-	across, beyond, through	transcontinental, transmitter

Words and word roots may also combine with suffixes. Here are examples of some important English suffixes that have come from Latin:

Latin suffix	Basic meaning	Example words
-able, -ible	forms adjectives and means «capable or worthy of»	adaptable, computable, flexible, constructible
-ation	forms nouns from verbs	foundation, automation, transplantation
-fy, -ify	forms verbs and means «to make or cause to become»	signify, acidify, humidify, qualify, justify
-ment	forms nouns from verbs	assignment, banishment, establishment
-ty, -ity	forms nouns from adjectives	electricity, peculiarity, technicality

International words comprise the prominent part of various terminological systems including the vocabulary of science, technology, industry and art. Etymological sources of this vocabulary reflect the history of world culture. Thus, for example, the humankind's cultural links with Italy are reflected in the great number of Italian words connected with architecture, painting and especially music borrowed into most European languages: *allegro*, *andante*, *arioso*, *baritone*, *duet*, *opera* and others.

The progress of technology, political, social and artistic life has been greatly accelerated in the 20th century caused the huge growth of international word-stock in different languages. A few examples of comparatively new words appeared due to the progress of science illustrate the influence of international vocabulary on the lexicons of other languages: *algorithms*, *antenna*, *bionics*, *cybernetics*, *entropy*, *genetic engineering*, *microelectronics*, *nanotechnology* etc. These words were borrowed into English, French, German, Spanish, Ukrainian and many other languages with the similar phonetic and grammatical forms and lexical meanings undergone modifications because of the linguistic rules existing in these languages.

Being adaptive system, the professional vocabulary is constantly adjusting itself to the changing requirements and conditions of human communication and cultural needs. This process of self-regulating the lexical system is a result of overcoming contradictions between the terminology systems and the requirements they have to meet. Speaker or language user chooses from the word stock those words, which in his/ her opinion can adequately express the thoughts and feelings about scientific and technical concepts or notions. Thus, the development of ISV is not limited with words existing in it; it is constantly renewing and adapting to the linguistic system changing functions.

6.2. ENGLISH FOR SCIENCE AND TECHNOLOGY (EST)

The senior branch of ESP is English for Science and Technology (EST). As it received the biggest amount of attention, English for Science and Technology (EST) was the first to be included in English teaching curricula, and it has had the greatest number of practitioners and the most numerous volumes of publications. According to David Crystal (1997), English for Science(s) consists of a special vocabulary, which often means a large set of words of Latin or Greek origin, but the development of sciences and new discoveries impose the continuous renewal or enrichment of this scientific vocabulary (D. Crystal: 1997, 67).

English for Science and Technology includes the large layers of scientific and technical vocabulary, based generally on Latin or Greek terms, with a lot of compounds which can be very long, imposing abbreviations for practical use, long sentences with a complex internal structure (sentences based on noun phrases), and the use of passive constructions. Moreover, scientific and technical vo-

cabulary requires continual updating because of the constant discovery process. Neologisms or new terms arising in the discovery process are linked to the development of special languages. Finally, the names of new notions and concepts are incorporated into the largest available dictionaries and databases of English for Science and Technology.

There is also a “science-specific” grammar in EST: this means that the language of science prefers very accurate and unambiguous expressions, which leads to a higher rate of repetitive expressions, to the frequent use of relative pronouns (*which, that, of which*) or adverbials. Linking words that express contradiction, explanation, and conclusion are unavoidable. Such linking words are conjunctions (*and, although, though, since, as*), prepositions (*despite, during*) or adverbs (*usually, meanwhile, firstly, secondly*). Moreover, scientific texts in English often use long and complex sentences, with complex noun phrases.

Science and technology terminologies occupy special position in national languages. Terminology of each branch of science and technology is systematically organized in accordance with the system of scientific concepts it serves (mathematical terminology, linguistic terminology, physics terminology, social science terminology and many others). All these terminologies comprise the notion English for Science and Technology.

Taking into account mathematic terminology that belongs to the science type of terminology, we may observe the following. There are terms that describe four simple rules of arithmetic: **addition, subtraction, multiplication** and **division**.

For example, **addition**: $3 + 5 = 8$.

We read this “three and five are (*or is*) eight” or “three plus five equal (*or equals to*) eight“, or rarely “three plus five make(s) eight”. 3 and 5 are called **components**; 8 is the **sum**.

Subtraction: $10 - 7 = 3$

We read this “seven from ten are (*is*) three“, or “ten minus seven are (*is*) three“, or “ten minus seven equal(*equals to*) three,” or rarely “ten minus seven leave(s) three“. 3 is called the **difference**.

Multiplication: $3 \times 5 = 15$

We read this “three times five is fifteen“, or “three multiplied by five is fifteen“, or “three times five make(s) fifteen”, 3 and 5 are named **factors**; 15 is the **product**.

Division: $21 : 3 = 7$

We read this “three into twenty one goes seven times“, or “twenty one divided by three is seven“, or “twenty one divided by three equals seven». 21 is the **factor**, 3 is called the **denominator**, 7 is called the **quotient**.

Fractions or rational numbers are read in the following way:

$\frac{1}{2}$ – one half

– $\frac{2}{4}$ – minus two fourths

7/8 – seven eighths

1/5 – one fifth

1/3 – one third

2 3/7 two and three sevenths

1/4 – one quarter [= one fourth]

– 1/12 minus one twelfth

There are numbers, which are pronounced like:

82. 59 – eighty-two point five nine

– 2.3×10^6 – minus two point three times ten to the six [= –2 300 000 minus two million three hundred thousand]

4×10^{-3} – four times ten to the minus three [= 0 .004 = 4/1000 four thousandths].

The numbers with exponents or roots are read in the following way:

3^2 [= $3 \times 3 = 9$] three squared

3^3 [= $3 \times 3 \times 3 = 27$] three cubed

3^4 [= $3 \times 3 \times 3 \times 3 = 81$] three to the (power of) four

3^{-1} [= 1/3] three to the minus one

3^{-2} [= 1/9] three to the minus two

$\sqrt{3}$ [= 1.73205...] the square root of three

$\sqrt[3]{64}$ [= 4] the cube root of sixty four

$(1+2)^{2+2}$ one plus two, all to the power of two plus two

In algebra, another layer of science terminology, letters are used to express the general properties of numbers. Representing one number by the letter *a* and another by the letter *b*, we can write the **equality**:

$a \times b = b$ times/multiplied *a* or, more shortly, $ab = ba$.

If there is no other sign indicated, the multiplication sign is understood between any two letters written side by side. To represent numbers, letters of the Latin alphabet are generally used:

$(a+b) \times c$ – *a* plus *b* in brackets times *c*;

$x^2 + y^3 + z^5$ – *x* squared plus *y* cubed plus *z* to the (power of) five;

$(x-y)^{3m}$ – *x* minus *y* in brackets to the (power of) *three m x* minus *y*, all to the (power of) *three m*;

$\sqrt{x+3} \sqrt{y}$ – the square root of *x* plus the cube root of *y*;

$n \sqrt{x+y}$ – the *n*-th root of *x* plus *y*.

The following examples show the reading **inequalities**:

$x > y$ – *x* is greater than *y*;

$x \geq y$ – *x* is greater (than) or equal to *y*;

$x < y$ – *x* is smaller than *y*;

$x \leq y$ – *x* is smaller (than) or equal to *y*;

$x > 0$ – *x* is positive $x \geq 0$ *x* is positive or zero, *x* is non-negative;

$x < 0$ – *x* is negative $x \leq 0$ *x* is negative or zero.

Geometry terms also belong to the science terminology consisting of the properties, constructions and measurements of lines, surfaces, and solids. A line has only one dimension - length. A surface has two dimensions - length and width. A solid has three dimensions - length, width and depth. A point has no

dimensions but it is simply a position in space. A flat surface is called a plane. A circle is a flat surface bounded by a curved line all points of which are equidistant from a point which is called the center. The bounding line of a circle is called the circumference. A straight line drawn from the center to the circumference is called the radius. The diameter is equal to two radiuses. An arc of a circle is any part of a circumference. A chord is a straight line connecting any two points on the circumference.

There are 360 degrees (360°) in a complete circumference. Degrees are divided into minutes, marked by the sign (′) and minutes are divided into seconds (the sign ″). The square is a four-sided figure all sides of which are equal and the angles are right angles. The triangle is a polygon having but three sides. The principal forms of solids bounded by plane surfaces are a prism, a cube, a cylinder, a pyramid and a cone.

Physics is a science based upon exact measurement, so translator of scientific and technical text should be familiar with commonly used measuring devices and the units of measurements. Physical quantities and units of measurements also comprise science terminology. As physics is a science based on the exact measurements, it is often necessary to be familiar with commonly used measuring devices and units of measurements. There are three basic concepts in physics: length, mass and time. The units used to measure them are called fundamental units. All other units are called derived units because they can always be written as some combination of the three fundamental units. For example, **area = length x length; volume = length x length x length; speed = length: time; density = mass: volume.**

There are two widely used sets of **fundamental units**:

- a) the Metric System;
- b) the English System.

The Metric System or the International decimal system of weights and measures is based on the meter and kilogram. Using metric units of distance (length) is usually measured in millimeters, centimeters, meters or kilometers. Time is measured in seconds, minutes, or hours; and mass is measured in milligrams, grams or kilograms. The English System uses the foot, yard and mile as the units of length; the ounce, pound and ton as the units of force and the second as the unit of time.

The chief advantage of the Metric system over the English units is that all metric units are divided into 10 or 100 parts. This enables fractional distances and masses to be expressed as decimals. Decimals, it is well known, are easier to manipulate in the addition, subtraction, multiplication, and division of two or more quantities.

The Foot-Pound-Second (F.P.S.) System is used in Great Britain and the United States of America. The Metric System (meter-kilogram-second) is in-

vented in France and accepted universally in science but not in engineering or commerce.

It is necessary to note that engineers and scientists have produced a code of standard symbols for convenient representation of physical quantities. This is a list of standard symbols used to express physical quantities:

- acceleration — a
- area — A
- density — ρ
- force — f
- moment — m
- pressure — p
- mass — m
- time — t
- electric potential — V
- electric current — I
- electric resistance — R
- temperature — t
- length — l
- heat — Q
- specific heat — c
- latent heat — l
- work — w
- power — P
- stress — a
- volume — V
- velocity — v

To use these symbols you should pay attention on the use of capital or small letters.

To simplify the representation of units a standard list of abbreviations and shortenings is applied in physics terminology:

- foot — ft
- pound — lb
- second — s
- squared foot — ft^2
- cubed foot — ft^3
- gallon — gal
- pound force — lb/f
- radian — rad
- horsepower — ftp
- ampere — A
- meter — m
- gram — g
- kilogram — kg
- minute — min
- squared meter — m^2
- cubed meter — m^3
- liter — l
- Newton — n
- kilogram force — kgf
- revolution — rev
- watt — w
- volt — v
- kilogram calorie — $kcal$
- Fahrenheit temperature — F
- Temperature rise (Fahrenheit) — $deg F$
- ohm — Ω (omera)
- Celsius temperature — C
- Temperature rise (Celsius) — $deg C$
- British thermal unit — Btu
- Coulomb — C
- Celsius heat unit — Chu
- Metric horse power — Ps

(“Ps” is the abbreviation for “Pferde Starke” which is in German for horsepower).

In practice, the units of one system may be converted into the units of the other one.

There are some differences in spelling in British English and American English metric and term systems:

BRITISH ENGLISH



metre
gramme
kilogramme
litre
aluminium
fibre
recognise
analyse
fuelled
analogue
licence
leukaemia
manoeuvre
oestrogen
paediatric

AMERICAN ENGLISH



meter
gram
kilogram
liter
aluminum
fiber
recognize
analyze
fueled
analog
license
leukemia
maneuver
estrogen
pediatric

British English and American English terms differ not only in spelling but also in the term usage:

BRITISH ENGLISH



asymmetric bar
casualty
demister (*in a car*)
earth (*electrical*) earthed
full stop (*punctuation*)
greaseproof paper
holdall
jump lead
milometer
number plate
paracetamol
physiotherapy
veterinary surgeon
wing (of a car)

AMERICAN ENGLISH



uneven bar
emergency room
defroster
ground, grounded
period
wax paper/waxed paper
carryall
jumper cable
odometer
license plate
acetaminophen
physical therapy
veterinarian
fender

Chemical formulae and chemical terms are often met in the texts, which belong to science terminology. Consequently, it is not necessary for interpreter to know all chemical formulae, elements and terms but it is needed to know how they are read. Latin letters expressed the names of chemical elements are read according to English alphabetic reading. The signs in chemical formulae are read as follows:

- the sign “+” is read as *plus, and, together with, react with*;
- the sign “—” defines only one bound and the unit of bound and is not read;
- the sign “=” is read as *give, form or produce*;
- the sign “->” is read as *produce, give, pass over or lead to*.

The most famous and simplest formula of water H₂O is read as [‘eitJ’tu:’ou]. Sometimes several variants of reading of chemical formulae exist as CO₂ - C plus O two give CO two [si: plus ou tu: giv si: ou tu:] or 1 atom of carbon reacts with 1 two-atom molecule of oxygen and produces 1 molecule of carbon dioxide.

Another example: 2H₂ + O₂-2H₂O can be read as two molecules of H two plus O two give two molecules of H two O [tu: ‘malikju: lz av eitj tu: plus ou tu: give tu: ‘malikju :lz av eitj tu: ou] or two two-atom molecules of hydrogen react with 1 two-atom molecule of oxygen and produce two molecules of water.

The more complicated formula like N₂ + 3H₂ 5± 2NH₃ can be read as *N two plus three molecules of H two form and are formed from two molecules of NH three* [en tu: plus 0ri: malikju :lz av eitj tu: fo:m and a: fo:md from tu: malikju :lz av en eitj 0ri:] or 1 two-atom molecule of nitrogen plus three two-atom molecules of hydrogen form and are formed from two molecules of ammonia.

Reading chemical equations has also its own rules:



The “+” sign on the left of the arrow means “*reacts with*”; the arrow means “*forming*” or “*producing*”; and the “+” sign on the right of the arrow means “*and*”. So this equation is read as: “One atom of zinc reacts with one molecule of sulphuric acid producing one molecule of zinc sulphate and one molecule of hydrogen.” The reactants are on the left side of a chemical equation (or arrow) and the products are on the right side. Typically, the arrow is replaced with “*produces*” or “*yields*” when the equation is said aloud. Coefficients are the numbers in front of the formulas. The coefficients give the number of molecules (or atoms) or moles involved in the reaction.

There are three important things to remember about reading chemical equations:

1. Reactants are on the left and products are on the right.
2. Coefficients are the numbers in front of each formula. If no number is shown, a one is understood.
3. The coefficients tell us how many molecules (moles) of each reactant used and how many molecules (moles) of each product made.

6.3. TRANSLATION OF NEW TERMINOLOGICAL VOCABULARY

New terms designating new concepts and notions created continually in science, technology, in professional slang unknown to TL speakers. These new terms and term combinations comprise the massive amount of terminological vocabulary. It has been stated that each language acquire 3000 new words annually, but in fact, they can not be accurately quantified, since so many hover between acceptance and oblivion and many are short-lived, individual creations. These unknown terms often used in scientific and technical texts signifying the constant exploring process are called **terminological neologisms**. The progress of science, radio, electronics, and industry causes the appearance of many terms — neologisms in professional languages, for example:

bomb – радіоактивне джерело (мед.); *summit* – саміт, симпозиум (політ.); *transfer* — трансфер (тур.); *anime* – аніме (кіно); *political correctness* (P.C.) – політкоректність, норма поведінки, прийнята у політичних колах (філ.).

Neologisms (from Greek “*neo*” new and “*logism*” word) are new words or combinations of words, idioms and fixed phrases appearing in the language to determine a new object or to express a new concept due to the development of social life, culture, science and technology. New meanings of existing terms or words are also considered as neologisms. A problem of translating new words ranks high on the list of translation issues because such words are not readily found in ordinary dictionaries and even in the newest specialized dictionaries.

Terms-neologisms should be distinguished from ordinary words as terms-neologisms exist for a short period and quickly become the common terms of science and technology. In 1975th the French linguist, lexicographer and terminologist Alain Ray wrote that “neologism will be perceived as belonging to the language in general or only to one of its special usages; or as belonging to a subject-specific usage which may be specialized or general” (A. Ray, 1975 cited in Yiokari: 2005, 3).

Nowadays, modern linguist consider neologism as a word that expresses a novel concept either through coining a new vocabulary item or through attaching a new meaning to an already existing one (Collins Cobuild English Dictionary: 1995).

Terms-neologisms appear in different subject fields such as manufacturing, mining, building, trading, international relations and are applied in a very limited sphere. New terms are especially useful in identifying inventions, new phenomena, or old ideas that have taken on a new cultural context. They are often created by combining existing words or by giving words new and unique suffixes and prefixes, with the help of abbreviation, with intentionally rhyming words existed in the language. Modern English terminology is a producing system that is why correct translation of professional terms acquires an important value for the successful understanding, normalizing and usage these terms in the Ukrainian terminology system in accordance with international standards.

The following types of new terms are identified:

1) terms - neologisms, recent and original, including newly coined forms, newly devised phrases, new collocations, compound nouns, new terminology, old words and phrases with new senses, acronyms, abbreviations, blends, eponyms, new combinations of morphemes. Hundreds of these appear every year in specialised periodicals and journals and many soon disappear. Tens of thousands are devised to form part of specialised terminologies in every subject field (*bio-computer* – комп'ютер, що імітує нервову систему живих організмів, thought-processor – комп'ютер, який логічно будує та розвиває ідеї);

2) dialect, patois and specialised terms used more often orally than in written (*bread* - гроші, *subser* – мильна опера, *big C* – рак як хвороба, *drag* – скукота);

3) colloquialisms, slang, taboo words, usually recorded, but not in all senses, words commonly used in remote anglophone areas rather than the UK (e.g. *helper*, *qwerty*, *stellar brothers*);

4) third language or target language words waywardly introduced into a SL text (*bioplasma* from Russian, *shiatsu* from Chinese, *satsang* from Hindu);

5) brand names, names of patented inventions, trademarks - usually signaled by capitalisation and often more or less standard suffixes (*Xerox*, *Obamacare*, *Ikea*);

6) names of new institutions and trends (*theatredom* – світ театру, *revivalism* – сучасна школа живопису, *computerism*);

7) SL, TL and third language archaisms or dictionary words that are rarely used but have time-pointed places in the dictionary (*planetokhod*, *post-soviet*, *babushkaphobia*, *Shakespeareism*);

8) unfamiliar connotations and symbolic meanings of words and proper names (*wikiality* (Wikipedia and reality), *Black hats*, to *skype*);

9) familiar alternative terms or words (*cosmos* and *space*, *sputnik* and *satellite*);

10) codewords (*salami slicing*, *datavelliance*);

11) common words of specific SL or third language cultural senses (*putlerism*, *burger economy*, *corporacracy*);

12) misprint, miscopying, misspelling, particularly of proper names (people and geographical names) and incorrect transliterations.

New terms (neologisms), that have appeared recently in English and are absent in the English-Ukrainian dictionaries cause translation difficulties. That is why, for the correct and adequate translation of terms - neologisms, it is needed to analyze the structure of new word or combination of words. For example, in the word “*resupply*” prefix «*re*» expresses repetition of an action, “*supply*” means «*запас, поставляти, постачання*», so the main meaning of the word “*resupply*” will be “*повторне поповнення запасу*”, ср: *recapitalization*, *renovation*, *reduplication*.

One of the common ways of new terms translation is a selection of proper *synonyms* in Ukrainian (analogue translation). An international word of the SL can be often substituted in the process of translation with another international word of TL that is synonymous or close to it (or of the same) meaning. The substitutions are mostly performed in larger context, though sometimes they may also be carried out at language level. This kind of substitution becomes possible due to the existence of internationalisms in TL borrowed in different previous historical periods. Such international words are of the same logic, grammatical and lexical grammatical class (part of speech). The faithfulness of translation achieved through this kind of synonymous substitutions may be usually established in a text only, though it may partly be traced at the word-group level as well. This can be seen from the following examples: *athletics* гімнастика and not *атлетика*, *diagram* схема and not *діаграма*.

The selection of a meaning from different synonyms depends on the context. So, if the term can have only one equivalent, it may have several analogues or synonyms in SL and TL. Translation with the help of analogue signifies the quality of translation. The equivalent can be only one, and if it is well-known to the translator, it would be easy to master the translation. If a translator chooses the way of analogue translation, it will be necessary to select appropriate meaning from different synonyms or synonymous row, besides they are not always represented in dictionaries. For instance, to translate the following sentence “*They have wantonly denied peoples their lawful right of self-determination*”, the meaning of the word *wantonly* cannot be defined with the help of English-Ukrainian dictionary because:

wantonly - безглуздо, безцільно, без мети; без упину; без будь-якої причини, безпричинно (М. Балла, Англо-український словник).

The next steps should be included in the searching:

1) Bilingual general and specialised dictionaries may be consulted first; whether or not they produce answers or clues, they must be followed up with careful checks and cross-checks in SL and TL monolingual dictionaries to determine cognitive and pragmatic equivalence as well as the currency of the TL word cited;

2) The translator has to consider the possibility of a misprint, misspelling or variant spelling;

3) If the non-equivalent term is established as a misprint, misspelling, misuse of words, rare spelling, etc., the deviation is normally ignored and the correct word is translated;

4) If the non-equivalent term is found as a little-known proper name - a person or a geographical feature - it is normally transcoded with some additional information (e.g., *Brangelina* is used to refer to supercouple Brad Pitt and Angelina Jolie, *Tebowing* – description of a prayerful victory stance derived from NFL quarterback Tim Tebow);

5) If the word is verified as a term-neologism, the translator has the choice of various procedures (transcoding, new coinage (утворення неологізму), literal

translation, general or cultural equivalent, label) depending on various considerations (importance of referent, the type of text, the nature of readership)

6) When the name of a new or unimportant institution is identified, it is either transferred with a statement of its function and status, or replaced by a generic name, such as “*body*”, “*committee*”, “*company*”, etc., with a statement of its function,

7) An old ‘linguistic’ word used in a new sense (e.g., *jogging*, *kicks*) may require componential analysis before translation and therefore may be translated with the help of transformations adding two or more words. Here may be given an approximate cultural equivalent (as above) or, for a more technical text, be transferred, accompanied by a brief functional definition that explains the purpose of the referent. A descriptive definition states its size, colour, composition.

Many international terms are semantically condensed and can be translated into TL only with a descriptive way. For example, *civilizable* той, що піддається цивілізуванню/цивілізації; *classifiable* той, що піддається класифікації, *readability* – властивість до читання, читабельність.

Non-equivalent terminological vocabulary means that the TL has no direct equivalent for a word that occurs in the SL. The following phenomena cause the appearance of non-equivalent terminological vocabulary:

- 1) specific concepts of culture;
- 2) the SL concept is not lexicalized in the TL;
- 3) the SL is semantically more complicated than the TL;
- 4) the term in both SL and TL has different lexical meanings;
- 5) the term from the SL does not exist in the TL;
- 6) there are some differences in physical or interpersonal perspective in both SL and TL;
- 7) there are differences in forms of terms in both SL and TL;
- 8) there are differences in frequency and purpose of using specific forms of terms;
- 9) the use of the term borrowed from the third language in the SL.

Some of these non-equivalent terminological vocabulary often exist in dealing with the translation of terminology that’s why there are some strategies used by professional translators in dealing with non-equivalent vocabulary:

- 1) Translation by a more general word.
- 2) Translation by a more neutral, less expressive word.
- 3) Translation by cultural substitution.
- 4) Translation using a loan word or a loan word plus an explanation.
- 5) Translation by paraphrase using a related word.
- 6) Translation by paraphrase using unrelated word.
- 7) Translation by omission.
- 8) Translation by illustration (using a loan word or a loan word plus an explanation).

The translator can never ‘abandon’ non-equivalent term, must never assume because it appears to be nonsensical (a non-existent word or an existing word clearly out of place), that nothing was intended, that it can be ignored. On the contrary, the translator must finally make some kind of guess at the word he cannot find, some compromise between the most likely contextual meaning of the word and the meaning suggested by the morphology or form of the word, if such exists. If the translator suspects that the typist (‘miscopied’) has misread the term, he must put some notes about it. In locating and interpreting ‘non-equivalent’ words, the translator requires common sense even more than resourcefulness- imagination and good connections. The chase for words and the sudden relief or satisfaction when the word is found, are amongst the greater attractions of the job.

PRACTICAL ASSIGNMENTS

Task 1. Get ready to discuss the following questions.

1. Identify the term “international scientific vocabulary”. Comment on the origin of term ISV. Tell about the linguistic peculiarities of international scientific vocabulary.
2. Define spheres of science and technology where international scientific vocabulary is used.
3. Speak on English for Science and Technology (EST).
4. Name mathematic, algebraic and geometry terms.
5. Signify two sets of fundamental units used in physics.
6. Enumerate physical quantities and units of measurements.
7. Point out the differences between British English and American English terms.
8. Explain the rules of reading chemical formulae and equations.
9. Name the types of new terminological vocabulary.
10. Identify the ways of translating new terminological vocabulary.
11. Signify the strategies of translating non-equivalent vocabulary in scientific and technical texts.
12. Talk on translation of international terms, proper names and non-equivalent terminological vocabulary.
13. Explain difficulties, which arise during the translation of international terms.
14. Give definition of the term “translator’s false friends” or “misleading words”.

Task 2. Read unit 6 carefully and find English equivalents to the following terms.

Додавання, доданок, відомий/ невідомий доданок, віднімання, зменшуване, від’ємник, різниця, множення, помножити, множник, добуток,

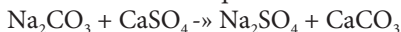
ділення, ділене, дільник, частка, рівновіддалений, чотиристоронній, багатокутник, поверхня, куля, кут, прямий кут, трикутник, фізичні величини, щільність, прискорення, сила струму, опір, унція, відсоток, градус, квадратний метр, діаметр, радіус, натуральні числа, дроби, квадрат, корінь квадратний, рівняння, нерівняння, об'єм, площа, геометрична прогресія, степінь.

Task 3. Find the following abbreviations in a dictionary and give them definitions.

W.e.f., i., c.g., avdp., yd, mph, lat., lb, kev, hr, CGS, w., rect, s.f., app, man, ru, s.a., a.c.

Task 4. Read mathematic and chemical equations and formulae.

$$28: 4 = 7$$



$$9 + 18 = 27$$



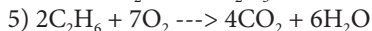
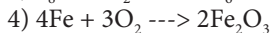
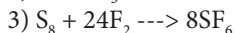
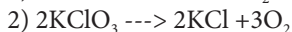
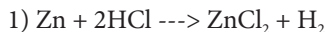
$$6 \times 9 = 54$$



$$11 - 6 = 5$$



Task 5. Identify the reactants, the products and the coefficients of these equations:



Task 6. Find the terms in the text; define their peculiarities and the terminology system of the text. Translate the text into your mother tongue.

There are two types of computers, the analogue and the digital. Today's analogue computer is a device for measuring such physical quantities as lengths and voltages and, through a mechanical linkage, exhibiting the measurement as a numerical value. The computer must be told what to do with information: to add, subtract, multiply, or divide the coded pulses stored in its memory. Parts of that memory contain instructions, prepared by a human brain, that provide the computer with the road to follow in order to solve a problem. These instructions are called the program.

The modern electronic digital computer counts with incredible speed using only two numbers - the one and zero of what mathematicians call the binary system. The counting ability of the computer is used to feed it information. First, the information is translated into a code. The information is then stored in a memory bank made of magnets. The direction in which electrical signals run through the magnets means one or zero, yes or no, off or on. Each magnet contains one piece of information called a bit. A large computer system can store hundreds of millions of such information bits.

Task 7. Match the following terms to their English equivalents from the text above.

Бінарна система, цифрові та аналогові комп'ютери, вводити інформацію у комп'ютер, засіб для вимірювання напруги, оперативна пам'ять, містити інструкції, які створені людиною, механічний зв'язок, числове значення, вирішувати проблему, велика комп'ютерна система, частка інформації, яка називається бітом, закодовані імпульси, електричні сигнали.

Task 8. Read the text, find science and technology terms. Identify its terminology system and translate the text into your mother tongue.

Mode of Injury

Blunt renal trauma can be classified according to the severity of injury and the most common is the renal contusion. Blunt trauma in the region of 12th rib compresses the kidney against the lumbar spine, and the injuries will commonly involve the waist or lower pole of the kidney, where the 12th rib makes its impact. The kidney can be damaged from a blow in the abdomen anteriorly, just below the rib cage, particularly in road traffic accidents, such as the victim is thrown onto the steering column or some other projecting object. Abdominal injuries due to seat belts include 11%, which involve the urinary tract, and half of those are renal.

Penetrating injuries (usually from gunshot or stab wounds) account for 20% of renal traumas in an urban setting. The damage from a bullet will depend not only on direction, but also on the velocity of the missile. Low-velocity missiles will penetrate all structures in their path. With high-velocity missiles, it is necessary to assume that the shock wave will have damaged an area around the track of the missile. A knife or stiletto stab can readily cut the cortex of the kidney if the weapon is driven more than 3 inches into the victim. Although perineal hematomas usually develop, the patient may not show hematuria unless the weapon has reached the calyces or renal pelvis.

There is also the possibility of iatrogenic injuries that can occur in the passage of a catheter up the ureter (damage of renal pelvis), when a renal biopsy is done or when there is an infection carried indirectly into the renal pelvis.

Task 9. Study the table of chemical formulae, then close the book and try to repeat them by heart.

Na ⁺	K ⁺	Mg ²⁺	Ca ²⁺	Al ³⁺	
NaCl sodium chloride	KCl potassium chloride	MgCl ₂ magnesium chloride	CaCl ₂ calcium chloride	AlCl ₃ aluminum chloride	Cl ⁻
Na ₂ O sodium oxide	K ₂ O potassium oxide	MgO magnesium oxide	CaO calcium oxide	Al ₂ O ₃ aluminum oxide	O ²⁻

NaNO ₃ sodium nitrate	KNO ₃ potassium ni- trate	Mg(NO ₃) ₂ magnesium ni- trate	Ca(NO ₃) ₂ calcium ni- trate	Al(NO ₃) ₃ aluminium nitrate	NO ₃ ⁻
Na ₂ SO ₄ sodium sul- fate	K ₂ SO ₄ potassium sulfate	MgSO ₄ magnesium sulfate	CaSO ₄ calcium sulfate	Al ₂ (SO ₄) ₃ aluminum sulfate	SO ₄ ²⁻
Na ₃ PO ₄ sodium phosphate	K ₃ PO ₄ potassium phosphate	Mg ₃ (PO ₄) ₂ magnesium phosphate	Ca ₃ (PO ₄) ₂ calcium phosphate	AlPO ₄ aluminum phos- phate	PO ₄ ³⁻

Task 10. Read the following abstract, find terms, which belong to international scientific vocabulary.

Newton's law of gravity defines the attractive force between all objects that possess mass. Understanding the law of gravity, one of the fundamental forces of physics, offers profound insights into the way our universe functions. The famous story that Isaac Newton came up with the idea for the law of gravity by having an apple fall on his head is not true, although he did begin thinking about the issue on his mother's farm when he saw an apple fall from a tree. He wondered if the same force at work on the apple was also at work on the moon. If so, why did the apple fall to the Earth and not the moon?

Newton eventually came to the conclusion that, in fact, the apple and the moon were influenced by the same force. He named that force gravitation (or gravity) after the Latin word «gravitas» which literally translates into «heaviness» or «weight.»

Newton defined the force of gravity in the following way (translated from the Latin): *Every particle of matter in the universe attracts every other particle with a force that is directly proportional to the product of the masses of the particles and inversely proportional to the square of the distance between them.*

Mathematically, this translates into the force equation shown to the right. In this equation, the quantities are defined as:

- F_g = The force of gravity (typically in newtons)
- G = The gravitational constant, which adds the proper level of proportionality to the equation.

Task 11. Read the terms borrowed from Latin or Greek. Compare them to their English equivalents. Make sentences with these terms.

Філологія, географія, кібернетика, юриспруденція, медицина, астрономія, модуль, аббревіатура, деривація, афіксація, інфінітив, фізкультура, ботаніка, діалект, автомобіль, фонетика, орфоепія, офтальмологія, катод, анод.

Task 12. Read international terms, check their pronunciation in a dictionary.

Faculty, legal, preventive, prevention, democracy, specification, specify, cyberspace, recipient, domain, computerizing, corruption, candidacy, psychology,

psychological, channel, chemistry, monitor, lingua franca, standard, oxygen, oxide, arbitration, disputes, version, etymology, compensation, beneficiary, municipal, audience, auditor, entrepreneur, licensing.

Task 13. Find nouns matching to the following adjectives.

Circular, straight, curved, electrical, flat, square, equal, cylindrical, equidistant, triangle, perpendicular, parallel, four-sided, opposite.

Task 14. Translate the sentences into your mother tongue.

1. Absolute zero is the temperature of -273.16 or 0 K at which molecular motion vanishes.
2. The nucleus of a helium atom (two protons and two neutrons) emitted as radiation from a decaying heavy nucleus is called an alpha particle.
3. Acceleration is the rate of change of velocity with respect to time.
4. The electric current that changes its direction periodically is named an alternating current.
5. Unit of electric current, one ampere is the flow of one coulomb of charge per second.
6. Archimedes principle means that a body immersed in a fluid experiences an apparent loss in weight, which is equal to the weight of the fluid displaced by the body.
7. Atomic mass unit is equal to one-twelfth the mass of C-12 isotope of carbon.
8. Under the same conditions of temperature and pressure, equal volumes of all gases contain equal number of molecules.
9. The center of gravity is the single point within a body at which the entire weight of the body is considered to act.
10. A vector is a quantity that has magnitude and direction.
11. The terminal velocity is the constant, maximum velocity of an object when the resistive forces on it are equal and opposite to the accelerating forces (e.g. pull of gravity).
12. Isotopes are atoms with the same number of protons, but different numbers of neutrons in their nuclei.

Task 15. Complete the sentences.

1. Fundamental units are used 2. Derived units can be written as 3. The Metric System is based on 4. The English System uses 5. The advantage of the Metric System is 6. For convenient representation of physical quantities and units we use ...

Task 16. Answer the following questions.

1. What units are used to measure length, mass and time? 2. What is the difference between the Metric System and the English System? 3. What is the advan-

tage of the Metric System? 4. How can we represent physical quantities? 5. How do we represent units of measurement?

Task 17. Using the information from unit 6 translate the text.

METALS AND NON-METALS

The 105 elements do not exhibit 105 completely different sets of properties. When the major properties are considered it is found that the elements fall into one of two groups, the metals or the non-metals. The contrast between the properties of these two groups is given below. It is not to be expected that all elements in one class will agree in every detail; some differ in one or two properties from the others of their class; these exceptions are indicated in brackets.

Metals. Physical properties.

1. Solid at room temperature (mercury is the only liquid metal).
2. Have a high density (except potassium and sodium).
3. Can be molded by pressure, i. e. they are malleable.
4. Have high melting and boiling points.
5. Have good conductivity of heat and electricity.
6. Can be drawn into wire, i. e. they are ductile.

Non-metals. Physical properties.

1. Many are liquids and gases at room temperature.
2. Density is usually low.
3. Solid non-metals are brittle.
4. Have low melting points and boiling points.
5. Have poor conductivity of heat and electricity (graphite is a good conductor of electricity).
6. Cannot be drawn into wire.

Metals. Chemical properties.

1. Have basic oxides
2. React with dilute acids forming salts.
3. Form positive ions.
4. Can be liberated at the cathode during electrolysis (hydrogen acts as a metal).

Non-metals. Chemical properties.

1. Have acidic oxides.
2. Salts of non-metals do not exist.
3. Form negative ions.
4. Can be liberated at the anode during electrolysis.

The chemical properties are much more conclusive than the physical properties for deciding whether a particular element is to be regarded as a metal or a non-metal, e.g.: if an element forms a basic oxide, it must be classified as a metal. A basic oxide is never formed by a non-metal.

To determine if a particular element is a metal or a non-metal, prepare its oxide and examine this as follows:

- a) if the oxide is soluble in water, use litmus to find out if the solution is acidic or alkaline;
- b) if the oxide does not dissolve in water, an attempt must be made to find out if it neutralizes an acid and forms a crystalline salt. Only metallic oxides do this.

Task 18. Pick out the terms in the following text and define them. Translate the text and explain the words which meanings are determined by the context, and those, which meanings are not quite clear.

The series of numbers, each term of which begins with the second, is equal to the product of the preceding one. A number, constant for this series, is called a geometric progression. When a number is used a few times as a factor, the product is called a power of the number. When 2 is used twice as a factor, the product is the second power of 2 or the squared 2, if it is used three times, then the product is in the third power, or the cube, four times – the fourth power of 2, n times or any number of times the n^{th} power of 2. It may be done by multiplication according to the formula:

$$2^3 = 2 \times 2 \times 2 \text{ (3 factors) or } 2^4 = 2 \times 2 \times 2 \times 2 \text{ (4 factors).}$$

The number 3 is called an index or an exponent of the power, the number 2 is the base of the power.

The equality $2^3 = 2 \times 2 \times 2 = 8$ expresses an operation known in mathematics as involution. The operation, by means of which the base may be found according to a given power and the exponent of that power, is called evolution and is expressed as follows: $\sqrt{49}$, i.e. the squared root of 49. The squared root of 49 is 7, since $7^2 = 49$ and $(-7)^2 = 49$.

The root of the third power (or cubed root) of 64 is 4, as $4^3 = 4 \times 4 \times 4 = 64$. The number n indicating the power of a root is called *the index or exponent of the root*. The symbol $\sqrt{\quad}$ is called *radical sign* or the sign of the root.

The operation, by means of which the exponent of a power may be found according to a given power and a given base, is called finding the logarithm of the given number.

Task 19. Complete the following sentences.

- 1. The symbol $\sqrt{\quad}$ is called
- 2. The operation, by means of which (the base) the exponent may be found according to a given, is called
- 3. The involution is an operation
- 4. 9^2 is read
- 5. A geometric progression is a

Task 20. Match the following terms to their English equivalents from Task 18.

Алгебраїчні рівняння – це рівняння, які можна записати у вигляді многочлена щодо невідомих, прирівняного до нуля. Для алгебраїчних рів-

нянь з одним невідомим 1-го (лінійних рівнянь), 2-го (квадратних рівнянь), 3-го (кубічних рівнянь) і 4-го степеня є формули, які виражають корені через коефіцієнт рівняння за допомогою скінченного числа арифметичних операцій і добування коренів. Еквівалентними рівняннями називаються два алгебраїчні рівняння, в яких кожен корінь будь-якого з них є коренем іншого, причому кратність рівних коренів у кожному з рівнянь однакова. Поняття еквівалентності пов'язане з числовою областю, в якій допускаються розв'язки. Так, рівняння $(x^2 + 1)(x - 1) = 0$ і $x - 1 = 0$ еквівалентні в області дійсних чисел, у якій вони обоє мають тільки один корінь $x = 1$, і нееквівалентні в області комплексних чисел, бо перше рівняння має ще корені $x = \pm 1$, яких не має друге.

Task 21. Read and write the following numbers:

102	55	5.32
in 1774	2.79	8/9
1/2	1/5	0.8
1/4	8/21	3000
6275	8356	472

Task 22. Analyze the following terms and term combinations, then translate them into your mother tongue.

1. Interference power density. 2. Land-line circuit. 3. Pilot-tone system. 4. Trunk communication. 5. Frequency-response characteristic. 6. Automatic adaptive system. 8. Continuous data. 9. Differential amplifier. 10. Dynamic range. 11. Harmonic distortion. 12. Random access. 13. Accelerating electrode. 14. Synchronizing signal. 15. Switching amplifier. 16. Modulating signal. 17. Integrated circuit. 18. Fixed point. 19. Armored cable. 21. Electronically controlled filter. 22. Remotely controlled plant. 23. Periodically operated switch. 24. Horizontally polarized antenna. 25. Manual phasing.

Task 23. Read the following sentences, find as many terms as you can, define their structural type and the way of translation.

1. A harmonic filter is no longer required.
2. We assign, tentatively, the structure to the free acid.
3. Once these two factors are known for a given network.
4. The higher the purity of titanium, the easier it is to fabricate, but the lower is its strength.
5. When the number is restricted, the response is no longer flat and the power or the bandwidth is reduced.
6. In order to determine whether a given compound is organic it is frequently sufficient merely to heat it.
7. Telstar by then was responding properly to all normal commands.

8. In fact, the atoms have an irregular to-and-fro motion similar to that of the electron.

9. The philosophy used in the design of the experiment is as follows.

10. The most efficient way to use tapes is to transfer information to or from them in large blocks rather than by individual words.

11. Mean values and deviation of the four parameters are given for various types of transistors in Table I.

12. The history of radar is a long one, for the underlying principle has been known to science for a long time.

13. The tuning sequence above takes less than 2 min for the two higher-power transmitters.

14. Another similarity between the two amplifiers is that the same low-pass harmonic filter is used in the output feeder.

15. Some elements possess so few metallic qualities that it is uncertain whether they should be called metals or nonmetals.

16. As an alternative to the distributed amplifier a normal 2-stage tuned amplifier may be used.

17. A soft coal, however large the lumps, falls to pieces too readily in the fire and chokes it.

18. Either a wideband distributed amplifier or conventional tuned amplifier can be used.

19. A number of factors affects the speed with which arithmetic operations are performed.

20. In gaseous reactions, the equilibrium position is largely influenced by pressure.

21. A reasonably uniform electrical output is obtained regardless of the relative orientation to the sun.

22. The boiling point on the centigrade scale is 100° and that on the Fahrenheit is 212° .

23. The amplified signals drive the two synchronous motors.

24. Of all the senses, vision is the only one that can make us directly conscious of things at great distances.

25. Radio relay systems are subject to severe selective fading due to multipath effects.

Unit 7

THE WAYS OF TERM FORMATION

7.1. Motivation of a term.

7.2. Semantic way of term formation.

7.3. Terminological borrowings.

7.4. Morphological way of term formation.

7.5. Syntactic way of term formation.

7.6. Conversion or morphological syntactic way of term formation.

7.7. Modern tendencies in term formation.

7.1. MOTIVATION OF A TERM

How can we create a new term? For this purpose, a researcher or terminologist must distinctly understand: a content of a concept, a scientific idea and the place of a term among others in terminology field or system i.e. to define **motivation** of a term. **Motivation** in terminology is thought as a correlation of a term with other ones in the same terminology system or with the words of common general language. Motivation is very important for term formation distinguishing necessary and substantial signs from unnecessary and uncorrelated ones. For instance, the term “омоніміка” is motivated by its correlation with such philological terms as «антропоніміка», «синоніміка», «топоніміка», where the suffix *-іка* means “a study”. The term «хомонут» is also motivated. The first element *homo* in the following terms «homophone» and «homograph» means “identical”, the second one in terms «synonym», «antonym», «paronym» means “name”.

Motivation of a term allows to interpret it according to a correlation of term with other ones in the same terminology system or in the same classification of definite concepts or notions. To illustrate this, let us try to explain modern English terms, give them short definitions and translate them into Ukrainian: *internet-banking system, a partygoer, recapitalization, speechwriter, nomophobia, multiuniversity*. Compare your answers:

- *Internet-banking system (інтернет-банкінг)* is a bank service provided through the Internet.
- *A partygoer (тусівник)* is a person who likes eating out.
- *Recapitalization (рекапіталізація)* is a change of capital structure in a company or enterprise due to bankruptcy.
- *Speechwriter (спічрайтер)* is a person who prepares speeches and reports for politicians, business leaders and other public people.
- *Nomophobia (номофобія)* is an abbreviation for “no-mobile-phone phobia” which means a fear of being out of mobile phone contact.

- *Multiuniversity (мегауніверситет)* is a university with a big amount of faculties.

The following ways are used for nomination or term formation in terminology: semantic way, borrowing, morphological way (affixation, word compounding or composition), syntactic way and conversion or morphological syntactic way.

7.2. SEMANTIC WAY OF TERM FORMATION

Semantic way of term formation means creating terms by means of scientific (or technical) reconsideration on the base of metaphorization or metonymization of the lexical meanings of well-known words: *дірка* (фіз.), *зарядка* (фіз.), *башимак* (на залізниці: пристосування, що служить для гальмування коліс), *мло* (“an email”, the new IT-slang), *евакуація* (“towing services”), *зашкалювання*, *материнська речовина* (фіз.).

The word of common general language with the simplest semantic structure can become a term easier. It sometimes happens as an extension of the meaning of an everyday word when the word used in different contexts acquires new connotations and new meanings. For example, in the lexical structure of the term *confrontation* the original meaning was *quarters, collation, and comparison*. Lately this word was used in term combination *confrontation of armed forces* and acquired the meaning *contiguity of armed forces*. Now the word *confrontation* has acquired the meaning *collision, opposition*.

Breaking and change of the meanings of everyday words can be by three following ways:

a) by the way of appearing a new meaning of every day word, with the help of reconsideration of the word existed in the language. Thus, we can trace the terminological meaning of the word *elementary* in combination *elementary particle* is *basic, complex, fundamental particle* (ср. one of general meanings of the word *elementary* is *simplest, simple*);

b) by the way of transferring the name on the base of associations. As a result, terminology meaning of such words appear: *сніг* (спец.) – особливий вид зображення; *дірка* (спец.) – дефектний електрон; *шійка* (спец.) – проміжна частина валу машини and etc.

c) by the way of giving the term the name of its inventor: *Henry* – *генрі*, *Joule* – *джоуль*, *Newton* – *ньютон*, *Ohm* – *ом*.

The process of forming new terms by means of reconsideration of the meanings of everyday words due to the second, special terminological meaning appears is called **terminologization**. Terminologized unit is a former word of general language which has acquired a new terminological meaning to define a new concept with a new lexical meaning next to its general one. The expressive-emotional meanings of every day words are lost: *голівка* (у болтів і заклепок), *хвостик*

(у інструментів, пристосувань), *лапка* (частина станини машин, у приладів) and etc.

The semantic way of term formation consists of:

a) a terminologisation of every day word: cp. *ray* – a narrow beam of light or *ray* in Mathematics;

b) a terminology derivation: cp. *conductivity physics, the property or power of conducting heat, electricity, or sound, superconductivity*. For example: *The phenomenon of almost perfect conductivity is shown by certain substances at temperatures approaching absolute zero*;

c) an adaptation of foreign words or borrowings from other languages: *Haemangioma гемангіома, ablaut аблаут, diphthong дифтонг*;

d) borrowing from other terminology system, cp.:

Virus, an ultramicroscopic (20 to 300 nm in diameter), metabolically inert, infectious agent – a medical term loaned into another terminology system, and

Virus, a segment of self-replicating code planted illegally in a computer program, often to damage or shut down a system or network, for e.g. *virus of flu and a computer virus*.

The process of borrowing terms from other terminology system is called **transterminologization**.

7.3. TERMINOLOGICAL BORROWINGS

The process of borrowing belongs to semantic way of term formation: *алгоритм, батискаф, кібернетика, лазер, мазер, сканер*. Sometimes it can be a mixture of the original words and borrowings (*дочірні атоми, легкі ізотопи – фіз., рідинний амортизатор, покоління нейтронів, силове поле – фіз.*). The main reason for terminological borrowing is the appearance of new concept with a ready-made name and the absence of the new concept name in TL: *marketing - маркетинг; dumping – демпінг; manager – менеджер*. Terminological borrowings play a considerable role in increasing terminology systems. The international scientific and technical, economic, cultural and historical, social and political terms of Latin and Greek origins are known for a long time:

- *acclimatization, agglutination, binary, humanity, dictatorship, internationalism, literature* and other words from Latin;

- *agronomics, dynamics, grammar, space, dramaturgy, democracy* and other words from Greek.

The question of borrowing terms is always vital in terminological practice. According to the opinions of famous researchers, the vulgar borrowing can be harmful destroying the system of terminological concepts.

To borrow foreign terms famous terminologist D. Lotte recommended paying attention on the following factors:

1) borrowed terms and term-combinations must correspond to the general phonetic rules of TL;

2) morphological peculiarities and structure of borrowed terms and term-combinations must correspond to the general morphological rules the TL;

3) define if the term for the new concept exists in the TL;

4) check how borrowed term combinations contact with all system of the TL, i.e. if there are homonyms, synonyms, antonyms and the words of the same root in the TL.

The simplest way of borrowing terms but non-productive is literal borrowing or transcoding. **Literal borrowing** (*буквальне запозичення*) is adopting term changing it according to the phonetic and grammatical systems of the TL. From such kind of borrowing, it is necessary to distinguish cases, when terms are formed from foreign root elements (usually Latin and Greek). This type of borrowing leads to the creation of international terms, the lexical units of identical origin comprising a stock, common to several languages. In scientific and technical literature words, adopted from other language, (mainly from Latin and Greek) occupied a considerable place. In most cases, they belong to various terminological systems:

- *atom, proton, focus, cosmos* – фізика;
- *plus, integral* – математика;
- *radio, diode, modem* – радіотехніка.

We can easily guess the origin of these terms on their roots: *accumulator, perpendicular, petrol, catalyst, radium, element, energy, analogy*, all these words already became popular not only for the English users but also for those who speak other language.

Calques or translation-loans belong to the number of borrowed words or phrases which do not retain their original form, but undergo the process of translating one part after another, e.g.: *машино-будівництво* – *machine building*, *self-service* – *самообслуговування*, *антисоціальний* – *antisocial*.

7.4. MORPHOLOGICAL WAY OF TERM FORMATION IN TERMINOLOGY

Morphological way of term formation in terminology is the creation of terms by means of existing in the language (borrowed before) word forming elements, affixes (prefixes and suffixes). **Word compounding (or composition) and affixation** are the most productive ways among them.

Affixation is forming terms with the help of prefixes and suffixes added to roots or stems. For example, prefix *re-* means a repeated action (*rethinking, retraining*); prefix *de-* means a return action (*demilitarize, denazify*); suffix *-ee* forms nouns which mean the object of action (*detainee* – *затриманий*, *parolee* – *узятий на поруки*).

The analysis of term structures can help to recognize terms and understand their meanings. Even if we have not met such term before, we can define its meaning on its morphological structure, on the meaning of its morphemes and its motivation. There are two models of morphological term formation:

- stem (Greek, Latin, English) + suffix;
- prefix + stem (Greek, Latin, English).

Suffixes and prefixes influence the lexical and grammatical meanings of a term. Some suffixes, for example, are used only to create nouns from verbs, adjectives from nouns, adverbs from adjectives, that is why to understand the meaning of the term correctly and use it freely it is necessary to know the meaning of prefixes and suffixes.

Prefix is put in the beginning of a term changing its meaning. It can be added to different parts of speech. The most common prefixes in technical literature are of international origin, for example:

- anti- (анти-, проти-) antibody — антитело
- co- (спів-) coexist — співіснувати
- de- (де-) demilitarize — демілітаризувати
- ex- (екс-) ex-president — екс-президент
- extra- (над-) extraordinary — надзвичайний
- pre- (до-, пред-) prehistoric — доісторичний
- super- (над-) superconductivity — надпровідність
- trans- (транс-) transmission — передача
- ultra- (ультра-) ultrasonic — ультразвуковий

In its turn, suffix is put in the end of a term. There are Latin and Greek suffixes which are the most useful in science and technical terminology:

- -age shortage – брак, некомплектність
- -ant (-ent) assistant — помічник
- -er (-or) transistor — транзистор
- -ian technician — технік
- -ing shunting —шунтування
- -ion (-tion, -ation) formation — формування
- -ment equipment — обладнання
- -ness steadiness – наполегливість
- -ship dictatorship - диктатура
- -ous blizzardous - холодний, з завірюхою.

The terms which elements are derived from different languages, (native stem + foreign suffixes or prefixes) are called **etymological hybrids** in modern lexicology.

The study of various term forming elements makes possible recognizing the links between similar terms and creating others in the same terminology system. Thus, affixation in the English terminology means forming new terms with prefixes and suffixes.

Word compounding (composition) is a productive way of term formation in the English terminology, the result of which is the appearance of compound terms. Compound term consists of at least two stems that are free in general language. It is a unification of two or more terms: *carry back* – *перенесення збитків на більш ранній період*.

Word compounding can be divided into the following types:

a) compounding of full stems (*сім'ядоля, кисневмісний, атомохід, димоуловитель, місяцехід, нафтопровід, струмообертач* and etc.);

b) compounding of clipped stems (compound of shortened terms): *бароапарат, космолавання, металовироби, держкомітет*;

c) compounding of partly dismembered terms and different word-formation elements: *hydro sandblast perforation* (*гідроніскострумінна перфорація*), *hydroponic hothouses* (*гідропонні теплиці*), *radio electronic industry* (*радіоелектронна промисловість*).

Clipping, ellipsis, blending and abbreviation belong to word compounding: *transistor receiver* - >*transistor* - >*trans*; *television text* - *teletext*; *ecological architecture*- *ecotecture*; *information* + *entertainment*= *infotainment*; *documentary* + *drama*=*docudrama*. The terms consisting of multiple elements are inconvenient for usage; the shortened variants of such terms are often used. On the one hand, shortening causes the appearance of more concise homonymous forms, especially of frequently used terms, while, on the other hand, the creation of shortened terms is easier to remember than long terms which are not clearly recognizable as terminological units. Thus, the following types of shortened forms can be distinguished:

a) shortened forms (*Court of Justice of the European Communities* – *Court*);

b) abbreviations (*IED* - *Improvised explosive device* – *вибуховий пристрій*, *PLHIV* – *People Living with HIV (human immunodeficiency virus)*);

c) clipped (curtailed) words (*pan.* – *panorama*; *tec.* - *technical*);

d) acronyms (*UFO* – *unidentified flying object*, *scuba* – *self-contained underwater breathing*).

7.5. SYNTACTIC WAY OF TERM FORMATION IN TERMINOLOGY

Syntactic way of term formation is the process of creating new terms from terminological combinations and phrases: *bold-headish, 6 o'clockish, how-do-you-doers*. It is also the usage of noun in the function of attribute. Thus in the English scientific and technical literature a noun without any change of the form used in the function of attribute is met very often, e.g.: *cane* — *очерет*, *sugar* — *цукор*, *sugar cane* — *цукровий очерет*, *cane sugar* — *очеретяний цукор*.

The following structure *noun* + *noun* + *noun* (and etc.) causes difficulties at the process of translation, because nouns stand in succession. The main word in such terminology group is the last, and all preceding nouns are its attributes.

Some noun-attributes can be translated as adjectives: *bar* — *стрижень*, *magnet* - *магніт*, *bar magnet* - *стрижневий магніт*; *machine building industry* - *машинобудівна промисловість*.

7.6. MORPHOLOGICAL SYNTACTIC WAY OF TERM FORMATION

Morphological syntactic way of term formation is a highly productive process of forming new English terms. It is a transition of a term of one part of speech into another one which is in linguistics called **conversion**. In modern terminology, conversion is a special type of affixless derivation where a new term does paradigmatic and syntactic functions different from those ones of an origin term without any changes in the external form of the original word.

Different linguists classify converted terms based on different criteria: the criterion of completeness/incompleteness, the semantic links or syntactic functions, the correlation them with different parts of speech, based on derivative stems (simple and complex), abbreviations, phrases and sentences. There are many types of conversion such as verbalization (*a map* (n) – *to map* (v), *an air* (n) – *to air* (v)), substantivation (*to back out* (v) – *a backout* (n)), adjectivation (*to get-out* (v) – *get-out* (adj)), adverbialization (*on-line* (adj) – *on-line* (adv)). Noun converted into verb, verb converted noun, adjective converted into verb or noun are widespread, for example, *the needy* – *нужденні*, *front-page* – *перша сторінка*.

7.7. MODERN TENDENCIES IN TERM FORMATION

The development of informative and communicative processes has provided the appearance of new terms in all sciences and technologies when new objects or parts of objects come into play. As a rule these terms form **the most important level** of vocabulary are called neologisms. Some of these terms have already become well-known for everyone and play a great role in the enriching target language. Such words like *SMS*, *mobile phone*, *Wikipedia*, *Bluetooth* entered quickly our life and transferred into the class of the common used lexical ones. These words are connected with comprehensive cognitive, lexical and semantic, word formative and grammar levels and designate new, not known earlier phenomena, objects, branches of science and professions.

Nowadays the necessity of the new ways of term formation to express new objects and new notions is explained by the reorientation of the linguistic science towards the practical branches of human activity. It is considered that the process of terminological nomination may be represented in the following way: **motivator – classifier – word-building pattern – concept (notion) – a term** (О. Глоба: 2002, 6).

Some new terms were brought to life by computer technologies development, cp.: *cyber security, cognitive radio, smartwatch, dropbox, private cloud, hybrid database* and others. The technological development has probably the most significant impact on the language. For instance M. Gaiduk emphasizes that “cyberland has been heavily influenced by pop culture and it boasts its share of counterculture phrases drawn from comic books, children’s stories, sci-fi movies and New Age movements” (M. Gaiduk: 2009, 10). Thus, the computerization is the most noticeable feature of the technological progress of the last decades.

There are several modern tendencies in the English term formation: the process of terminologization that is considered as the most widespread among them, transterminologization, terminological borrowing and conversion. The semantic volume of the terms created earlier has been constantly changing because of re-considering term meanings.

What happens with the term when it actually functions in scientific speech? In reality, the logical principle of sign construction is not frequently observed in everyday speech, and as a result we encounter the disturbance of “the law of sign” or often meet interscientific homonymy. The phenomenon of interscientific terminological homonymy could be considered as one of such disturbances, when the same term can enter into different terminology systems of a certain language. And when we try to translate these terms it causes certain difficulties.

So it is evident that all lexical processes occurring in a certain language could also be reflected in a certain terminology system. In the development of vocabulary, three lexical processes are to be distinguished: **terminologization, transterminologization and determinologization**. All these processes in the development of term polysemy are caused by linguistic reasons though. Everyday words are involved in the term migration.

Terminologization is a very productive way of term formation. It is the usage of everyday word as a term, when a linguistic unit from common language is used for special purposes. Scholars emphasize that nowadays the major part of neologisms are terms that is why semantic changes in a language are mostly caused by the development of new terminological meanings on the basis of common word meanings (O. Akhmanova, L. Bilozerska, V. Karaban, V. Kovalenko). The second tendency is transterminologization i.e. a transition of term from one terminology system into another one accompanied with minor semantic changes. And the third tendency in the process of term formation is borrowing foreign terms, when a new notion is named with the help of a foreign word.

There are two types of borrowings. The first type is full borrowing which means that both internal and external forms of the term are loaned. The second type, partial borrowing means that a foreign term adjusts its morphological and phonetic forms to the norms of the TL. Therefore, in the process of translating partial borrowing is rendered by calquing.

Moreover, there are conceptual units called “terminology phraseology” representing a definite concept. Vice versa there are terms which are determinologized and become lexical units of general language. The problem of determinologization should be considered carefully. Determinologizing terminological vocabulary is the process of transition of terms from a certain special, professional sphere to the sphere of general use. Such determinologized terms are met in the colloquial speech (mainly of educated people). As a rule, they are used ironically.

What are the reasons for determinologization? In a great deal it depends on the sphere of activity where the term is used, i.e. on different functional styles (formal or informal). On the other hand, it is closely related to the intensity of borrowings from one or other levels of vocabulary limited on the sphere of usage or their distribution. Many words, idioms and phrases quite often have other metaphorical, lexical or phraselogical meaning. The special meaning of terms is lost at the process of determinologization, but the terms obtain expressive-emotional meaning. So, this method could be considered as the way of term formation with the elements of semantic expression.

Different types of lexical meaning and parallel ‘processing’ at different fields are highly productive in the process of professional communication. Narrow professional words are usually not highly distributed in literature; i.e. the sphere of their usage remains limited. Moreover, professional speech is often colloquial, that is why secondary terminologization of professional words and expressions appears quickly: terms existing in the boundaries of one terminology system pass to another one. In a new sphere of knowledge, such terms can modify the meaning, so the reader cannot understand them in the sense he knew them before, (in that science, where they came from). The clear division between these factors sometimes is practically impossible to be conducted.

The objective process of transterminologization is caused with scientific, technological, economic development of the countries, mass media, political situation in the world, extension of multilateral cooperation in the economics and science. Verbal speech, systematic movement of proper themes on radio and television promote the processes of determinologization and transterminologization of professional and technical terms. The reasons for the secondary terminological nomination are explained by the influence of such intralingua facts as phonetic convergence and semantic processes. The other reason for the secondary terminologization is the integration of scientific knowledge realized by the different ways and implicated in various forms, the unification of concepts, categorization of apparatus and formation of the synthetic sciences. The instance of the term borrowing without any semantic transformations can explain the presence of the same terminological units in certain close subject science research. Interfield sciences (biochemistry, biophysics radio astronomy, geophysics, geochemistry, etc.) often demonstrate the usage of the terms of initial sciences, which include differ-

ent subsystems of the suitable concepts. The main characteristic language reason for transterminologization is the tendency to economize language material.

All mentioned modern tendencies of the English term formation require the further deep analysis and investigation.

PRACTICAL ASSIGNMENTS

Task 1. Get ready to discuss the following questions.

1. Define the importance of motivation in the process of term formation.
2. Enumerate which ways of term formation are used in terminology.
3. Comment on semantic way of term formation in terminology; exemplify your answer.
4. Explain the role of borrowings in term formation.
5. Point out the differences between borrowing and calque.
6. Comment on morphological way of term formation; give examples.
7. Name languages whose morphemes are used in term formation, give examples.
8. Speak about syntactic and morphological syntactic ways of term formation. State, whether there are some differences between them, give examples.
9. Define modern tendencies in term formation.

Task 2. Match the words to the following prefixes to create new terms. Explain the meaning of the new formed words. Some prefixes can be used several times.

Interference	Trans-
Balance	Bio-
Formation	Co-
Action	Anti-
Tropical	In-
Operate	Inter-
Particle	Sub-
Mission	Non-
Organic	De-
Chemistry	Out-

Task 3. Create terms with suffixes -er, -or, -ist, -ian from the following words.

Sail, statistics, compose, regulate, politics, accumulate, special, resist, music, technical, demonstrate, mathematics, develop, weld.

Task 4. Use suffixes -ity, -ness, ment, -tion, -ion, -ing to create terms with abstract meanings of peculiarity, quality, state and character. Translate the newly formed terms into your mother tongue.

Durable (довготривалий), porous (пористий), permeable (проникний), develop (розвивати), treat (обробляти), watertight (водонепроникний), bend

(гнути), forge (кувати), weld (варити), tight (вужкий), dense (щільний), stiff (жорсткий), settle (осідати), improve (поліпшувати), apply (використовувати), draw (тягнути), install (встановлювати), absorb (поглинати), compress (стискати), cut (вирізати).

Task 5. Study the terms; explain the way of their formation.

Reactivity, telescope, radioactivity, fallout, radium, generalization, transmitter, X-rays, uranium, discomfort, theory, overloading, inelastic, vulcanized rubber, denominator, hydraulic press, MIA.

Task 6. Translate the terms without a dictionary paying attention on the meaning of prefixes and suffixes of the following terms.

Decompose, demilitarization, disappearance, reconstruct, coathour, extra-territorial, prefabricate, ultramodern, prewar, limitless, convertible, non-resistance, superconductivity, inaccurateness.

Task 7. Read and compare the meanings of international scientific terms.

Master, progress, transmission, argument, confident, optimistic, initiate, committee, differentiation, operation, dynamic, conductor, accurate, division, obligation, contribution.

Task 8. Read the text. Find terms; define their structure, terminology system and semantic meaning. Identify the type of terms and term combinations, explain the ways of their formation.

The visible light spectrum is the section of the electromagnetic radiation spectrum that is visible to the human eye. It ranges in wavelength from approximately 400 nm (4×10^{-7} m) to 700 nm (7×10^{-7} m). It is also known as the optical spectrum of light.

The wavelength (which is related to frequency and energy) of the light determines the perceived color. The ranges of these different colors are listed in the table below. Some sources vary these ranges pretty drastically, and the boundaries of them are somewhat approximate as they blend into each other. The edges of the visible light spectrum blend into the ultraviolet and infrared levels of radiation.

Most light that we interact with is in the form of white light, which contains many or all of these wavelength ranges within them. Shining white light through a prism causes the wavelengths to bend at slightly different angles due to optical refraction. The resulting light is, therefore, split across the visible color spectrum.

This is what causes a rainbow, with airborne water particles acting as the refractive medium. The order of wavelengths (as shown to the right) is in order of wavelength, which can be remembered by the mnemonic "Roy G. Biv" for Red, Orange, Yellow, Green, Blue, Indigo (the blue/violet border), and Violet. You'll notice that in the image and table Cyan also appears fairly distinctly, between green & blue.

By using special sources, refractors, and filters, you can get a narrow band of about 10 nm in wavelength that is considered monochromatic light. Lasers are special because they are the most consistent source of narrowly monochromatic light that we can achieve.

Task 9. Pick up synonyms to the following terms.

To call, to produce, to utilize, example, different, special, whereas, instance, various, to generate, to name, use, while, particular, perhaps, transform, settle, raise, maybe, turn into, increase, significance, rate, advancement, importance, development, speed, size.

Task 10. Make a pre-translation analysis of the text. Define the grammatical and lexical peculiarities. Translate it into your mother tongue.

**NEW MODELING TOOL DEVELOPED FOR IMAGING ATOMIC
DISPLACEMENT IN CRYSTALS**

Feb 21, 2014 by Mona S. Rowe

You use crystals everyday: sugar in your coffee, the active ingredient in hand warmers, maybe a diamond stud in your ear. A crystal is built of atoms arranged in a repeat pattern in all three dimensions. X-rays are good at detecting this pattern because x-rays can only diffract into specific directions that depend on the symmetry and repeat distances in the pattern. If the atoms are displaced because of strain, their pattern of displacement can be calculated from the directional change of the diffracted x-ray beam. That is the simple theory.

Now think of an ocean wave hitting the piles of a jetty. If the wave hits once and leaves the piles, that's an example of kinematical diffraction. Next picture the wave staying with the piles and hitting the piles multiple times, which causes a complex pattern of ripples. That's dynamical diffraction. It usually occurs in single crystals over a micron in size and results in phenomena that can't be explained by the simpler kinematical diffraction theory.

The dynamical diffraction with "multiple hits" is obviously much harder to model in diffraction theory. For this reason, all existing dynamical approaches are usually applicable only to simple crystal geometries, for example, by assuming an infinitely large crystal block.

At the National Synchrotron Light Source II (NSLS-II), now under reconstruction at Brookhaven National Laboratory physicists Hanfei Yan and Li have developed an ingenious method to model x-ray dynamical diffraction for any crystal size and geometry. Their theoretical model opens up opportunities to explore new ways of imaging strain fields – a quantitative measure of the relative atomic displacement – in crystals, particularly in microcrystals, which are important to nanotechnology applications. It also sheds light on many fundamental diffraction problems that have not been fully understood before.

Yan and Li are part of the team building the Hard X-ray Nanoprobe (HXN) beam line, one of an initial suite of beam lines that will be ready for early science commissioning experiments in the fall of 2014 at NSLS-II.

According to Yan, x-ray dynamical diffraction is poised to become a very important modeling tool for HXN because strain can affect optical, mechanical and electrical properties of crystalline materials. Knowing how the strain distributes is vital to understanding the underlying physics. A nanobeam will enable the strain imaging at the nanoscale, which is from 1 to 100 nanometers (a strand of human DNA is from 1.8 to 2.3 nanometers in diameter).

Task 11. Make a pre-translation analysis of the text. Find as many terms as you can. Translate it into your mother tongue.

CLIMATE CHANGE BRINGS MORE CRIME

A new study broadens a notion held by the earliest criminologists: Periods of higher temperatures - on an hour-by-hour or week-to-week basis - are likely to produce more crime. The study by Matthew Ranson of Abt Associates, a research and consulting firm in Cambridge, Mass., suggests global warming will trigger more U.S. crimes including murders and rapes over the next century, with social costs estimated to run as high as \$115 billion.

Between 2010 and 2099, climate change can be expected to cause an additional 22,000 murders, 180,000 cases of rape, 1.2 million aggravated assaults, 2.3 million simple assaults, 260,000 robberies, 1.3 million burglaries, 2.2 million cases of larceny and 580,000 cases of vehicle theft, the study published this week in the *Journal of Environmental Economics and Management* says.

Compared with the number of crimes expected to occur during this period in the absence of climate change, these figures represent a 2.2 percent increase in murders, a 3.1 percent increase in cases of rape, a 2.3 percent increase in aggravated assaults, a 1.2 percent increase in simple assaults, a 1 percent increase in robberies, a 0.9 percent increase in burglaries, a 0.5 percent increase in cases of larceny and a 0.8 percent increase in cases of vehicle theft, the study says.

The social costs of these increases would be roughly \$38 billion to \$115 billion, based on dollar values of per-offense losses established by earlier research.

“A 1 percent to 3 percent increase in a particular crime may seem modest,” Ranson said in an interview. “But for victims, survivors and law enforcement, the burden of those numbers can be very substantial.

“The broader context here is that climate change will influence our lives in a variety of ways beyond how much water we can spare for such things as farming,” he added. “Now, there is reason to believe it will also impact social connections in our neighborhoods, the amount of time we allow our children to spend outside and how much we are willing to spend on law enforcement.”

Overall, crime rates for most offenses by 2090 will be 1.5 percent to 5.5 percent higher because of climate change, according to the study of crime statistics and weather data for each of the nation's nearly 3,000 counties.

"To put these numbers in perspective," the study says, "recent research suggests that a 1 percent increase in the size of a city's police force results in an approximate 0.3 percent decrease in violent crimes, and a 0.2 percent decrease in property crimes, with some variation across types of offenses."

Therefore, it adds, "an immediate and permanent 4 percent increase in the size of the U.S. police force would be required to offset the aggregate climate-related increases in murder, manslaughter, robbery, burglary and vehicle theft likely to occur over the next century."

The study merged monthly reports on criminal activity from the FBI's Uniform Crime Reporting files with temperature and precipitation records for 2997 counties from the U.S. National Climatic Data Center's Global Historical Climatology Network Daily and projections of future climate drawn from 15 global circulation models.

The data set covers a 30-year period and contains 891,000 unique county-by-year-by-month observations.

Task 12. Fill in the gaps using the text from task 11.

1. The study by Matthew Ranson of Abt Associates, a research and consulting firm in Cambridge, Mass., suggests _____ will trigger more U.S. crimes _____ over the next century, with social costs estimated to run as high as \$115 billion.

2. Compared with the number of crimes _____ during this period in the absence of climate change, these figures represent a 2.2 percent increase in murders.

3. The broader context here is that _____ will influence our lives in a variety of ways beyond how much water we can _____ such things as farming.

4. Overall, crime rates for most offenses by 2090 will be 1.5 percent to 5.5 percent higher because of climate change, according to the _____ and weather data for each of the nation's nearly 3,000 counties.

5. Therefore, it adds, "an immediate and permanent 4 percent increase in the size of the _____ would be required to offset the aggregate climate-related increases in murder, manslaughter, robbery, burglary and vehicle theft likely to occur over the next century."

Task 13. Translate the given abstracts. Define the scientific field of the text. Compare their lexical and grammatical peculiarities. Translate them into your mother tongue.

13.1. Generating electricity is not the only way to turn sunlight into energy we can use on demand. The sun can also drive reactions to create chemical fuels, such as hydrogen, that can in turn power cars, trucks and trains.

The trouble with solar fuel production is the cost of producing the sun-capturing semiconductors and the catalysts to generate fuel. The most efficient materials are far too expensive to produce fuel at a price that can compete with gasoline. “In order to make commercially viable devices for solar fuel production, the material and the processing costs should be reduced significantly while achieving a high solar-to-fuel conversion efficiency,” says Kyoung-Shin Choi, a chemistry professor at the University of Wisconsin–Madison.

In a study published last week in the journal *Science*, Choi and postdoctoral researcher Tae Woo Kim combined cheap, oxide-based materials to split water into hydrogen and oxygen gases using solar energy with a solar-to-hydrogen conversion efficiency of 1.7 percent, the highest reported for any oxide-based photoelectrode system.

13.2. NASA’s Galileo spacecraft arrived at Jupiter on December 7, 1995, and proceeded to study the giant planet for almost 8 years. It sent back a tremendous amount of scientific information that revolutionized our understanding the Jovian system. By the end of its mission, Galileo was worn down. Instruments were failing and scientists were worried they wouldn’t be able to communicate with the spacecraft in the future. If they lost contact, Galileo would continue to orbit the Jupiter and potentially crash into one of its icy moons.

Galileo would certainly have Earth bacteria on board, which might contaminate the pristine environments of the Jovian moons, and so NASA decided it would be best to crash Galileo into Jupiter, removing the risk entirely. Although everyone in the scientific community were certain this was the safe and wise thing to do, there were a small group of people concerned that crashing Galileo into Jupiter, with its Plutonium thermal reactor, might cause a cascade reaction that would ignite Jupiter into a second star in the Solar System.

13.3. University of Colorado Boulder scientists have found a creative way to radically improve thermoelectric materials, a finding that could one day lead to the development of improved solar panels, more energy-efficient cooling equipment, and even the creation of new devices that could turn the vast amounts of heat wasted at power plants into more electricity. The technique—building an array of tiny pillars on top of a sheet of thermoelectric material—represents an entirely new way of attacking a century-old problem, said Mahmoud Hussein, an assistant professor of aerospace engineering sciences who pioneered the discovery.

The thermoelectric effect, first discovered in the 1800s, refers to the ability to generate an electric current from a temperature difference between one side of material and the other. Conversely, applying an electric voltage to a thermoelectric material can cause one side of the material to heat up while the other stays cool, or, alternatively, one side to cool down while the other stays hot.

Devices that incorporate thermoelectric materials have been used in both ways: to create electricity from a heat source, such as the sun, for example, or to cool precision instruments by consuming electricity.

Task 14. Make a pre-translation analysis of the text. Find as many terms as you can, give them definitions. Translate the text into your mother tongue.

BRAIN PROCESS TAKES PAPER SHAPE

A group of researchers from China has created a paper-based device that mimics the electrochemical signaling in the human brain. The thin-film transistor (TFT) has been designed to replicate the junction between two neurons, known as a biological synapse, and could become a key component in the development of artificial neural networks, which could be utilized in a range of fields from robotics to computer processing.

The TFT, which has been presented today in the journal *Nanotechnology*, is the latest device to be fabricated on paper, making the electronics more flexible, cheaper to produce and environmentally friendly.

The artificial synaptic TFT consisted of indium zinc oxide (IZO), as both a channel and a gate electrode, separated by a 550-nanometre-thick film of nano-granular silicon dioxide electrolyte, which was fabricated using a process known as chemical vapour deposition.

The design was specific to that of a biological synapse—a small gap that exists between adjoining neurons over which chemical and electrical signals are passed. It is through these synapses that neurons are able to pass signals and messages around the brain.

All neurons are electrically excitable, and can generate a ‘spike’ when the neuron’s voltage changes by large enough amounts. These spikes cause signals to flow through the neurons, which cause the first neuron to release chemicals, known as neurotransmitters, across the synapse, which are then received by the second neuron, passing the signal on.

Similar to these output spikes, the researchers applied a small voltage to the first electrode in their device which caused protons—acting as a neurotransmitter—from the silicon dioxide films to migrate towards the IZO channel opposite it.

As protons are positively charged, this caused negatively charged electrons to be attracted towards them in the IZO channel, which subsequently allowed a current to flow through the channel mimicking the passing on of a signal in a normal neuron. As more and more neurotransmitters are passed across a synapse between two neurons in the brain, the connection between the two neurons becomes stronger and this forms the basis of how we learn and memorize things.

The researchers in their own device demonstrated this phenomenon, known as synaptic plasticity. They found that when two short voltages were applied to the device in a short space of time, the second voltage was able to trigger a larger current in the IZO channel compared to the first applied voltage, as if it had ‘remembered’ the response from the first voltage.

Corresponding author of the study, Qing Wan, from the School of Electronic Science and Engineering, Nanjing University, said: ‘A paper-based synapse

could be used to build lightweight and biologically friendly artificial neural networks, and, at the same time, with the advantages of flexibility and biocompatibility, could be used to create the perfect organism–machine interface for many biological applications.’

Task 15. Make a pre-translation analysis of the text. Translate it into your mother tongue. Find grammatical transformation in your variant of translation.

COMPARING THE EFFECTS OF HUMAN ACTIVITIES WITH HISTORIC PERIODS OF CLIMATE CHANGE

Researchers supported in part by the NASA Goddard Institute for Space Studies (GISS) have compared the effects of human activities with historic periods of climate change using data collected from wetlands along the lower Hudson River in New York State. What did they find? Over the past millennium, humankind has had the greatest impact on ecosystem change at the study sites.

The scientists were able to track how the ecosystem has changed during recent periods in Earth’s history, including the Medieval Warm Period (MWP) and the Little Ice Age (LIA). They compared what they saw to more recent changes brought about by humankind. The results highlight just how dramatic a force of change humans can be on planet Earth.

North of the towering skyscrapers and concrete slabs of New York City lies in a land, that seems a world away from the bustle of Manhattan. The Hudson River National Estuarine Research Reserve is 4,800 acres of coastal wetlands that serve as a vital sanctuary for a myriad of wildlife. The four reserve sites located along a 100-mile stretch of the Hudson Estuary protect populations of more than 150 species of birds, including ospreys and bald eagles, as well as a host of forest animals like deer and foxes. This makes the HRNERR an important laboratory for research and education that concerns the delicate natural resources of the United States. However, as troops of schoolchildren canoe through the waterways and tramp along the forest paths, many are unaware that the ground below them also holds an important record of Earth’s climate history.

Recently, a team of scientists drilled into the HRNERR and collected core samples that provide a geological record of the region over the past 1100 years (roughly since the year 900). This “stratigraphic paleo-ecological” column can basically be read like a book by scientists who want to know more about how this beautiful ecosystem has changed over time in response to environmental pressures—be it changes in Earth’s climate or the arrival of human industry in the region.

When looking at the sediment cores, the scientists search for a number of different clues about what the environment of the HRNERR has gone through over the centuries. First, they look at the signs of life contained within the cores—such as pollen, spores and fossils. This material from ancient plants and animals

sinks to the bottom of the marsh and ends up trapped in the layers of sediments, thereby providing us with direct evidence of what lived on the site.

When the research team opened the geological book written by the HRNERR, they spotted specific eras of history. The Medieval Warm Period (MWP) was the first—a time of warm and dry weather in the north Atlantic that lasted from about A.D. 800 to 1300. Evidence of erosion in the sediment samples indicates that vegetation in the region, and the roots that held the soil in place, died off during the drought. Water in the region grew scarce, evaporation in the heat increased, and plants that were adapted to saltier climates moved in.

Task 16. Read the following statements and put “T” when the statement is true and “F” when the statement is false. Correct the wrong statements.

1. International scientific vocabulary (ISV) comprises scientific and specialized words which are in the current use in several modern languages.
2. Words of identical origin that occur in several languages are called international.
3. The name “ISV” was firstly used by Philip Gove in Webster’s Third New International Dictionary in 2002.
4. Terminology of each branch of science and technology is chaotically organized in accordance with the system of scientific concepts it serves.
5. There are three widely used sets of fundamental units in physics.
6. Morphological way of term formation is a creation of terms by the means of existing in the language everyday words.
7. The process of borrowing terms from other terminology system is called transterminologization.
8. Terminologized unit is a former word of general language that acquires consequently a new terminology meaning to define a new concept next to its general meaning.
9. The following ways are used for term formation as semantic way, borrowing, morphological way.
10. Compound term consists of at least two stems that are free in general language.

Task 17. Translate the following international words.

Radio, genius, human, priority, demonstrate, contribution, physical, chemical, university, laboratories, problem, electromagnetic, communication, operation, apparatus, progress, transmission, music, vision, signals, television, meeting, industry, period, centre, radar, telecontrol, telemetric systems, electronic microscopes.

Task 18. Read and translate the following sentences paying attention to the meanings of the words in bold.

1 a) The most familiar lightning strokes are the negative flashes from cloud to ground. They start near the base of a cloud as an invisible discharge called the

stepped **leader**, which moves downward in discrete, microsecond steps about 50 m (165 ft) long.

b). When the negatively charged stepped leader approaches to within 100 m (330 ft) or less of the ground, a **leader** moves up from the ground - especially from objects such as buildings and trees - to meet it.

c). The society publishes many materials, including the monthly reviewing journal *Mathematical Reviews*. It is also a **leader** in electronic publication.

d). A **leader** in reorganizing French science after 1945, he directed the effort to develop France's atomic energy program.

e) Some genes have a region called the **leader** that precedes the coding segment, and a region called the trailer that follows it.

f). Gorillas live in family groups that consist of a single male **leader**, or silverback; some younger, black-backed males, possibly sons of the silverback; several adult females; and varied numbers of juvenile and infant offspring.

2 a) Because of erosion on the outer **bank**, meandering rivers and streams tend to shift over their floodplains and form oxbow lakes.

b) Integers are used to measure temperature, keep a **bank** balance, compute yardage in a football game, and make any other calculations in which directions as well as amounts are important.

c) In 1995 **alone derivative investments were blamed for bringing down Britain's venerable investment bank** Barings PLC.

d) The fern wall, a cloud **bank** marking the upper limit of precipitation, hangs over mountain ridges, often obscuring them.

3 a) **Gravity erosion is often called mass wasting. It occurs where land-surface irregularities such as hill slopes allow gravity to transport the rock debris produced by weathering.**

b) Einsteinium does not occur in nature. It was first discovered in the **debris** from the "Mike" thermonuclear explosion in the South Pacific in 1952.

c) The lymphatic system organs also filter foreign substances and cell **debris** from blood, and store lymphocytes, the most common type of white blood cell.

d) This disease, which is the major cause of tooth loss in adults, causes gums to pull away from teeth; pockets to form that fill with pus and cell **debris**; and jaw bone degeneration.

4 a) Psychopaths are selfish, callous, and exploitative in their use of others, and often become involved in socially deviant **behaviors**.

b) Because norms vary from society to society, **behavior** that is considered deviant in one society may be acceptable and common in another. Thus, **behavior** is not deviant in itself. Rather, it is deviant only insofar as it violates the norms of a particular social system.

c) Criminology has been penetrated by more-general sociological concerns and has tended to become part of the broader study of all kinds of deviant **behavior**, including those not involving violations of the law.

5 a) In a piano, violin, or guitar some sound is radiated directly by the vibrating strings, but it is augmented by the sounding **board**, which is a vibrating plate.

b) An expansion **board**, also called an expansion card, is a printed circuit **board** that plugs into a slot in a personal computer.

c) Generally, after four years' experience beyond a college education, a civil engineer may be licensed by a state **board** of registration for professional engineers.

d) To make papyrus, moistened strips of thinly sliced pith with the rough outer covering removed were laid side by side on a **board**.

6 a) When the **linguistic** usage of the term semantics was first introduced into English in the late 19th century, it referred to the classification of historical change in word meanings.

b) In writing speech sounds or other **linguistic** elements are represented as visual symbols, which are then perceived and processed visually (reading).

7 a) This method of pollution **control** is the most effective and, as the costs of pollution **control** and waste disposal increase, is considered one of the most efficient.

b) Other measures have included **control** of herd size by shooting the animals with hormonal darts to sterilize them.

c) Servomechanisms use mechanical motion rather than electric or electronic signals to measure the changes requiring **control**.

8 a) The main body of the satellite, built by TRW Space Laboratories, consisted of a rectangular aluminum **box** that was 173 cm (68 in) long, 84 cm (33 in) wide, and 84 cm (33 in) deep.

b) Among the other artificial organs available are the artificial larynx, or «voice **box**,» an electrically powered device used externally.

c) A scraper is an open-fronted **box** whose bottom edge can be sunk below ground surface to excavate a layer of earth as it moves.

9 a) A tone **arm** carrying a stereo cartridge is mounted next to the turntable. The **arm** usually pivots to rest its stylus lightly on the record groove and to track the two sound channels inscribed in the groove walls.

b) This damping can be supplied by a partially closed cylinder that entraps air under the swinging **arm**.

c) As the rotor spins, its **arm** comes into contact with each of the outer terminals, in sequence.

d) As the standing-army principle that began about 1500 came into general use, artillery became an organized **arm** of the military.

10 a) Regulation was accomplished manually at first - through measurement, evaluation, and **adjustment** of the variable.

b) With careful **adjustment**, the instrument measures the dip or inclination of the Earth's magnetic field to the local horizontal.

c) Adolescents may often view their parents as having little capacity to guide them in their **adjustment** to the larger world.

d) As the 1990s began, popular movements that included farmers, workers, women, environmentalists and community groups in the South were challenging the **adjustment** policies and large-scale projects that were wreaking havoc on the poor and on the environment.

e) In addition, tongue positioning is the primary **adjustment** in the production of vowels, diphthongs, and semivowels.

11 a) If the four impedances are diodes (devices that transmit electricity in one direction only), alternating current (AC) applied to the **bridge** is rectified (transformed) into direct current (DC).

b) This type of air-driven artificial heart was approved in 1990 by the U. S. Food and Drug Administration for use as a **bridge** to transplantation, but not for permanent use.

c) The preschool serves as a **bridge** from the home to the larger society.

d) The rotor creates a **bridge** between the central terminal and each outer terminal, which is connected to its spark plug with thick wire.

12 a) A building is generally classed by the material used to create its **frame**.

b) The tubing that constitutes the major portion of the bicycle **frame** is made today from one of a variety of space age materials, including aluminum, titanium, and carbon fiber, that combine great strength with light weight.

c) But the basic television aspect ratio will influence the way the movie **frame** is composed so long as most movies are produced to be shown on television.

d) Modern spinning machines are based on early-19th-century innovations, primarily the ring-spinning **frame** invented by the American John Sharp in 1828.

13 a) Built floor **by floor**, steel frame structures can be erected to great heights.

b) Oceanic mineral resources include various metallic and nonmetallic materials of differing origin and economic potential that occur on or beneath **the floor** of the continental shelf and ocean basin.

c) There is, therefore, some choice in the location of the shift lever, which may be on the steering column or on **the floor**.

d) During inspiration **the floor** of the mouth cavity depresses, forming a negative pressure that causes water to flow into the mouth.

e) Below the shorter trees are shrubs; and covering the forest **floor** is a layer of herbaceous (non woody) plants growing in soil inhabited by fungi and bacteria.

14 a) A curtain **wall** is an exterior wall that carries no floor loads; it usually is made principally of metal, stone, glass, or precast concrete.

b) The thermal storage **wall** avoids some of the shortcomings of the direct-gain system by interposing a thick concrete wall in the heated space next to the windows.

c) Commonly known as the belly, it does not include the spinal column and the remainder of the back **wall**.

d) The heart **wall** is made up of special type of striated muscle fibers called cardiac muscle.

15 a) As the trusses are set, they are held in **alignment** by horizontal beams called purlins, which span between trusses.

b) The most sensitive magnetometers depend on the absorption of light of specific frequency. The ability to absorb the light is affected by the **alignment** of the nuclear moments with the magnetic field.

c) Although sharing an approach to judging, each justice retained an independence that precluded a predictable **alignment**.

d) The Axis was the name of the **alignment** between Nazi Germany and Fascist Italy first formed in October 1936 and strengthened by a formal alliance in May 1939.

e) The wars were caused and prolonged by the **alignment** of rival aristocratic factions along opposing religious lines.

Task 19. Give Ukrainian equivalents to the international words and “pseudo friends” of the translator.

Director, gymnasium, medal pedagogical, master, commission, congress, professor, technological, bureau, contribution, container, nation, periodic, element, principle, inorganic, combination, alcohol, aquae, specific (gravity), physics, geophysics, patriot, energy, activity, progress, industry, thesis, general, generalization.

Task 20. Devide the following words into three groups – internationalisms, partial pseudointernationalisms, full pseudointernationalisms.

Expression, license, dynamics, correction, model, expertise, complement, paradigm, obstruction, cognitive, academic, symbol, system, model, paradigm, aspect, conceptual, elegant, familiar, elegant, conference, notation, perspective, problem, **fact, anonymous, regular, address, criticism, data, isomorphism, vari-**

ant, scholar, algorithm, journal, manuscript, system, deduction, tradition, final, stress, role.

Task 21. Study theoretical material from Unit 7. Choose the correct item.

1. There are two stages in the process of translation of a term _____
 - a) identifying the term on the context and finding its lexical equivalent;
 - b) translation of the term meaning and finding its lexical equivalent;
 - c) identifying the meaning of the term on the context and translating it.
2. To translate a term or term combinations firstly it is necessary _____
 - a) to find terms and determine which terminology system the text belongs to;
 - b) to find terms and translate them;
 - c) to select the appropriate meaning of a term according to the context and find equivalents for terms.
3. The term “radio electronic industry” is translated into Ukrainian as _____
 - a) радіо та електронна промисловість;
 - b) промисловість радіо та електроніки;
 - c) радіоелектронна промисловість.
4. The main ways of translating terminological abbreviations _____
 - a) translation with equivalents and analogues, transliteration and transcription;
 - b) analogue, transcoding, word for word and descriptive translation;
 - c) transcoding, selecting proper analogue and calquing.

Unit 8

MODERN TERMINOLOGICAL DICTIONARIES

- 8.1. Dictionaries and the language development.
- 8.2. Classification of terminological dictionaries.
- 8.3. How to work with terminological dictionaries.
- 8.4. The role of the Internet in translating scientific and technical literature.

8.1. DICTIONARIES AND THE LANGUAGE DEVELOPMENT

Dictionaries comprise the cultural property of people containing the selected words arranged in the alphabetical order. Dictionaries help to explain word meanings and usually include information about different words. Any person can look up a word in dictionaries, find out what it means, and learn how it is pronounced. Most contemporary dictionaries express linguistics facts about the words of a definite language used as tools: the more completed they are the more useful they are. There is no individual who is not acquainted with the procedure of searching for words in dictionaries, but it is one thing to look a word up in a dictionary and quite another is to understand fully the information given in it. Linguists and lexicographers deal with dictionaries more often deciding the size and the number of words the dictionary should include. Lexicographers and terminologists have the task to record the meanings of words and arrange them in the convenient for users order. Different dictionary editors try to solve the problem of arrangement defining the core set of lexical entries with the help of levelled frequency.

The problem of interaction of general lexicography and terminography as two scientifically applied subjects can be firstly considered with the analysis their internal and external factors and the sources for compiling and developing. Dictionaries are the main concepts of lexicography but it is hard to find definition of this concept in lexicographical sources. It is the result of the discussion whether glossaries, thesauri or term banks and database are dictionaries, and whether they belong to lexicographical field. Thus, in some European countries the opposition between lexicography and terminology is quite strong.

The main function of terminology is to give definition to new notions and concepts and standardize terms and terminology systems to use them in professional communication. Systematization of terms in dictionaries and other resources for correct professional usage is called codifying. The following dictionaries are applied in the process of codification as INTENT, MULTITRAN, GIGATRAN and others. The result of this work demonstrates how linguists, translators and teachers can use them to get more contemporary English used in different contexts from spoken to written, from informal to formal and official. The lexical mean-

ings of these terms, grammar structures revealed through Cambridge International Corpus of English, a unique one billion-word computer database.

Translation dictionaries are the most popular and useful type in modern terminological dictionaries. They are represented in two, three and more languages. Compiling a serious terminological dictionary requires cooperation with domain experts such as Vox Tran, LIND-Web, GALA on Demand, LT Advisor, TermoStat Web and others. Their help is needed in selection, term extraction, compilation of terminological definitions and concepts, searching for equivalents and verifying the factual correctness of the material in the dictionaries. Terminological databases are created in English, German, French, Chinese, Ukrainian and other languages containing terms from different subject fields. They also contain definition of a term, source of the term, context, examples, terminological class the term belongs. For example, traditionally all terminological vocabulary in EU should correspond to the 23 official EU languages.

The problem of distinguishing lexical meanings of polysemic terms of different subject fields is one of the major issues in modern lexicography and terminography. At the process of searching for the semantic correspondence of a polysemic term of SL into TL lexicographer meets many difficulties from the full equivalents in two and more languages to the absence of one of terminological meanings.

To avoid the difficulties that arise at the translation of scientific and technical texts and some misconceptions at the usage of international vocabulary the document called International Unification of Concepts and Terms was offered by ISO. According to the regulations proposed in this document all international terms of scientific and technical texts should have similar lexical meanings in all languages to reduce mistakes and misunderstandings and increase contacts in scientific and technological fields. The appearance this document signified the possibility of new conditions in the process of term formation.

Terminological dictionaries play the most important and positive role in stabilizing terminology, and among them there are «Large Oxford Dictionary» and four volumes of addition to it, the completed edition of dictionary of a «Random House Dictionary», all dictionaries edited by Barnhart. It is necessary to emphasize that the definitions given in mentioned dictionaries are well developed, short and exact and can be used as a standard. The mentioned dictionaries include many terms from different branches of science and technology added with the explanations of their meanings and examples. The information given in dictionaries allows understanding semantic possibilities of terms, and sometime etymological meanings. Terminology databases are increasingly available online or on CD-ROMs, on USB appliances in the form of electronic dictionaries or as private databases established and maintained by engineers, computer specialists, and other specialists working as terminologists, translators, technical writers for various purposes:

- computer-assisted human translation;
- computer-assisted technical and scientific writing;

- material for information systems as the parts of administration;
- terminological researches in linguistics, information science, sociology of technology, etc.

Special computer programs have been developed for such purposes.

8.2. CLASSIFICATION OF TERMINOLOGICAL DICTIONARIES

It is accepted in modern linguistics that all terminological dictionaries are divided into two basic genres: explanatory dictionaries with definitions (or encyclopedic dictionaries) and translating dictionaries (O. Akhmanova: 1974, 89). These genres are distinguished with the composition of glossary and method of forming lexical articles in dictionaries. According to vocabulary represented in a dictionary, as well as its functions, two kinds of dictionaries are divided into two groups: **special terminological dictionaries and narrow specialized dictionaries**. These two kinds of terminological dictionaries are represented in the both genres explanatory and translating ones. Encyclopedic terminological dictionaries in their turn are dictionaries containing explanations for the terms. The article in this type of dictionaries consists of two parts: the name of notion or concept and definition.

Terminological dictionaries contain information about terms of definite subject field of science and technology, for example, linguistic dictionaries, dictionaries of IT technology terms, chemistry dictionaries and others. Narrow specialized dictionaries are designed to give more information in particular fields than general terminological dictionaries. Terminological dictionaries include some terms used in various fields of science and technology, such as biology or medicine. Therefore, they are:

- a) general explanatory dictionaries or encyclopedic dictionaries and translating dictionaries;
- b) terminological explanatory dictionaries or encyclopedic dictionaries and translating dictionaries.

Terminological dictionaries could be also represented in the two following forms: classical terminological dictionaries and dictionaries of information technologies. **Classical terminological dictionaries** consist of the vocabulary of certain fields of science (chemistry, medicine, geology, biology and etc.) and technology (metallurgy, computer engineering and etc.). The development of science and technology causes the appearance of such terminological dictionaries as geographical, chemical, biological, physical, meteorological dictionaries and etc.

Dictionaries of information technologies are direct to the news service and divided into varieties according to the nature of terms, entry structure and formal signs of structural elements and explanations given to terms and their meanings. There are common alphabetical terminological dictionaries, thesauruses, dictionary-concordances, frequency dictionaries, combinatory and others. Dictionaries

of information technologies, as a rule, exist in several forms: in written forms or manuscripts and in printed electronic carriers or CD-ROMs (TERMIUM, TERMIUM Plus, EURODICAUTOM, ESPRIT, Thesaurus. com., Lingvo, Wordsmyth English Dictionary-Thesaurus, INTENT, MULTITRAN, GIGATRAN and etc.). Terminological encyclopedias offer definitions of concepts and realias (things, people and processes), selected in accordance with the concept of composing an encyclopedia. According to the special purposes, terminology vocabulary is included in **philological or linguistic dictionaries** (bi- and multilingual dictionaries, dictionaries of dialects, concordances, dictionaries of foreign words and etc.). The aim of such dictionaries is to serve the process of language study. **Contextual dictionaries** for machine translation and machine dictionaries belong to philological dictionaries. Contemporary technical and scientific terms and nomenclatures comprise **dictionaries-thesauri** that represent explanations of a term and its translation variant.

Terminological dictionaries range in the size from small pocket to large multivolume ones. The number of definitions in dictionaries depends on its purpose. Some bilingual dictionaries are little pocket ones of different (from 5 to 15 thousand words) contents. The following dictionaries were often published in the second half of the XIX century in Germany.

In modern translation there is another classification of dictionaries.

1. **Linguistic or especially linguistic dictionaries** which are monolingual (with definitions) and bilingual (for translation). Every person who starts learning foreign languages has this kind of dictionaries. Bilingual dictionaries are always translating; they give translation mainly of separate words and considerably rarer of different phrases, idioms and word combinations in mother tongue or foreign language. Such dictionaries can be used in different spheres of knowledge and of the most various contents: from 5-10 thousands lexical entries (students' and separate terminological dictionaries) to the enormous dictionaries of 100—200—300 thousands words and word combinations. For example, the new English-Ukrainian dictionary edited by M. Byalla in 1996 contains of 120 thousands linguistic units.

2. **Multilingual translating dictionaries**, which were widespread in 19th – 20th centuries. As a rule, these were terminological dictionaries in which terms had one meaning represented in many different languages. In these dictionaries, all terminology variants, mainly separate words, had the same identical lexical meaning. For example, in anatomic dictionary the word “*легені*” correlates to the name of this part of human body in other languages (as well as the words “*ніс, око, серце*”). There are also geological, mathematical, botanical, economical and other multilingual dictionaries, where, for example, the words “*залізо, золото, уранова руда, квадратний корінь, логарифм*» have monosemantic correspondances in translation in other languages.

For instance, English-French-German-Ukrainian Dictionary of UE terminologies issued in 2007 contains about 10,000 English terms supplied with their

Ukrainian, German, French equivalents (В. Єромоленко: 2007). These terms are used in the main branches of microelectronics: technological processes and equipment necessary for the manufacture of integrated circuits, semiconductor and hybrid integrated circuits, methods and means of design and simulation of integrated circuits, and diagnosis, testing and control of materials, crystals, substrates and integrated circuits. The indices of the English, Ukrainian, German, French terms included in the dictionary make it possible to find the necessary term in one of these languages quickly.

3. **Idiomatic**, or, as they are called by French lexicographers, **phraseology dictionaries** are also often bilingual or monolingual. **They consist of word-combinations or idioms** that are represented in one or several foreign languages. There are complete accordances or absolute equivalents which are separately selected in a certain historical and cultural period, have identical structure and meaning. However, in idiomatic dictionaries the majority of word combinations is made of similar phraseology analogues such as “*don't cross your bridges before you come to them*”/ “*не кажи “зон”, поки не перескочиш*” or “*look before you leap*”/ “*не знаючи броду- не лизь у воду*” and others. The best known phraseological dictionaries are English Idioms by W.G.Smith, English Idioms and how to use them by W. McMordie, English-Russian Phraseology Dictionary by A.Kunin.

4. **Dictionaries of synonyms and antonyms** are also bilingual (as well as monolingual). In each dictionary synonyms are shown in accordance with their meanings, for example, *large, big, great, massive, huge, vast, enormous*. These words have such correspondences as “*великий, значний, масивний, величезний, обширний, величезний*” in Ukrainian. In antonymous dictionaries the words are given with the opposing meanings. For example, to the word “*large*” the antonyms in the English and Ukrainian languages are: “*small, little, wee, teeny-weene, tiny, undersized*” and “*маленький, невисокий, незначний, дрібний, крихітний*”.

5. **Monolingual explanatory dictionaries** are also of different types. For example, explanatory monolingual dictionaries can consist of the words and their synonyms. There is an 11 volume Dictionary of the Ukrainian language (1970 – 1980), edited by academic I. Bilodid (over 134 thousand of words and phrases) or the English language explanatory dictionary by A. Hornby and Longman Dictionary. Nowadays the Oxford explanatory dictionary of English, published by Oxford university in 1997 is the most complete in the world. This dictionary contains about 611 thousand entries and weighs 54,4 kilograms. Each of adopted explanatory dictionaries, and, especially, a Large Oxford English dictionary is a real lexical source of one or another national language.

6. **Thesaurus** as explanatory dictionary gives definitions of not all words, but (also in an alphabetical order) their derivatives. For example, in the thesaurus of Rozhe (in 1994 edition, New York) for the word “*prose*” there are such commentaries as:

Nouns – 1.prose; expository prose; prose rhythm; prose style. 2.prosaism, prosakism, prosaieness, unpoeticalness; matter-of-factness; unimagitiveness, plainness, insipidness, flatness, vapidity, dullness.

Verbs – 3.prose, write prose or in prose; pedestrianize.

Adjectives – 4.prose; unversified, non-metrical. 5.prosaic, prosy, prosing; plain, common, commonplace, ordinary, pedestrian, unimaginative; insipid, vapid, dull.

Next to the phrases and idioms the slang expressions are given.

Dictionary-Thesaurus contains the treasure knowledge about definite words and their meanings, their synonyms and antonyms, their ways of use.

7. **Dictionaries of foreign words** are explanatory and simultaneously translating dictionaries, because they give an explanation and translation of foreign words. These dictionaries contain foreign words and terms which became international with the development of science and technology. For example, the dictionary of foreign words by O. Melnichuk (published in Kyiv in 1974) contains 18633 lexical units and gives definitions and explanations to foreign words and terms from social and political spheres of activity, medicine, jurisprudence, physics, biology, chemistry, geology and other science and technology, which enter to a general Ukrainian vocabulary. The article of the dictionary consists of the word-title, etymological data (explanation of origin of foreign word) and definition. The article also contains a lot of explanations and examples.

8. **Dictionaries of paronyms**, or words which are pronounced and written almost identically, but have quite different meanings in one or several languages. Ignoring such words can cause misunderstanding at the translation of concepts which are not only separate linguistic units, but also represent the whole text. Compare *to raise* and *to rise*, *collision* and *collusion*, *excise* and *exercise*, *conjunction* and *conjecture*, *to affect* and *effect*, *alternately* and *alternatively* and others. Such words exist in every language, so they need to be well distinguished.

9. **Dictionaries of social and political realias** of the source or target languages contain most widespread word-concepts or word-combinations, which define specific objects: national foods, clothes, musical instruments or dances, etc. For example, “No.10 Downing street” signifies the place of the Prime-Minister of the UK but not a simple home-street number. In their turn, Ukrainian realias like “**вишиванка, кутя, свита, кожух, вареники**” **should be translated with the application of a descriptive translation or transliteration.**

10. There are also large and small dictionaries in which the most widespread questions are shown and the answers on the questions like “What is your name/family name? What is your occupation?” and etc. Such **phrase-books** or **phrase-guides** are completed by people who for the first time meet with a certain foreign language with the practical purposes (during a tourist or excursion trip or with the aim of studying foreign languages).

11. **Picture dictionaries** got special distributions, which represent the names of different objects, phenomena and realities of foreign language and give pictures. One of the most famous is the Large child’s dictionary of English of Walt Disney, published by “Rainbow” in 1993 (Kyiv), or the Oxford picture Diction-

ary (Oxford University Press, 2008). The later version of the dictionary is an up-to-date pictorial reference for vocabulary learning such as the Pocket Oxford Dictionary (Oxford University Press, 2010).

12. **Dictionaries of pronunciation or phonetic dictionaries** of some languages, which occupy the special position in studying foreign languages. The most famous of them is “An English Pronouncing Dictionary” by Jones (London, 2002) containing ten thousand of words with their standard and non-standard English pronunciation. There are spelling dictionaries, which give only correct written forms of words in Slavonic languages instead of phonetic ones.

13. **Linguistic and cultural knowledge dictionaries** containing ethnographic notions and phenomena of a definite country. In fact, all features of geographical position, history, architecture, culture, religions, historical persons, writers, artists, politicians of foreign country (as well as of native ones) are included in the country knowledge dictionaries. Linguistic and cultural information is placed in the dictionary of social and political terminology. In the process of public/social co-operation and international relations, which continuously develop and broaden in national and global scales, due to new terminological dictionaries such economy concepts as *marketing* and *management* appeared.

Also different literary, social-political and technical dictionaries, in particular, an American “Who is Who?”, in which short biographic information of famous people in different areas of knowledge and professional activities is given belong to **educational dictionaries**. “Who is Who in America” a biographical dictionary of notable men and women of the US revised and reissued biennially. It was founded in 1990 by A.N. Marquis. There is such important information as biographies of political leaders, in particular newly, appeared in this or that country of Europe, Asia, Africa, or in Australia or America. “Who is Who?” also gives short biographic information about new names of scientists, in particular the Nobel laureates, sportsmen, singers and even gangsters and criminals who accordingly showed up in the legal or illegal activity. So, translators who work in such high public institutions as Council of ministers, Foreign Ministry or Home Ministry, may be interested in the given information “who is who”.

14. Thus, the most important and famous types of dictionaries are such monolingual or bilingual (translating) and even multilingual **terminological and narrow terminological dictionaries as:**

14.1. Philosophy dictionary (where the most important philosophical terms/concepts and information of philosophers are given).

14.2. Pedagogical dictionary, which contains the most widespread concepts and terms of pedagogic and teaching methods.

14.3. Dictionary of linguistic terms.

14.4. Dictionary of bank terms.

14.5. Biblical dictionary (bilingual) which fixes present Christianity terms of foreign and native (or vice versa) languages.

- 14.6. Cybernetic dictionary of proper terms.
 - 14.7. Chemical dictionary of most various terms.
 - 14.8. Physical dictionary, which contains major concepts of such science as physics.
 - 14.9. Mineralogical dictionary, which shows the names of minerals existing in nature.
 - 14.10. Dictionary of space rocket and other terminology.
 - 14.11. Agricultural dictionary (names of different forms of ground treatment, types of crops, fruit, and others like that).
 - 14.12. Botanical dictionary (names of existing and disappearing plants and trees) and others like that.
 - 14.13. Touristic dictionary (terms of tourism and touristic communication).
- There are other dictionaries used by translators/interpreters for proper discourse, ср.: *Англійсько-український словник-довідник інженерії довідник за редакцією Т. Балабан, 2000, Англійсько-український глосарій виробів Microsoft®, 2006, Англійсько-український геодезичний словник за редакцією Б. Рицара, 2010* and etc.

8.3. HOW TO WORK WITH TERMINOLOGICAL DICTIONARIES

Dictionaries, for the most part, include terminological meanings in the entry of the headword. Terminological meanings are shown in brackets, ср., the word “power” in mathematics is “*the product obtained by multiplying the number into itself*”; in mechanics “power” means “*capacity of doing work*” while the optic term “power” denotes “*the magnifying capacity of a lens*”.

How can we work with a terminological dictionary effectively? To look up a necessary word in a dictionary quickly, it is necessary:

- 1) to know the alphabet well;
- 2) to know the order of the word place in a dictionary or the alphabetical principle of the word order in the dictionary;
- 3) to know the structure of a dictionary: conditional notes, signs, indexes, place of background paper, group of words, original forms of the words;
- 4) to take into account the three first letters of a word, located on the page above: on the left there are the three first letters of a word from which the page begins, on the right above there are three first letters of a word from which the page ends.

There is a background paper in every dictionary, which contains explanations of applied notes, abbreviations and signs, as well as manual instructions. Take any English-Ukrainian dictionary and study a background paper. Find a list of the most widely used abbreviations in England and the USA. What abbreviations are used for, in which way they are represented in a dictionary?

The leading English terms are arranged in an alphabetical order, compound terms being considered as though they were written as one word, for example:

Wash
Washer
Wash liquid
Wash tank
Water-cooled cathode

Each main entry consists of English or Ukrainian terms arranged in a column. The word *see* is used to refer the user to a synonymous term or abbreviation. The synonymous variants are given in brackets, for example, optional parts of terms are enclosed in parentheses: *silicon nitride, silicon nitride mask*.

Explanations of equivalent terms are printed in italics and enclosed in parentheses. To find the English equivalents of Ukrainian terms, the user should refer to be indices given at the end of the dictionary, where all the terms are supplied with letters and numbers corresponding to those marking the leading English terms.

If the derivative terminological forms are given, a basic word is replaced by a sign ~ (tilde). Sometimes repetitive parts of a term are taken away and changed with two vertical parallel hyphens ||. The alphabetical nest system of term placement is accepted in many dictionaries. According to this system, there are terms, consisting of determinations and determined words. Firstly, it is necessary to search for determined words. For example, if it is necessary to look up for the term “*barking machine*”, you should search it in the nest of the term “*machine*”.

Term combinations and idioms are given in order of the main term. The main term in the article is also replaced with a sign ~ (tilde). For example:

back 1. спина; 2. спинка; 3. зворотня сторона; задня сторона; to ~ away відводити; to ~ off відгвинчувати; ~ of arch зовнішня поверхня арки і так далі.

Remember, a term in a dictionary is always represented in its original form. Thus, a noun is in singular, an adjective is in positive form, a verb is in the three forms (Infinitive, the Past Simple, the Past Participle). If the second form of a verb and the third one of it are the same, only one form is given.

Simple tasks for work with a dictionary:

- a) Name letters which are before and after the letters of alphabet: *t, c, s, h, l, g, m, p, q, b, i, o*;
- b) Put the following words in an alphabetical order: *invent, they, evening, give, yesterday, success, who, poor, freedom, among*;
- c) Put the words, beginning with the same letter, in an alphabetical order: *sum, stress, some, son*.

8.4. THE ROLE OF THE INTERNET IN TRANSLATING SCIENTIFIC AND TECHNICAL LITERATURE

Throughout history, technology and translation have always been closely connected with one form or another one. For the most part, translation has facili-

tated the dissemination of technology by making new scientific and technological expertise available to new audiences. However, technology has also played a significant role in the promotion of translation. In the 15th century when Gutenberg developed moveable type printing, a few could have predicted the explosion in translation activity that would ensue. Since then, the relationship between scientific and technological development and translation continued although the role of technology has remained somewhat static in the centuries since Gutenberg.

Despite the developments such as electric typewriters, telex machines, fax machines and even the personal computer, translation has remained relatively untouched by technology. However, over the past 10 years, something remarkable has happened. The Internet has emerged from its humble origins as a government-funded research project to become even more revolutionary than printing itself. It has transformed not only the way of producing translations, but also the way of the translation industry functions and also the way of training translators.

In the context of the translation industry, the Internet has affected the role of translators and the arena in which they work in a number of ways. By facilitating communication and effectively eliminating the boundaries between local and international markets, the Internet has helped to create a global translation market. The situation now is that there is more work available for translators as a result of increased global trade and improved access to foreign translation markets and clients which in turn brings with it new types of work. Instead of being restricted to the subjects and texts produced by indigenous industries and clients, translators can get virtually any type of text on virtually any subject from anywhere in the world. For example, a translator may receive software localization projects from Ireland railway engineering, specifications from Spain and Singapore, television advertisements from the US, combine harvester manuals from Germany, exercise guides from Austria and so on. However, this apparent abundance of work courtesy of the Internet brings with it new challenges for translators in the form of greater competition from other translators.

The Internet has been instrumental in translation making the transition from a largely paper-based activity to an almost exclusively computer-based one. It quickly becomes apparent just how much technology is involved in modern translation: PCs, email, FTP, website design, search engines, spreadsheets, online databases, DTP, graphics, word processing etc. These are just the non-translation specific tools. If we include the likes of translation memory (TM) tools, terminology management systems, concordance tools, machine translation, project management applications, localization and quality assurance tools the list gets much longer and much more complicated.

Particularly in the case of TM tools, it could be argued that such technology owes its very existence to the Internet. If we consider the fact that a fundamental prerequisite for using TM tools is the availability of texts in electronic form it is clear that without email or the ability to download files from websites or FTP serv-

ers (File Transfer Protocol), our options for using translation memory tools would be severely limited. Our options for obtaining electronic texts would be for the client to post a CD containing the files to us: to type up the document from a paper version or to use optical character recognition (OCR) to scan the documents into our computer. None of these options is particularly practical or efficient. Indeed, such is the complexity of OCR that the amount of time required to scan a translation and transform it into electronic format would be likely to outweigh any benefits of using the TM tool. Without the ubiquity of electronic texts as facilitated by the Internet, it is hard to imagine translation memory tools achieving almost universal acceptance and use.

The increased use of TM tools has in turn affected significantly the way in which translators are paid for their work. The increased awareness among clients and translation agencies of TM tools and their capabilities means that more and more clients expect translators to pass on the benefits in the form of discounts.

There are different ways of using the Internet.

1. Machine translation (MT) is a process whereby a computer program analyzes a source text and, in principle, produces a target text without human intervention. In reality, however, machine translation typically does involve human intervention, in the form of pre-editing and post-editing. With proper terminology work, with preparation of the source text for machine translation (pre-editing), and with reworking of the machine translation by a human translator (post-editing), commercial machine-translation tools can produce useful results, especially if the machine-translation system is integrated with a translation-memory or globalization-management system.

Unedited machine translation is available to a large public on the Internet such as Babel Fish, Babylon, and Star Dict. These computer tools produce a rough translation that, under favorable circumstances, “gives the gist” of the source text. There are also companies like Ectaco, which produce pocket translation devices that utilize MT.

Relying exclusively on unedited machine translation, however, ignores the fact that communication in human language is context-embedded and that it takes a person to comprehend the context of the original text with a reasonable degree of probability. It is certainly true that even purely human-generated translations are prone to error; therefore, to ensure that a machine-generated translation will be useful to a human being and that publishable-quality translation is achieved, such translations must be reviewed and edited by a human.

Machine translation automates the easier part of a translator’s job; the harder and more time-consuming part usually involves doing extensive research to resolve ambiguities in the source text, which the grammatical and lexical exigencies of the target language require to be resolved. Such research is a necessary prelude to the pre-editing necessary in order to provide input for machine-translation software, such that the output will not be meaningless.

2. **Computer-assisted translation**, computer-aided translation, or CAT is a form of language translation in which a human translator uses computer software to support and facilitate the translation process. Computer-assisted translation is sometimes called machine-assisted, or machine-aided, translation (not to be confused with machine translation). Computer-assisted translation is a broad and imprecise term covering a range of tools, from the simple to the complicated including:

1) Spell checkers, either built into word processing software, or add-on programs;

2) Grammar checkers, again either built into word processing software, or add-on programs;

3) Terminology managers, which allow the translator to manage his own terminology bank in an electronic form. This can range from a simple table created in the translator's word processing software or spreadsheet, a database created in a program such as FileMaker Pro, for more robust (and more expensive) solutions, specialized software packages such as LogiTerm, MultiTerm, Termex, etc.

4) Electronic dictionaries, either unilingual or bilingual

5) Terminology databases, either on the host computer or accessible through the Internet, such as TERMIUM Plus, TermFolders, SEMATEX or Grand dictionnaire terminologique from the Office québécois de la langue française.

6) Full-text search tools (or indexers), which allow the user to query already translated texts or reference documents of various kinds. In the translation industry, one finds such indexers as Naturel, ISYS Search Software and Search Desktop.

7) Concordancers, which are programs that retrieve instances of a word or an expression and their respective context in a monolingual, bilingual or multilingual corpus, such as a bitext or a translation memory.

8) Bitext aligners are tools that align a source text and its translation which can then be analyzed using a full-text search tool or a concordancer.

9) Project management software that allows linguists to structure complex translation projects, assign the various tasks to different people, and track the progress of each of these tasks.

10) Translation memory tools (TM tools), consisting of a database of text segments in a source language and their translations in one or more target languages.

2. The Internet. Companies and individuals that seek for translators that are more accurate generally favor web-based human translation. In view of the frequent inaccuracy of machine translators, human translation remains the most reliable, most accurate form of translation available. With the recent emergence of translation crowdsourcing, translation-memory techniques, and internet applications, translation companies and agencies have been able to provide on-demand human-translation services to SMBs, individuals, and enterprises.

While not instantaneous like its machine counterparts such as Google Translate and Yahoo! Babel Fish, web-based human translation is becoming in-

creasingly popular as the solution for relatively fast, accurate translation for business communications, legal documents, medical records, and software localization. This solution also appeals to private users for websites and blogs through the “string” system that enables websites to localize easily.

PRACTICAL ASSIGNMENTS

Task 1. Get ready to discuss the following questions.

1. Discuss the role of dictionaries in the development of languages.
2. Point out the main principles of terminological dictionary structure.
3. Name existing types of terminological dictionaries, point to the spheres of their usage.
4. Speak on the various terminological dictionaries and exemplify your answer.
5. Comment on the algorithm of the work with a terminological dictionary.
6. Discuss the way the Internet has affected the role of translators and the arena in which they work. Speak about the role of the Internet in translator’s work.
7. Explain the role of the technologies in the process of translation.
8. Identify the advantages of the machine translation.
9. Name the computer technologies used in modern translation.
10. Characterize the computer-assisted translation.
11. Name the tools of a computer-assisted translation.

Task 2. Put the following terms into the alphabetical order.

Anchor, chain, formula, socket, motion, vehicle, very, glass, use, again, work, pair, move, stability, heat, soon, way, state, gas, mixture.

Task 3. Find the following abbreviations in the dictionary and explain their meaning.

Adv.; a.; cj.; num.; prep.; pron.; vt.; avdp.; awu; bbl; btto; c.g.; cwt; doz.; F; ft; fp; G.M.T.; hp; hr; Hz; i.; kcal; kev; lat.; lb.; lb. ap.; mph; mps; msl; ntp; nt. wt.; oz; qty; rpm; sq.; ths; TM; V; VHF; w.e.f.; wh; WP; wrnt; wt; X; xw.; yd.; Z.

Task 4. Read the following sentences and identify the type of dictionaries for their translation.

1. We assign, tentatively, the structure to the free acid.
2. The higher the purity of titanium, the easier it is to fabricate, but the lower is its strength.
3. Spurious outputs can be best avoided by choosing a ratio of at least 8:1 between the two input frequencies.
4. The tanker is a one-deck single screw vessel with a forecabin and a poop, with aft location of the engine room and the superstructure, with a bow bulb.

5. Another similarity between the two amplifiers is that the same low-pass harmonic filter is used in the output feeder.

6. The three strata or kinds of units that comprise the vocabulary are the following: general words, special terms and terminological word-combinations.

7. A reasonably uniform electrical output is obtained regardless of the relative orientation to the sun.

8. Of all the senses, vision is the only one that can make us directly conscious of things at great distances.

9. Supraphrasal unities are not the end or ultimate objects of hypersyntax.

10. The following liquid cargoes may be classed as dangerous ones: fuel oil, petrol, kerosene, lubricants and acids.

Task 5. Translate the following words paying attention to the meaning of prefixes “over-, inter-, under-”.

over-	inter-	under-
to overestimate	to interchange	to underestimate
to overcharge	to interact	to undercharge
to overvalue	to intermix ,	to undervalue
to overheat	international	to undergo
to overcool	interstellar	to understand
to overload	the interchange	underground
to overpay	interconnection	

Task 6. Read the sentences, find abbreviations, identify the way of their translation. Then translate sentences into your mother tongue.

1. During the German-led exercise Rapid Arrow 2011, the NATO active Layered Theatre Ballistic Missile Defense Interim Capability (ALTBMDB) was successfully tested.

2. Wikipedia, the free encyclopedia that anyone can edit.

3. DNA is a nucleic acid that contains the genetic instructions used in the development and functioning of all known living organisms (with the exception of RNA viruses).

4. A meal is not usually considered brunch if it is started before 11 am; such meals would still be considered breakfast.

5. My drogue chute is my good friend. Not only because it gives me a chance to land on a very small field, but also because it is easier to make a spot landing. A drogue chute counters ground effect and the flight trajectory becomes impressively flexible.

6. A CD-ROM is a pre-pressed compact disc that contains data accessible to, but not writable by, a computer for data storage and music playback.

7. The HPV vaccine will save many women from cervical cancer and the rubella vaccine will prevent severe birth defects resulting from rubella infection in early pregnancy.

8. For customers with high gas consumption we offer liquid gas supply in cryogenic tanks.

9. OEM manufactures products or components that are purchased by a company and retailed under that purchasing company's brand name.

10. Ad is paid, non-personal, public communication about causes, goods and services, ideas, organizations, people, and places, through means such as direct mail, telephone, print, radio, television, and internet.

11. Amphetamine is a psycho stimulant drug of the phenethylamine class that produces increased wakefulness and focus in association with decreased fatigue and appetite.

12. What characterizes a scuba set is its full independence from the surface as a diving device, by transporting breathable air or other kind of breathing gas.

13. The EU has also tightened its Iran sanctions following a report by the UN's nuclear watchdog that said Iran had carried out tests "relevant to the development of a nuclear device".

14. The term RADAR was coined in 1940 by the United States Navy as an acronym for radio detection and ranging.

15. Advanced Accelerator Applications (AAA) has a unique platform of laboratories for the research, development, production and distribution of radio-pharmaceuticals for molecular diagnostics and therapy, aiming at a personalized treatment of serious diseases.

16. ECG is used to measure the rate and regularity of heartbeats as well as the size and position of the chambers, the presence of any damage to the heart, and the effects of drugs or devices used to regulate the heart.

17. The FBI's main goal is to protect and defend the United States, to uphold and enforce the criminal laws of the United States, and to provide leadership and criminal justice services to federal, state, municipal, and international agencies and partners.

18. Are you looking for example memos to use as guidelines for creating documents of your own?

19. PINs are most often used for automated teller machines (ATMs) but are increasingly used at the point of sale, for debit cards and credit cards.

20. IUPAC was established in 1918 as the successor of the International Congress of Applied Chemistry for the advancement of chemistry. Its members, the National Adhering Organizations, can be national chemistry societies, national academies of sciences, or other bodies representing chemists.

Task 7. Analyze the text, find abbreviations, and identify the way of their translation. Translate the text into your mother tongue.

THE SMALLEST ATOMIC DISPLACEMENTS EVER OBSERVED

An international team of scientists has developed a novel X-ray technique for imaging atomic displacements in materials with unprecedented accuracy. They have applied their technique to determine how a recently discovered class of exotic materials – multi ferrous – can be simultaneously both magnetically and electrically ordered. Multiferroics are also candidate materials for new classes of electronic devices. The discovery, a major breakthrough in understanding multiferroics, is published in *Science* dated 2 September 2011.

The authors comprise scientists from the European Synchrotron Radiation Faculty (ESRF) in Grenoble (France), the University of Oxford and the University College London (both UK). Helen Walker from the ESRF is the main author of the publication.

Everybody is familiar with the idea that magnets are polarized with a north and a south pole, which is understood to arise from the alignment of magnet moments carried by atoms in magnetic materials. Certain other materials, known as ferroelectrics, exhibit a similar effect for electrical polarization. The exotic “multi-ferroic” materials combine both magnetic and ferroelectric polarizations, and can exhibit a strong coupling between the two phenomena.

This leads to the strange effect that a magnetic field can electrically polarize the material, and an electric field magnetize it. A class of strong multiferroics was discovered ten years ago and has since led to a new, rapidly growing field of research, also motivated by the promise of their exotic properties for new electronic devices. One example is a new type of electronic memory, in which an electric field writes data into the memory and a magnetic detector is used to read it. This process is faster, and uses less energy than today’s hard disk drives.

However, the origin of the electric polarization in multiferroics remained mostly elusive to date. The team’s work unambiguously shows that the polarization in the multiferroic studied proceeds from the relative displacement of charges of different signs, rather than the transfer of charge from one atom to another.

As the displacement involves a high number of electrons, even small distances can lead to significant polarization. The actual distance of the displacement still came as a surprise: about 20 femtometres, or about 1/100,000th of the distance between the atoms in the material. Measuring such small displacements was actually believed to be impossible.

Task 8. Fill in the missing words (the rule of right hand, lexical equivalent, international words, alphabetical order, transliteration, misleading words, shortening).

1. For adequate translation of a term it is very important to find _____ in the language of translation.

2. The order of translation of compound terms and term combinations depends on the _____.
3. _____ is a method of transferring the words of one language by the letters of other language.
4. The words which are identical in sound forms but have different lexical meanings in different languages are called _____.
5. The words in dictionaries are placed in _____.
6. _____ of words consists of the reduction of word to one of its parts.

Task 9. Read the text and translate it into your mother tongue.

THE SUN ENERGY

The sun's energy manifests itself as thermal, photoelectric and photochemical effects. Men have tried to use solar energy since earliest times, but no means existed to generate useful power from the sun's heat until steam and hot-air engines were invented.

Grade devices for heating water by solar energy date back many years, and production of salt by solar evaporation of sea water is probably the most ancient of man's sun-activated processes. Photoelectricity has been known for almost a century, and millions of selenium photocells have been used as light meters and in similar application.

Most fundamental of all thermal solar processes is the simple fact that, when sunlight falls upon a surface of any kind, the surface becomes warmer than the surrounding air. The extent to which the surface temperature rises depends upon many factors, most important of which are the angle between the surface and the sun's rays, (the absorptivity of the surface and precautions taken to prevent the surface from losing the absorbed heat.

The angle effect is caused by the fact that the sun's rays travel in straight lines. When a surface is perpendicular to the rays, their intensity is at its maximum; the surface being horizontal, the radiation intensity drops off and reaches its minimum.

The most effective way to minimize the loss of energy from the sun heated surface is to cover it with one or more sheets of a glass-like material which is transparent to the sun's rays but opaque to the longer wave length emitted by the warmed surface. The air space between the surface and the glass is an effective prevention of heat loss by convection.

A flat plate of blackened metal covered with one or more transparent sheets of glass or plastic is known to be the simplest collector of solar energy. Once collected, heat can be used in a variety of ways. Here are some of the potential and actual applications.

Space heating is probably the most important, since nearly one-third of our energy supply is used for this purpose. Water heating can be achieved by porta-

ble solar heaters, which are able to give as much as 400 litres of boiling water on a sunny day.

The distillation of sea's water is another process to be accomplished by variations of the simple flat plate collector. The production of temperatures low enough for air conditioning and domestic refrigeration is a very important potential use of solar energy which is only now beginning to receive the attention it deserves.

Task 10. Match the following terms to their English equivalents from the text above.

Пристрій, фотоелектрика, величина, абсорбційна здатність, застереження, зменшуватись, світло-непроникний, виділяти, запобігання, конвенція, переносний сонячний нагрівач, дистиляція, заслужувати.

Task 11. Study theoretical material from Unit 8. Choose the correct item.

1. Terminology is a science _____
 - a) which summarizes experience of terminology work and terminology phenomena;
 - b) which create contemporary terminology vocabulary;
 - c) which calculates terms in different terminology systems.

2. The methods applied in terminology are _____
 - a) descriptive and structural;
 - b) descriptive, contrastive and comparative-typology;
 - c) descriptive, contrastive, comparative-typology and structural.

3. Number of terms of the same sphere of science or technology comprises a _____
 - a) derivation system;
 - b) terminology system;
 - c) semantic system.

4. Determinologization of word is a _____
 - a) a process of transition of a word from a special sphere of use to the general one;
 - b) a process of transition of a word from the general sphere of use to a special one;
 - c) a process of new terms creation on basis of common everyday words.

5. To translate the text with terms we should firstly _____
 - a) look through the text and determine to which terminology system the text belongs;
 - b) find and determine terms in the texts;
 - c) pinpoint terms and classify them.

6. Terminological dictionaries are divided into ____
- explanatory and linguistic ones;
 - encyclopedic and linguistic ones;
 - classical terminological dictionaries and dictionaries of information technology.

Task 12. Translate the following sentences paying attention to the polysemic meaning of the words in bold.

1. There are clock that **mark** time with an accuracy of one second per 300 years. 2. He gets only good and excellent **marks** for his answers at all exams. 3. You must **review** grammar rules regularly. 4. You English instructor will return your paper with a **review**. 5. Let us **centre** our attention on the research. 6. The consultation **centre** of the Institute is not far away from my job. 7. To **pass** an exam by Physics you must give the subject much attention and time. 8. When you come to the place, you must show your **pass** at the entrance.

Task 13. Translate the following sentences into your mother tongue.

1. Engineers often think of communication system in terms of the ingenious devices that make them function for the elegant art by means of which they can be understood and designed.

2. Our world has become so various and complicated that we no longer have one common medium of communication.

3. If domestic satellites are to be economically competitive, they must provide a multitude of circuits between cities rather than between ground terminals located far from cities.

4. Despite the lowering in maintenance costs, electronic switching systems have not been all that much cheaper than electromechanical switching.

5. Faster circuits were provided by data terminals which put signals of 48-KHz group circuits intended for 12-voice channels in frequency division, and on broader channels as well.

6. Traditionally, costs of transmission have fallen more rapidly than the cost of switching or the cost of complicated terminals intended to use transmission more effectively.

7. As switching rather than transmission is the problem and bottleneck of telephony, so terminals rather than transmission appear to be the bottleneck in data services.

8. One hand calculator has 35 keys, displays 12 digits together with a minus sign.

9. It now appears that by using optical fibers as the transmission lines communication of information via optical signals is no longer a dream but a reality.

10. It is still unclear at this time whether, indeed, one type of fibers is better than the other.

11. The realization of an optical fiber communication system depends on the availability as well as the reliability of various components.

12. Large varieties of lasers are available as sources for optical communication systems.

13. Useful integrated optical circuits must be able to perform a number of functions in the area of high-bandwidth optical communications.

14. On the other hand, for some channels neither the phase nor the amplitude can be assumed to remain constant over a significant number of bit transmissions.

15. Thus, no noise distribution can produce a higher error probability.

16. Communication theory deals with systems for transmitting information from one point to another.

Task 14. Translate the following terms using terminological dictionary.

1. radio-controlled bomb; 2. surface-launched missile; 3. surface-cooled reactor; 4. liquid-cooled engine; 5. time-modulated beam; 6. ground-based computer; 7. engine-driven pump; 8. fission-produced particle; 9. ramjet-propelled missile; 10. cathode-loaded amplifier; 11. pressure-operated switch; 12. battery-fed receiver; 13. rocket-powered booster; 14. meson-produced star.

Task 15. Translate the text into your mother tongue using machine translation.

ELECTRONIC EQUIPMENT

Industrial equipment of electronics is known to play a very important role today. Hundreds of electronics equipment are now available to science and various industries to help do jobs better or more economically or to take over jobs that could not be done otherwise.

The application, use, and proper maintenance of the many electronics equipments now in industrial use demand certain knowledge to be of the fundamentals of various standard electronics equipments.

We already know that in motors, incandescent lamps, transformers, etc., the electricity always flows in the copper wire or other metal parts. But consider lightning, where electricity seems to jump through space. The great electric pressure of lightning forces the electric current to pass through the air. In the same way, inside any radio tube, tiny electric currents are made to pass through the space separating certain parts in the tube. Such action — where electricity appears to flow through space instead of being confined to metal conductors or circuits — is said to, be electronic.

Why is it called electronic? Years ago, scientists who were trying to explain how electricity passed through space, imagined such an electric current to be a steady -stream of tiny electrical particles. They called these particles electrons. To-

day, any electric current is believed to consist of countless number of electrons. Only when electricity passed through space, when the stream of electrons comes out of the metal into the open, is such action said to be electronic. For a device to be called electronic, electricity must flow across the space inside the device and be controlled by that device.

In ordinary air, electrons can be made to jump through space only by pressure of high voltage. However, if it enclosed in a tube from which the air has been removed, the electrons flow across the space more easily. All tubes must be carefully sealed for the desired conditions to be maintained inside the tube. Most of the small tubes are vacuum tubes, the large ones usually containing mercury or other vapour.

Some electric lights are electronic. The common incandescent light bulb is not considered to be electronic even though it is enclosed like a radio tube, for the electric current flows entirely within the metal filament. In contrast, the fluorescent lamp is electronic; its light is produced by the action of electric current flowing through the space between the two ends of the lamp.

Electronics as a science is not new, for radio, sound pictures, fluorescent light, etc. are known to depend upon electronics.

Task16. Read the text and translate it into your mother tongue.

UNIT 9

THE WAYS OF TRANSLATING SCIENTIFIC AND TECHNICAL TEXTS

9.1. Annotative or referential translation.

9.2. Abstract or summary translation.

9.3. The ways of translating manuals and instructions.

9.1. ANNOTATIVE OR REFERENTIAL TRANSLATION

Annotative or referential translation is a translation of references and annotations devoted to the definite scientific and technical texts. The size of the text translation includes 3-5 sentences. The first one should be about the theme and the author; the second one should be devoted to the main issues or idea of the text they deal with. Finally, the last sentences should point out the target readers (*the book is applied for..., the article is pointed out and etc.*).

9.2. ABSTRACT OR SUMMARY TRANSLATION

Abstract or summary translation is a shortened translation of the text of science and technology. Abstract or summary translation is carried out in several steps:

1. the translator reads sentences underlying and highlighting those sentences and paragraphs which contain the information about the contest of the text;
2. the translator translate underlined or highlighted sentences and paragraphs only;
3. after completing translation of the underlined or highlighted sentences or paragraphs the translator conveys stylistic means of the texts (terms, metaphors, metonymies, similes, idioms);
4. the last step is when the translator unites all translated sentences and paragraphs into one abstract or text.

9.3. THE WAYS OF TRANSLATING MANUALS AND INSTRUCTIONS

In the world, where almost one third of the population (1.8 of 6.5 billion) speaks English, the manuals included in the products come in at least two languages: the language of the manufacture country and in English. Manuals provide customers with all the necessary information on appliances, systems and programs.

The contents of the manual take users gradually and provide all instructions related to installation, first-time and daily operation, handling faults, proper maintenance, safety instructions and regulations, product features, various usages, and technical specifications. For this reason, manuals must be suitable for a wide range of target population, whether they are technically unskilled consumers or people with the extensive technical knowledge. In addition, manuals should be written clearly and accurately, and directions and instructions should use the correct professional terminology.

Translation of manuals and instructions is one of the special types of technical translation. As the number of imported products has increased recently, this type of translation is becoming more and more popular. Moreover, under the Ukrainian law system all products, which are sold in the Ukrainian shops, should be provided with manuals in the Ukrainian language.

Instructions or manuals are printed standard issues, which contain the recommendations on the course of actions or processes informing customers about the rules of using the product. As a rule, manuals and instructions are divided into issues that are why it is easy to connect the information with the help of links. It helps to find any necessary information quickly and makes its using easy.

Translation of manuals and instructions include:

- 1) translation of different operational manuals for all types of equipment;
- 2) translation of warranty certificate;
- 3) translation of manufacturer's specifications;
- 4) translation of any accompanying documents ;
- 5) making all necessary adjustments for Ukrainian operational manuals.

Usually, manuals and instructions are small texts, which require precise and accurate translation. If translation is not faithful, customers can not use these manuals and instructions. The main thing for any translator who works on conveying manuals and instructions is terminological preciseness. All terms used in the text of translation should be monosemantic and stable.

PRACTICAL ASSIGNMENTS

Task 1. Get ready to discuss the following questions.

1. Identify different types of translation of scientific and technical texts (annotative or referential translation, abstract or summary translation).
2. Explain the fact why translation of manuals and instructions has become so popular.
3. Give the definition of instructions and manuals as genres of scientific and technical literature.
4. Define the information included in manuals and instructions.
5. Describe the process of translating manuals and instructions.

Task 2. Translate the text into your mother tongue paying attention to its grammatical and lexical peculiarities.

SAFETY PRECAUTIONS INFORMATION FOR PARENTS

Please read the operating instructions and safety precautions carefully before use.

Explain the content and the hazards associated with using the phone to your children.

Remember to comply with legal requirements and local restrictions when using the phone. For example, in aeroplanes, petrol stations, hospitals or while driving.

Mobile phones can interfere with the functioning of medical devices such as hearing aids or pacemakers. Keep at least 20 cm between a phone and a pacemaker.

When using the mobile phone hold it to the ear, which is further away from the pacemaker. For more information, consult your doctor.

The mains voltage specified on the power supply unit (V) must not be exceeded. Otherwise, the charging device may be destroyed. The power supply must be plugged into an easily accessible AC mains power socket when charging the battery. The only way to turn off the charging device after charging the battery is to unplug it. Small parts such as the SIM card, sealing stop, lens ring and lens cap can be dismantled and swallowed by small children. The phone must therefore be stored out of the reach of small children.

Do not place the phone near to electromagnetic data carriers such as credit cards and floppy disks. Information stored on them could be lost.

The ringtone, info tones and hands free talking are reproduced through the loudspeaker. Do not hold the phone to your ear when it rings or when you have switched on the hands free function. Otherwise, you risk serious permanent damage to your hearing.

Only use original batteries (100 % mercury-free) and – charging devices. Otherwise, you risk serious damage to health and property. The battery could explode, for instance.

You may only open the phone to replace the battery (100 % mercury-free), or SIM card. You must not open the battery under any circumstances. All other changes to this device are strictly prohibited and will invalidate the guarantee.

Task 3. Find the following words and word combinations in the text.

При використанні телефону, запобіжні заходи, ковтнути маленькі деталі, оригінальні акумулятори, підключити до системи живлення, слуховий апарат, медичний заклад, зарядний пристрій, створювати перешкоди, відключити від електромережі, додаткова інформація, оригінальні аксесуари,

ті, що не містять ртуті, у випадку невиконання цієї вимоги, легкодоступна мережева розетка, вести до анулювання гарантії, кредитні картки та дискети, недосяжне для дітлахів місце, законодавчі акти.

Task 4. Match the given words with their translation.

- | | |
|--|---|
| 1. Remember to comply | a. зарядка |
| 2. the hazards associated with using the phone | b. кардіостимулятори |
| 3. pacemakers | c. відтворення звуку в режимі гучного зв'язку |
| 4. for more information | d. можливі небезпеки при користуванні телефоном |
| 5. power supply | e. герметизуюча заглушка |
| 6. SIM card | f. зарядні пристрої |
| 7. sealing stop | g. звернути увагу |
| 8. electromagnetic data carriers | h. можливі важкі хронічні порушення |
| 9. handsfree talking | i. у жодному випадку |
| 10. risk serious permanent damage | j. здобуття додаткової інформації |
| 11. charging devices | k. електромагнітні носії даних |
| 12. under any circumstances | l. сім карта |

Task 5. Fill in the gaps using the text below.

1. Explain _____ associated with using the phone to your children.
2. Mobile phones can _____ the functioning of medical devices such as hearing aids or pacemakers.
3. When using the mobile phone _____ which is further away from the pacemaker.
4. The mains voltage _____ the power supply unit (V) must not be exceeded.
5. The power supply must be _____ an easily accessible AC mains power socket when charging the battery.
6. The phone must therefore _____ of small children.
7. The ringtone, info tones and handsfree talking _____ the loudspeaker.
8. The only way to _____ the charging device after charging the battery is to unplug it.
9. The battery could _____, for instance.
10. All other changes to this device _____ and will invalidate the guarantee.

Task 6. Translate the following parts of the phone operating instructions.

1. Codes
PIN control

You can stop the PIN prompt being activated when the phone is switched on, but you then risk unauthorised use of the phone. Press **§Change§**. Enter PIN and confirm with **§OK§**.

Change PIN

You can change the PIN to any 4- to 8-digit number you find easier to remember.

2. Dialing with number keys

The phone must be switched on (standby mode). Dial number (always with area code, if necessary with international dialing code). To dial international dialing code press and **hold 0**

until a “+” is displayed. Press **§Country§** and select country.

3. Calendar

You can enter appointments in the calendar. Time and date must be set for the calendar to work correctly. Page between days with H. Press G **briefly** to page between weeks, press and **hold G** to page between months. Calendar days in bold face indicate appointments on this day.

Task 7. Translate from Ukrainian.

Розблокування SIM-карти

1. Після трьох невдалих спроб правильно ввести PIN вашу SIM карту буде заблоковано. Введіть код PUK (**MASTER PIN**), що надається оператором зв'язку з SIM-картою відповідно до інструкції. Якщо код PUK (головний код PIN) було втрачено, будь ласка, проконсультуйтеся з оператором зв'язку.

2. Захищайте телефон від вологи та рідини! Оподи, волога та рідина містять мінеральні солі, які роз'їдають електросхеми. Якщо все ж таки в телефон потрапила волога, негайно відімкніть його та видаліть акумулятор для уникнення електричного шоку. Не розташовуйте ваш телефон, навіть якщо в нього потрапила волога, у зоні дії джерела тепла, наприклад, мікрохвильової печі, духовки або радіатора. Телефон може перегрітися та вибухнути.

3. За допомогою браузера ви можете завантажити з інтернету програми (наприклад, звуки дзвінків, ігри, зображення, анімацію).

4. Компанія «Бенк'ю» не надає жодних гарантій і відмовляється від будь-якої відповідальності за наслідки роботи програмного забезпечення, яке не поставлялося разом з телефоном, або записано користувачем на телефон.

Unit 10

THE TRANSLATION PATENT AND PATENT LITERATURE

10.1. The basic features of American and British patent language description.

10.2. Useful idioms and phrases in American and British patents.

Nowadays in the world of developed technologies, the problem of adequate patent translation has become of a great importance. According to M. Cross, the experienced translator, the head of his own Patent Translations Inc., who spends much of his time editing translations and training translators and editors in the ins and outs of patent translation, says that “the translations will be certified by the translators as being faithful to the original” (M. Cross: 2010, 20). To convince his thought M. Cross adds that **there is the necessity of literal translation of patent** which is used “an exact and accurate reproduction of the entire content of the source text without embellishment or modification in modern linguistics” (M. Cross: 2010, 21). In this case, the job of the patent translator has become similar to that of a court interpreter: translators may not contribute their own knowledge or opinions but rather must limit themselves to reproducing precisely what is said in the original patent.

Another linguist R. Faber defines “patent literature is a kind of strictly structured scientific and technical texts applied for a long, precisely worded legal definition of an invention” (R. Faber: 2003, 23). A patent text is the text contains scientific and technical information about an agreement between a state and an individual or company to provide anyone with the right to use it for filing, litigation support, and research. Patent is issued by the state for just about anything that is useful, so long as the idea is novel — and by novel, the state means that it must not be publicly known anywhere in the world. That is why the problem of a precise, adequate and accurate reproduction and rendering patent literature concerns not only the translators of patents but also the inventors.

Ukrainian linguist L. Chernovaty emphasizes that the text of patent transferred into another foreign language environment is the only carrier of scientific and technical information for rendering it in time and space and coincides with functioning such genres of scientific and technical literature as article or report (L. Chernovaty: 2016). The style of patent literature is strictly regulated. It is a kind of normalized scientific and technical writing, which creates one of the parts of non-fiction style executing informative function.

Patent is issued by the state for just about anything that is useful, so long as the idea is novel — and by novel, the state means that it must not be publicly known anywhere in the world. That is why the problem of a precise, adequate

and accurate reproduction and rendering patient literature concerns not only the translators of patients but also the inventors.

Patient literature exists mostly in written form; all information is represented in an objective, precise and clear way in it. Clarity is an important part of patient literature. Sentences are not long and don't contain too many clauses. If a sentence is too long, it should be divided into several smaller ones. The words in the sentences and linking words should be repeated to lead the reader through the smaller sentences. Every extra word gives the reader something extra to read and understand. The more words are used the greater the chance of misunderstanding something.

Patient literature is different from other texts in the vocabulary, grammar, syntax, and the way of presenting material.

Vocabulary. In general, the patient vocabulary consists of a great number of stamps and clichés, synonyms, polysemic words and of a wide range of words with written-bookish stylistic colouring (scientific and technical concepts and notions, marked vocabulary, archaisms, special terms).

Many polysemic words, archaisms are used in the American and British descriptions of inventions.

Thus, it could be concluded that patent vocabulary consists of:

1. the extensive use of scientific terminology;
2. the use of abstract, mainly foreign words and idioms;
3. the use of polysemic words and synonyms;
4. the presence of tautology expressions;
5. the presence of drawings and schemes, charts, mathematical, physical, chemical and other signs and formula, abbreviations;

Grammar. It is worth saying that the style of patient is also differ from other function styles in the use of specific grammar forms, constructions and tenses. It can be vary in:

- 4) the terms of language means, the constructions of the gerund and participle used to make the text more condense and precise;
- 5) the use of parentheses;
- 6) the personal manner of representing material, the constructions from the first person.

Syntax. The texts of patent differ from other function styles not only in their vocabulary and grammar but also in their syntactic constructions. The forms of Past Participle or impersonal Passive constructions are used in the beginning of the new paragraphs in patent literature: *The above mentioned, Broadly stated, Patented, It is understood, It is to be understood, As can be best noted* – *Як вказано або зазначено, Відповідно до, Дата видачі патенту, Слід розуміти, Зрозуміло, Як показано*. Impersonal sentences of this type bring minimum semantic information and serve only as an introduction of the sentence presenting the basic thought.

The way of presenting material. Another peculiarity of patent literature is the way of presenting material.

The first and most noticeable peculiarity of patent writing is the logical sequence of utterances with a clear indication of the interrelations and interdependencies. Logical sequence of utterances is definitely important to comply with the following general features.

The second characteristic feature of patent literature is repetition. The repetition and formality of patent writing are closely connected with the specific use of linguistic means called intellectualization or rationalization. It means the tendency to concrete and precise expressing information.

Thus, to all peculiarities of patent writing mentioned above it can be added a specific vocabulary, using terms and scientific technical concepts and notions, a wide range of words with written-bookish stylistic colouring, using Passive and participle constructions, abstract nouns formed from verbs and adjectives, strictly logical syntax and sentence order, objectivity, impersonality, repetition, tautology and formality.

The key role in the process of translating patent literature belongs to translators and in this turn, translators' primary task is presenting information of invention descriptions in the most appropriate, accurate and adequate way to make executing it as a court interpreter without any contributions of their own knowledge or opinions but with rather limitation. To translate adequately English patent literature it is necessary to know the patent content and its structure. This aim supersedes any intentions to transfer the text of the source language into the target one and to make the communication successful and effective by means of the target language. Patent translators do not interpret words but interprets what people do with these words. In this sense, the translators of patents become the intercultural and cross-field writers.

For successful adequate translating patent literature in the English language, it is necessary to know well the patent contents and their structure. There is a comparative description of American, British and Ukrainian patents which seems to be useful.

American patent	British patent	Ukrainian patent
I. Бібліографічні дані		
1. Бібліографічний розділ (Bibliography)	1. Бібліографічна частина	1. Бібліографічний розділ
2. Анотація (Abstract)	Анотація	Реферат
II. Основна частина опису		
1. Креслення (Drawings)	1. Вступна фраза	1. Галузь використання
2. Передумови створення винаходу. (Background of the Invention)	2. Галузь, до якої належить винахід	2. Недоліки існуючих рішень

3. Задача винаходу та короткий опис (Summary of the Invention)	3. Суть проблеми, передумови створення винаходу	3. Задача винаходу та короткий опис
4. Короткий опис креслень (Brief Description of the Drawings)	4. Історія питання і попередній рівень розвитку техніки	4. Детальний опис
5. Детальний опис винаходу (Detailed Description of the Invention)	5. Недоліки існуючих рішень	5. Формула винаходу
6. Опис переважних варіантів винаходу (Description of the Preferred Embodiments)	6. Переваги пропонованого рішення	6. Креслення або графічні зображення
7. Галузь техніки, до якої належить винахід (Field of the Invention)	7. Короткий опис суті технічного рішення	–
8. Опис прототипу (Description of the prior art)	8. Короткий опис креслення	–
9. Принцип дії (Operation)	9. Повний опис із залученням креслень	–
10. Формула винаходу (Claims)	10. Приклади здійснення винаходу	–
–	11. Формула з «омнібус» - пунктом.	–
–	12. Інформація про патентного повіреного	–
–	13. Креслення або малюнки	–

As follows from a table, in the structure of patent description of each of the above-mentioned countries two basic chapters are distinguished: bibliographic data and detailed basic part. In addition, the structures of invention descriptions offered in comparison show to the patents of the USA, the UK and the UE countries, that mostly in texts of patent descriptions there are next chapters:

- a) bibliographic description,
- b) introduction (introductory part),
- c) review of well-known technical decisions on this question and critic of the present technology,
- d) summary of the invention,
- e) field of the invention,
- f) the detailed description of the invention,

g) claims.

However, in practice on one or another considerations some chapters can be omitted or united, but on condition that information that must be contained in these chapters will be clear from other ones.

10.1. THE BASIC FEATURES OF AMERICAN AND BRITISH PATENT LANGUAGE DESCRIPTION

To the basic features of American and British patent description language belong:

- the wide use of stamps and clichés;
- the presence of large number of synonyms;
- the presence of large number of words having, in this context that meaning which is usually given in the dictionaries;
- the wide use of marked vocabulary and archaisms;
- the use of grammatical constructions from the first person.

Synonyms. The synonyms used in American and British descriptions of inventions can be divided into two groups. The first group unites the words, which can be synonymous only in certain word-combinations. Therefore, for example, the verbs *to aid better, to enhance, to improve, to increase, to raise* are synonyms only in the combinations with the noun *efficiency* and in this case have one meaning *повисити*.

To the second group the words, which are synonymous regardless of the word-combination they are used in, belong. One of the vast synonymous rows belonging to this group, form the words and word-combinations, having the meaning *недолік*: *complaint, default, defect, defective feature, deficiency, detriment, detrimental characteristic, disability, disadvantage, disadvantageous effect, disadvantageous feature, drawback, fault, failing, failure, inadequacy, nuisance; objection, objectionable feature, shortcoming, undesirable characteristic, undesirable effect, undesirable feature, unsatisfactory result, weakness* and others.

The phenomenon of synonymy is closely related to the phenomenon of tautology. Tautology is used by many authors of invention descriptions of the UK and the USA: *the disadvantages and drawbacks, the invention or discovery, the purpose and object, new and novel, to improve and increase (the efficiency), to remove or obviate (the disadvantages)* and others.

Especially tautological expressions are often met in the “extending” phrases of description: *changes and modifications, forms or modifications, modifications and adaptations, the spirit and intent, the field and scope* and others.

However, at the process of translation it is necessary to avoid tautology, as it is not specific to the descriptions of inventions. For example:

A general object of my invention is to improve and increase the efficiency of rotary internal combustion engines of this type. -

Задачею винаходу є підвищення ККД роторних двигунів внутрішнього згорання цього типу.

Polysemic words. Polysemic words in American and British descriptions of inventions can be subdivided into three groups:

1) words having different meanings, depending on which grammatical structure in which section of the description they are used;

2) words that have different meanings in certain phrases;

3) words whose meaning are determined only by the context.

For example, the words *to comprise*, *to consist in*, *to provide*, *to relate to* with the word *invention* *винахід*. In the introduction it can be translated *винахід відноситися до*, in the summary of the invention they mean *мати на меті*, *метою*, in the detailed description of the invention they can be translated *пропонується* and the phrase *the invention comprises* (*the invention comprises, consists in, provides, relates to*) can be translated *пропонувати\пропонуємо*.

The following verb *to meet* can be translated in patent literature as:

to meet a condition – *відповідати вимогам*,

to meet a disadvantage – *ліквідувати недолік*,

to meet an object – *мати ціль*,

to meet a problem – *вирішувати проблему*,

to meet a requirement – *відповідати вимогам*,

to meet a standard – *відповідати стандарту*.

The meanings of the words from the third group are not determined with the formal features. Thus, the noun *disclosure* can have two meanings (опис і винахід), which are determined only by a context.

It is evident that the division of polysemic words into groups is conditional. Thus, the verb *to provide* besides above mentioned meanings «*належати до, задачею винаходу, пропонувати*» is often used in different chapters of the patent description in the meaning “*створювати, здійснювати, виконувати*»:

The object of the invention is to provide a system...

Мета винаходу - створити систему...

Specific words and idioms. Some words in the invention description can have another meanings. Thus, the noun *limitation* in Muller’s dictionary has the following meanings: 1) обмеження; 2) обмовка; 3) обмеженість; 4) граничний термін; 5) pl. недоліки; in plural - обсяг; the limitations of the claim — обсяг формули винаходу.

The noun *purpose* in Muller’s dictionary has the following meanings: 1) намір, задача, призначення; 2) результат, успіх; 3) цілеспрямованість, воля, - може означати суть: *without deviating from the purpose of the invention* — у межах суті винаходу. The noun *disadvantage* in the dictionary: 1) невигода; невиконане становище; 2) шкода, збиток, незручність; 3) перешкода; в описах винаходів означає *недолік*. The noun *objection*: 1) заперечення, протест; 2) несхвалення, нелюбов; в описах винаходів означає *недолік*.

The noun *claim* in the dictionary: 1) вимога; 2) позов, претензія) usually is a stumbling-stone for the beginning translators of invention descriptions. In singular this noun is meant *пункт формули винаходу і формула винаходу (що складається з одного пункту)*, in plural are *пункти формули винаходу, формула винаходу (що складається з декількох пунктів) і формули винаходу*. In the extended parts of the invention description, it is meant *формула винаходу, у формулі винаходу*.

Stylistically marked vocabulary. The most wide spread word in American and British invention description is the word *said* — *згаданий*. In British patent it is often met in the detailed description of the invention and in claims, in American generally in claims. The frequency of using the word *said* depends only on the author of the description. Some authors use this word more often, some of them use it rarely, and somebody does not use it at all. The use of the word *said* is canonized in the claims of American patents. But at the translation it is better to omit this word if it is allowed by the context. If the usage of this word is essential it will be translated «*згаданий, цей, наданий, названий*», ср.:

A closure member in said passage...

Відсікаючий елемент у названому розділу ...

In extending parts of description, which precede to the detailed description the following words are widely used: *нижченаведений або наведений нижче, прикладений - accompanying, annexed* with the words *description, drawing, claim*.

The following archaic words such as the adverbs with *there* and *where* (*there-across, therealong, there beneath, therebetween, thereby, therefore, therein, thereon, thereover, therein through, therewith, therewithin, whereafter, whereby, wherein, whereof, whereon, wherethrough, whereupon* and etc.) are not translated with the meanings given in the dictionaries in patents. Their translation is rather simple. The adverb containing *there* is replaced with the pronoun *it* or *them* depending on a context with an appropriate preposition, ср. *therewith* = *with it, with them*:

The compressor is connected with the turbine and rotates therewith. –

Компресор сполучений з турбіною і обертається з нею.

The adverb containing *where* is replaced with the pronoun *which* with appropriate preposition: *whereafter* = *after which*:

... whereafter the pressure in the second chamber drops.

... після чого тиск в другій порожнині падає.

Grammatical constructions from the first person. The authors of invention descriptions quite often use grammatical constructions from the first person. However, in Ukrainian translation such personal constructions are changed into impersonal ones:

My invention relates – Винахід належить до;

I aim to provide an engine – Завданням цього винаходу є створити двигун;

According to the invention we provide an engine – Пропонується двигун.

**10.2. USEFUL IDIOMS AND PHRASES IN AMERICAN
AND BRITISH PATENTS**

American patent		
БІБЛІОГРАФІЧНА ЧАСТИНА		
1.	United States Patent Office	Патентне відомство США
2.	Appl. No.	Номер заявки
3.	Assignee	Власник патенту
4.	Attorney	Патентний повірений
5.	Field of search	Сфера використання
6.	Filed	Дата подачі заявки
7.	Filed ... , 19..., Ser. No...	Дата подання заявки ... 20... № ...
8.	Inventor	Винахідник
9.	Primary examiner	Експерт
10.	X.... assignor to ...a corporation of...	Винахідник X (місце постійного проживання), власник патенту (найменування, місцезнаходження компанії) корпорації, штату
11.	X...assignors, by means assignments, to...	Винахідник X (місце постійного проживання), власник патенту, що отримав права через третю особу
12.	X...(PO; Vox.....,....).....	Винахідник X (місце постійного проживання – а/с, вул.)
13.	Filled..., 20..., Ser. No...	Дата подання заявки ... 20... № ...
14.	Original application... 20..., Serial No..., now Patent No...dated ...20...Divided and this application ..., 20..., Serial No...	Дата подання першої заявки ...20..., №..., на яку виданий патент США № від 20... Дата подання розділеної заявки ... 20... № ...
15.	Application..., 20..., Ser. No...	Дата подання заявки ... 20... №
16.	Claims priority, application..., ..., 20...	Дата конвенційного пріоритету...20...по заявці №..., поданою ст.
17.	...claims	...пунктів формули винаходу
18.	Int, Cl...	...пунктів формули винаходу
19.	U.S. Cl...	...пунктів формули винаходу
20.	Granted under Title...U.S. Code (20...) sec...	Видано згідно з розділом Кодексу законів США (20...)

21.	This invention is a property of the U.S., Government as represented by Secretary of...	Цей винахід належить уряду США в особі міністра...
22.	Patented..., 20...	Дата видачі патенту ... 20..
Галузь техніки, до якої належить винахід, і огляд стану техніки		
1.	Background of the invention	Передумови до створення винаходу
2.	The present invention relates to..., and, in particular, to...	Цей винахід належить до ... і, зокрема, до...
3.	This invention relates in general to...	Цей винахід в основному належить до...
4.	This invention relates to ..., and specifically to...such as, for example...	Цей винахід належить до і зокрема, до...наприклад...
5.	The present invention relates to ..., and its object is, generally to provide	Цей винахід належить до ... і, його задачею є ...
6.	This invention relates to the art of ... and is particularly concerned with ...	Цей винахід належить до і його задачею є...
7.	The present invention generally relates to... and more particularly...	Цей винахід в основному належить до , а конкретніше до.
8.	My invention concerns a new and improved ... and specifically my invention lies in ...	Цей винахід належить до нового і вдосконаленого і, зокрема, цей винахід стосується.
9.	The invention relates to ... More particularly, the invention relates to ..	Конкретніше, цей винахід стосується . Більш конкретно, винахід має відношення.
10.	This invention relates in general to ... and in particular to ...	Цей винахід належить загалом до . і, зокрема, до.
11.	The present invention relates to improvements in ... described in my application Serial No... filed ... , now Patent № ..., dated ... More particularly this invention involves ... This application is a division of my copending application Serial No...filed ...	Цей винахід належить до удосконалення, описаного в заявці № цього заявника, поданій, щодо якої якій видано патент США №. від. Цю заявку виділено із спільно наданої заявки №., поданої, щодо якої видано патент США №. від.
12.	More particularly, the invention is directed to ...	Більш конкретно, винахід належить до...
13.	More specifically, the invention has to do with novel and highly effective ...	Більш конкретно, винахід належить до і надзвичайно ефективний...

14.	The invention is in the field of...	Цей винахід належить до галузі
15.	The present invention resides in ...	Цей винахід належить/ відноситься
16.	The present invention concerns method and means for ...	Цей винахід відноситься до способу і присторою для ...
17.	The invention is of particular advantage in the case of ...	Цей винахід доцільно застосовувати...
18.	The use of ... is well known in a number of diverse arts	Широко відоме застосування у різних галузях техніки...
19.	Another example of an application of ... is found in ...	Інший приклад застосування... можна знайти в ...
20.	A typical application of such ... finds ...	Типовим застосуванням такого є...
21.	Solutions thus far proposed to overcome the foregoing problems have involved ...	Відомі рішення, спрямовані на подолання зазначених вище труднощів, пов'язані з...
22.	The present invention is particularly useful for...	Цей винахід доцільно застосовувати при... (Пропонований... має переважне застосування для).
23.	The invention is in the class of...	Винахід належить до класу...
24.	It is common knowledge that	Загальновідомо, що...
25.	There is a long-felt need to provide ...	Давно назріла необхідність у створенні...
26.	Many types of...have been provided but...	Відомі... декілька типів, проте...
27.	The inventive concept in this case must be used in...	Принцип цього...
Задачі винаходу		
1.	It is an object of my invention to provide	Задачею цього винаходу є створення...
2.	My invention provides novel means for...	Цей винахід спрямований на створення нового пристрою для...
3.	The principal object of this invention is to provide an improved apparatus of this character...	Основною задачею цього винаходу є створення вдосконаленого облаштування зазначеного типу...
4.	A further object of the invention is to provide ...	Іншою задачею цього винаходу є створення...

5.	Still further objects and features of his invention reside in the provision of ...	Інші задачі і аспекти цього винаходу полягають у створенні...
6.	Accordingly, it is the primary object of the present invention to provide ...	Відповідно до викладеного основною задачею цього винаходу є створення...
7.	Another object of the present invention is to provide...	Інша задача цього винаходу полягає в створенні...
8.	Still another important feature of the present invention is to provide...	Ще одна важлива особливість цього винаходу пов'язана із створенням...
9.	Yet another important object of the present invention is to provide...	Ще однією важливою задачею цього винаходу є створення...
10.	An object of the invention is to...	Задача винаходу...
11.	A further object of the invention is to...	Наступна задача винаходу...
12.	Other objects of the invention are to...	Інші задачі винаходу полягають...
13.	With this object in view, the present invention comprises an improvement in the apparatus described in my prior patent...	Відповідно до зазначеної задачі цей винахід належить до удосконалення пристрою, описаного в існуючому патенті цього заявника...
14.	Another object is the development of...	Інша задача полягає в розробці...
15.	In general, it is an object of the invention...	Головною задачею цього винаходу є...
16.	Broadly, it is an object of the invention...	Головною задачею винаходу є...
17.	An additional object is to provide...	Додатковою задачею є створення.
18.	Objects of the present invention are to overcome the above disadvantages and to provide...	Цей винахід спрямований на усунення зазначених недоліків за допомогою...
Коротке формулювання суті винаходу		
1.	Summary of the invention	Стислий виклад суті винаходу
2.	These and other objects are attained in a device...	Зазначені і інші задачі винаходу досягаються за допомогою пристрою...

3.	Broadly speaking, the invention is based upon the conception that...	В цілому, цей винахід оснований на тому, що...
4.	To achieve this objective it is proposed according to the invention in a device of the kind referred to...	Для досягнення зазначених задач відповідно до цього винаходу пропонується в облаштуванні вказаного типу...
5.	In accordance with the invention a device is provided wherein...	Відповідно до цього винаходу пропонується пристрій, в якому...
6.	To the accomplishment of the foregoing and related ends, said invention, then consists in...	Для досягнення зазначених задач відповідно до цього винаходу пропонується...
7.	The present invention contemplates means...	Згідно з цим винаходом пропонується пристрій...
8.	These objects are accomplished by...	Зазначені задачі досягаються...
9.	The present invention provides an improved ...	Згідно з цим винаходом пропонується вдосконалений...
10.	According to the invention ...	Згідно з цим винаходом...
11.	A further feature of the invention provides that...	Наступний аспект цього винаходу полягає в тому, що...
12.	The invention concept in this case may be used in...	Принцип цього винаходу може бути використано в...
13.	Broadly stated, in accordance with the present invention a system is provided...	Відповідно до спільної задачі цього винаходу пропонується система...
Завершальна фраза вступної частини опису		
1.	Description of the drawings	Опис креслень/ рисуноків
2.	The above-mentioned and other features and objects of this invention and the manner of attaining them will become more apparent and the invention itself will be better understood by reference to the following description of an embodiment of the invention taken in conjunction with the accompanying drawings, wherein...	Зазначені та інші аспекти і задачі цього винаходу, а також способи їх здійснення очевидні з наведеного нижче опису прикладу здійснення цього винаходу, який ведеться з посиланнями на креслення, що додаються, на яких...
3.	The above-mentioned objects and other objects and advantages of the present invention are illustrated in the accompanying drawings, wherein...	Зазначені інші задачі і переваги цього винаходу представлені на кресленнях/ графічних матеріалах, що додаються, на яких...

4.	The invention will now be explained in greater detail with the reference to embodiments thereof which are represented in the accompanying drawings, wherein...	Нижче наведений детальний опис винаходу на прикладах його здійснення, представлених на кресленнях/пояснених на рисунках, що додаються, на яких...
5.	Various other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings illustrating a presently preferred embodiment thereof, and wherein...	Інші задачі і переваги цього винаходу розкриваються з наведеного нижче опису, який розглядається з посиланнями на креслення, що пояснюють/ зображують/ наводять найбільш доцільний нині варіант здійснення, на яких...
6.	Additional objects and features of the invention will appear from the following description in which the preferred embodiment is set forth in detail in conjunction with the accompanying drawings, referring to the drawings...	Додаткові задачі та аспекти винаходу розкриваються з наведеного нижче детального опису переважного прикладу його здійснення, який ведеться з посиланнями на креслення, що додаються, на яких...
7.	Other objects, advantages and features of the invention will become evident from the following specification and accompanying drawings which are merely exemplary ...	Інші задачі, переваги і аспекти цього винаходу очевидні з наведеного ступного нижче опису і малюнків, що додаються, які носять суто ілюстративний характер...
8.	These and other objects of this invention will become apparent from the reading of the attached specification...	Зазначені та інші задачі цього винаходу очевидні з опису винаходу, що додається...
9.	The nature of the invention will be clear from the following description...	Суть винаходу очевидна з наведеного нижче опису...
10.	A fuller understanding of the nature and objects of the invention will be had from the following detailed description, taken in conjunction with the accompanying drawings...	Наступний докладний опис і супутні креслення забезпечують краще розуміння суті і переваг даного винаходу...
11.	For further details of the invention, reference may be made to the drawings wherein...	Аспекти цього винаходу далі можуть бути уточнені за кресленнями, на яких...

12.	In the accompanying drawings, with the aid of which I will describe my invention...	На кресленнях, що додаються, за допомогою яких ведеться опис винаходу...
13.	The exact nature of this invention as well as other objects and advantages thereof will be readily apparent from consideration of the following specification relating to the annexed drawings in which...	Суть задачі цього винаходу, а також його інші цілі і переваги очевидні з наведеного нижче його опису і креслення, що додається, на якому...
14.	with due reference to the accompanying drawings...	...з відповідними посиланнями на креслення/ рисунки, що додаються...
15.	In describing my invention, reference will be made to the accompanying drawings, in which corresponding parts are identified by corresponding reference characters and in which...	Опис цього винаходу ведеться з посиланнями на креслення, на яких однакові деталі позначені одними і тими ж літерами...
Детальний опис винаходу		
1.	Referring to Fig...,	Як видно з рис. ...,
2.	It is understood, in all cases, that...	Слід розуміти, що в усіх випадках...
3.	The present invention utilizes...	У пропонуємому пристрої (способі, і т. п.)/ у пристрої, що пропонується...
4.	Thus the present invention has a number of economic advantages over prior practice	Таким чином, цей винахід забезпечує численні економічні переваги порівняно з відомими рішеннями...
5.	Referring now specifically to the drawings, the numeral ... generally designates...	Як видно зокрема з креслень, загальною позицією... позначений...цифю
6.	The illustrated embodiment of the invention (Fig...) comprises...	Згідно з описуваним прикладом здійснення (рис.), пропонуємый пристрій включає (містить)...
7.	In the prior arrangement according to the prior patent referred to above ...	У відомій конструкції, виконаній згідно з раніше виданим патентом, згаданим вище...

8.	Alternatively, the device may comprise ...	Згідно з іншим варіантом здійснення винаходу пристрій може містити...
9.	It will be apparent that...	Потрібно розуміти, що...
10.	...and it may be formed in any known convenient mannerі може бути виготовлено (виконано, отримано) будь-яким відомим доцільним способом.
11.	Accordingly, the operation of the embodiment will now be described with reference to Fig...	Далі дія пропонованого пристрою згідно з цим прикладом здійснення пояснюється нижче за допомогою рис.
12.	In the embodiment disclosed in Fig...	У прикладі здійснення винаходу, ілюстрованому на рис.
13.	As can be best noted in Fig	Як показано на рис...
14.	It will be readily understood by those skilled in the art ...	Фахівцям у цій сфері техніки має бути очевидно...
15.	Thus the present invention is especially well suited to ...	Таким чином, пропонується винахід доцільно застосовувати...
16.	In the arrangement of Fig...	У конструкції, показаній на рис..
17.	This invention has been described in terms of specific embodiments	Цей винахід описано на конкретних прикладах його здійснення...
18.	In one prior art embodiment	В одній з відомих конструкцій...
Розширювальний абзац		
1.	While particular embodiments of the invention have been shown and described, various modifications thereof will be apparent to those skilled in the art and therefore it is not intended that the invention be limited to the disclosed embodiments or to the details thereof and the departures may be made therefrom within the spirit and scope of the invention as defined in the claims.	Вище наведені конкретні приклади здійснення винаходу, що допускають різні зміни і доповнення, які очевидні фахівцям у цій галузі техніки. Тому винахід не обмежується цими описаними прикладами або окремими елементами, і в нього може бути внесено зміни і доповнення, які не виходять за межі суті і об'єму винаходу, визначені формулою винаходу.
2.	Various modifications may be made in the invention without departing from the spirit of the following claims.	Можливі різні зміни/ модифікації винаходу, що не виходять за межі наведеної нижче формули винаходу.

3.	While the invention has been described herein in terms of the preferred embodiments, numerous variations may be made in the apparatus illustrated in the drawings and herein described without departing from the invention as set forth in the appended claims.	Вище цей винахід описано на переважних прикладах його здійснення, проте в показаних на кресленнях і описаний вище пристрій можуть бути внесені численні зміни, що не виходять за межі суті і об'єму винаходу, визначені у формулі винаходу.
4.	It is to be understood that the form of my invention, herewith shown and described, it is to be taken as a preferred embodiment, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of my invention or the scope of claims below...	Зрозуміло, що здійснення цього винаходу, проілюстроване і описане вище, слід розглядати як переважний варіант, і що можуть бути внесені різні зміни, що стосуються формули, розмірів і розташування елементів, у межах суті, а також об'єму цього винаходу.
5.	...without affecting (avoiding, deviating from, exceeding, falling outside, going outside, widening) the scope of the invention...	...у межах об'єму винаходу...
6.	...without altering (constituting a departure from, deviating from) the spirit of the invention...	...у межах суті винаходу...
7.	This invention may be variously otherwise embodied within the scope of the appended claims.	Цей винахід, можливо по-різному здійснити в межах суті.
Формула винаходу		
1.	What I claim is...	Формула винаходу...
2.	What we claim is...	Формула винаходу...
3.	What I claim as my invention and desire to secure by Letters Patent is...	Формула винаходу...
4.	What is claimed is...	Формула винаходу...
5.	It is therefore, particularly, pointed out distinctly claimed as the invention...	Формула винаходу...
6.	The invention is claimed as follows:	Формула винаходу...
7.	I claim as my invention: ...	Формула винаходу...
8.	I claim:...	Формула винаходу...

9.	We claim:...	Формула винаходу...
10.	Having thus described my invention, I claim:...	Формула винаходу...
11.	What is claimed as new is, as follows:...	Формула винаходу...
12.	What we claim as new and desire to secure be Letters Patent of United States is:...	Формула винаходу...
Матеріали, використані при експертизі заявки		
1.	References Cited by the Examiner	Матеріали, використані при експертизі заявки
2.	References cited in the file of the patent	Матеріали, використані при експертизі заявки
3.	Bibliography cited	Матеріали, використані при експертизі заявки
4.	List of references	Матеріали, використані при експертизі заявки
British patent		
Бібліографічна частина		
1.	Patent specification	Опис до патенту на винахід
2.	Drawings attached	Креслення додаються
3.	Date of the application and filing Complete Specification ... 20... No...	Дата подання заявки і повного опису... 20... №.
4.	Application made in...on...20...	Доповнення зроблено від... 20...за заявкою, поданою до...
5.	Complete Specification published ... 20...	Дата публікації повного опису... 20..
6.	Index at acceptance ... Class	Клас міжнародної патентної класифікації
7.	International Classification ...	Клас міжнародної патентної класифікації; МПК
Назва винаходу		
1.	Improvements in or Relating to Apparatus and process for...	Удосконалений спосіб і пристрій для його здійснення
Заява власника патенту		

1.	We, General Engineering Co., Limited, a British company of Station Works, Bury Road, Radeliffe, Manchester, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement	Цю фразу перекладати не слід, а назву фірми (чи приватної особи) (підкреслено) зазначають у бібліографічній частині перекладу опису
Галузь техніки, до якої належить винахід		
1.	The invention relates to a process ...	Цей винахід вналежить до способу/процесу...
2.	This invention is directed to a novel article...	Цей винахід вналежить до нового виробу...
3.	The present invention relates to the production of...and especially to the production of...	Цей винахід вналежить до виготовлення ... і, зокрема, до виробництва...
4.	This invention relates to the manufacture of...	Цей винахід вналежить до виготовлення ...
5.	This invention is directed to a method and means for...	Цей винахід стосується способу ... і пристрою для його здійснення...
Критика прототипу		
1.	It has previously been proposed ...	Відомий спосіб...
2.	The preparation of ... from ... is well known	Широко відоме виготовлення... з...
3.	At present, such devices are constructed in the form of...	Відомі такі пристрої, виконані у вигляді...
4.	It has been known that...can be obtained by...	Відомо, тому що отримано...
5.	A number of techniques have been proposed for the production of...	Відомі способи виготовлення...
6.	It is known to...	Відомий спосіб...
7.	It has also been discovered that...	Відомо також, що...
Стиль формулювання сутності винаходу		
1.	According to the present invention there is proposed a method of... wherein...	Згідно з цим винаходом пропонується спосіб, за яким...
2.	According to the invention the apparatus for ..., is characterized in that...	Згідно з цим винаходом пропонується спосіб, що полягає...

3.	According to this now specification...	Згідно з цим винаходом
Власне опис винаходу		
1.	...which method forms the subject of cooending Application No...	...цей спосіб описано в спільно поданій заявці №... (патент Великобританії №...)
2.	As disclosed in the prior patent specifications ...	Згідно раніше опублікованим описом...
3.	As disclosed and claimed in the prior British patent specification ...	Згідно з раніше опублікованим описом до патенту Великобританії...
4.	This type of device is described and claimed in British application No... filed...20...Serial No. ...	Пристрій такого типу описано у заявці №..., поданій 20...р. у Великобританії, на яку видано патент №...
5.		Відомо, що...
6.	It will be appreciated that...	Фахівцям у цій галузі техніки очевидно, що...
7.	Specifically, with reference to Fig. ...	Зокрема, як показано на рис...
8.	The individual elements of the construction are described in greater detail in our patent No. ...	Окремі елементи конструкції детальніше розкрито в описі до патенту Великобританії №... заявників цього винаходу...
9.	As herein described and for the purpose set forth...	Відповідно до опису і для зазначеної задачі...
Формула винаходу		
1.	What we claim is:	Формула винаходу
Останній пункт формули винаходу		
1.	Apparatus ... substantially as hereinbefore described with reference to, and as shown in the accompanying drawings	Пристрій ... відповідно до наведеного опису і креслень, що додаються...

PRACTICAL ASSIGNMENTS

Task 1. Get ready to discuss the following questions.

1. Discuss the peculiarities of translating patent literature.
2. Comment on the differences between American, British and Ukrainian patent literature.
3. Characterize the style of patent documentation.
4. Speak on about the peculiarities of vocabulary, grammar and syntax of patent texts.

Task 2. Choose the correct translation variant of the words used in patent literature.

Adaptation (пристосування, переробка, варіант), to alleviate (полегшувати, пом'якшувати, частково усувати), alteration (перебудова, зміна, варіант), advantageously (в одному варіанті, переважно), ambit (межі, об'єм, діапазон), application (прохання, звернення, заявка), aspect (вид, особливість, вираження), attribute (властивість, символ, особливість), breadth (об'єм, ширина, полотнище), character (риса, суть, характер), change (варіант, зміна, зміна), class (вид, клас, галузь), concept (концепція, винахід), concern (мета, відношення, тривога), to contempt (мати намір, припускати, мати на меті), contemplation (припущення, суть, роздум), to correct (коригувати, усувати недоліки), to cure (вилікувати, усунути), default (неплатіж, халатність, недолік), description (опис, вид, дескрипція), development (розвиток, варіант), to disclose (відкривати, знаходити, описувати), to discuss (дискутувати, описувати), discussion (опис, обговорення, дискусія), embodiment (інтеграція, втілення, варіант), to embrace (охоплювати, мати на меті), equivalent (еквівалент, варіант), extent (протяг, міра, об'єм), failure (провал, дефект, недолік), fault (помилка, провина, недолік), feature (риса, особливість), genus (суть, вид), heart (ядро, суть, центральна частина), intendment (правильне трактування, суть), to meet (йти на компроміс, вирішувати проблему), meaning (суть, значення), modification (варіант, модифікація, видозміна), motive (мотив, мета, намір), need (необхідність, мета), nuisance (перешкода, порушення громадського порядку, недолік), to overcome (долати, усувати), purview (обсяг, сфера, межі), ramification (наслідок, результат, варіант), range (рівень, об'єм, ранг), realm (обсяг, галузь, сфера), the invention resides in a method (винахід витікає з методу, винахід, який базується на методі, пропонований спосіб), result (результат, особливість, обсяг), specific embodiment (спеціальне вкладення, конкретний варіант, сфера застосування), specification (опис, специфікація, перелік), to specify (точно визначати, специфікувати, описувати), sphere (сфера, обсяг, галузь), spirit (суть, обсяг, характер), in a suitable embodiment (в одному варіанті, у відповідній позиції), to surmount (долати, усувати), to teach (навчати, винаходити), tenor (суть, тенор, обсяг), terms (обсяг, терміни, умови), version (версія, варіант).

Task 3. Underline, which of the following words have the meaning «онуч» at the process of translating patent literature.

Description, specification, teaching, picture, discussion, subject, disclosure, advantage.

Task 4. Pick up 11 words from the suggested 15 ones which in patent literature have the meaning «недолік»:

Fault, drawback, loss, deficiency, trouble, luck, defect, nuisance, weakness, ignorance, mishap, failure, disadvantage, default, detriment.

Task 5. Put the verbs into two columns with the meanings «ліквідувати / усунути недолік» and «частково ліквідувати/ усунути недолік», paying attention that not all these verbs can be grouped.

To turn out, to alleviate, to overcome, to remedy, to lessen, to mitigate, to take advance, to reduce, to solve, to meet, to obviate, to improve, to cure, to set, to surmount, to get rid of, to relieve, to remove, to do away, to understand, to deal with, to aid, to teach.

Task 6. Put the nouns into two columns with the meanings «обсяг винаходу» и «суть винаходу»:

Scope, essence, spirit, extent, ambit, nature, realm, limits, substance, tend, precepts, intendment, sphere, range, gist, character, contemplation, breadth, genus, purview.

Task 7. Find in each sentence the words, which are used in patent literature with the same meaning that underlined word.

Aim: embodiment, concept, motive, weakness, fault, need, subject, concern, principle

Purpose: obtain, essence, objective, progress, character, tend realm, adaptation, change

Object: range, mode, node, principle, trust, need, objective, subject, aim, variant, spirit.

Task 8. Translate the following word combinations with the verb «to meet».

To meet a requirement, to meet a disadvantage, to meet a problem, to meet an object, to meet a standard, to meet a condition.

Task 9. Translate the following words into your mother tongue.

Concurrent application contribution to the art; one having ordinary skill in the art; prior art constructions; essential attribute; patent claim; the invention comprises an engine; the invention is in the class of; inventive concept; the invention consists in a method; conveniently in a convenient embodiment; particular

description; the invention embraces a method; basic features; characteristic features; disadvantageous features; feature of novelty; without affecting the scope of the invention; without altering the spirit of the invention; without departure from the invention; in keeping with the invention; metes and bounds; corollary object; outstanding object; fundamental object; concomitant object; in a preferred embodiment; the invention provides system; novel result; complete specification; the engine as specified; text of the claim; the object of the invention is to teach an engine.

Task 10. Choose from the abstract of the patent the examples of stylistically marked words. Translate the abstract into your mother tongue.

The flow diagrams depicted herein are just exemplary. There may be many variations to these diagrams or the steps (or operations) described therein without departing from the spirit of the invention. For instance, the steps may be performed in a differing order, or steps may be added, deleted or modified. All of these variations are considered a part of the claimed invention.

Although preferred embodiments have been depicted and described in detail herein, it will be apparent to those skilled in the relevant art that various modifications, additions, substitutions and the like can be made without departing from the spirit of the invention and these are therefore considered to be within the scope of the invention as defined in the following claims.

Task 11. In which sections of patent literature the following words could be found. Translate them into your mother tongue.

- What is claimed as new is as follows...
- More particularly, the invention is directed to...
- My invention provides novel means for...
- It has previously been proposed...
- According to the present invention the apparatus for... is characterized in that...
- The present invention contemplates means...
- The exact nature of the invention as well other objects and advantages thereof will be readily apparent from consideration of the following specification relating to the annexed drawing in which...
- In prior arrangement according to the prior patent referred to above...
- The invention may be carried out in other ways...
- It is therefore particularly pointed out distinctly claimed as the invention...
- Having thus described my invention, I claim...
- Still another object is the provision of...
- Still further objects and features of the invention reside in the provision of...
- These objects are accomplished by...

- These and other objects are attained in a device...
- It has also been discovered that...
- To the accomplishment of the foregoing and related ends, said invention, then consists in...
- The construction (the method) in hand...

Task 12. Read the following sentences. Define which sections of the patent literature they belong to.

a) The above-mentioned objects and other objects and advantages of the present invention are illustrated in the accompanying drawings.

b) According to the present invention there is provided a flash evaporator comprising a first and second flash stages connected in series and disposed in spaced relationship to provide a space there between...

c) While the invention has been described herein in terms of the preferred embodiments, numerous variations may be made in the apparatus illustrated in the drawings and herein described without departing from the invention as set forth in the appended claims.

d) It is also to be understood that the word "ceramic" is used here in a broad sense and intended to several kinds of sintered material containing ceramics, for instance the so called "cermets" made a mixture of ceramic and metal powder.

e) The steam boiler 10 shown in Figures 3 and 4 is very similar to the boiler 10 shown in Figures 1 and 2 except that the bed 52 is defined by a circular wall 54 and the evaporating tubes 55 and superheating tubes 56 are both helically coiled.

f) A boiler as claimed in Claim 3 in which a desuperheater is provided between the primary and secondary parts of the superheating section.

Task 13. Translate the following abstracts from patent literature. Define from which sections they were taken from.

a) The present invention relates to bathing accessories. More particularly to a soap bag that a person would simply insert the bar soap or soap slivers into the pocket of the soap saver and seal the Velcro fastener. A user would then begin quickly and comfortably lathering his/her body while showering or bathing. This modernized bathing tool would also allow a bather to use 100 percent of the bar, which would prevent wastage of expensive bar soaps. With this selfsudsing bathing tool, a person could safely and effectively wash his/her body without the need to constantly lather his/ her wash rag. Also, by using this all in-one bathing accessory, a person would not worry about dropping a bar of soap. This product could be ideal for use by consumers of all ages, including children. The soap saver can be produced from terrycloth or cotton and in a variety of sizes, shapes, textures, patterns, and colors.

b) In addition, it should be understood that the figures, which highlight the functionality of the present invention, are presented for example purposes only.

The architecture of the present invention is sufficiently flexible and configurable, such that it may be utilized in ways other than that shown in the accompanying figures.

c) Disclosed is a system for detecting an acute myocardial infarction (i.e., a heart attack) at the earliest possible time and promptly warning the patient that he should immediately seek medical care. The present invention includes an implantable electronic system that can sense a change in the patient's electro gram that is indicative of a heart attack. If a heart attack is sensed, the device would then cause an implantable and/or externally located alarm to be actuated to warn the patient of his condition and a medical practitioner at a remote diagnostic center would receive the patient's electro gram for analysis.

Task 14. Read the abstract from the patent and answer the questions.

The present invention relates to a blood testing machine, and it more particularly relates to a machine which performs a plurality of different tests on a blood sample.

Medical doctors of today make use of many different techniques for diagnosing and controlling disease. One such technique is blood analysis, which has become more important with the advent of the modern hospital laboratory and the extensive research into human biochemistry. However, even though sophisticated procedures and apparatus have been developed for analyzing blood, the problem remains of unwanted delays in obtaining the results of the blood tests. Thus, it would be highly desirable to have a machine for quickly and efficiently analyzing a patient's blood in the patient's room, thereby eliminating the time delay in transporting a blood sample to the hospital laboratory for analysis by the ordinarily overworked laboratory technicians. In addition, it would be highly desirable to have such a machine which could repeatedly draw blood from a patient without repeated venipuncture and their accompanying trauma to the patient. In this regard, a needle portion of the input device to the machine would remain intravenous for as long as the physician deems necessary. In this way, a nonlaboratory attendant, such as a nurse, could repeatedly operate such a machine to test a patient's blood periodically, whereby the nurse would be alerted to any change in the patient's condition and thus be forewarned of an oncoming crisis, such as a heart attack. Moreover, it would be desirable to have such a machine, which would be small in size and portable in nature, so that it could be used, if desired, in a vehicle, such as an ambulance.

Therefore, it is the principal object of the present invention to provide a new and improved blood testing machine.

Questions.

- a) Name the invention and its objects.
- b) Where is the invention used in
- c) Name the devices, which were used early.

- d) Name the drawbacks of the previous technical decisions.
- e) Explain the advantages of the invention.

Task 15. Read the text from the patent and answer the questions.

ABSTRACT

A safety gate for enclosing a passageway includes first and second gate members situated in an overlapping arrangement for slidable movement horizontally so that a width defined collectively by the gate members is selectable. The second gate member is essentially received by the first gate member. Each gate member includes an upstanding proximal end panel and spaced apart upper and lower panels extending away from the respective proximal end panel, the upper and lower panels having terminal ends, respectively, that together define a void therebetween. Each gate member includes an upper rail member extending horizontally along an upper edge of the first gate member that is perpendicular to respective upper panels. The first and the second rail members are situated one atop the other and share a singular vertical axis extending through them.

The invention claimed is:

1. A safety gate for enclosing a passageway, comprising: a first gate member having an upstanding proximal end panel and spaced apart upper and lower panels extending away from said proximal end panel, said upper and lower panels having terminal ends, respectively, that together define a void therebetween; a second gate member having an upstanding proximal end panel and spaced apart upper and lower panels extending away from said proximal end panel, said upper and lower panels having terminal ends, respectively, that together define a void therebetween; wherein said upper and lower panels of said first and second gate members have a planar configuration; wherein said upper panel of said first gate member defines a primary aperture proximate said terminal end thereof; wherein said upper panel of said second gate member defines a primary slot extending longitudinally therealong; wherein said first and second gate members are situated in an overlapping and slidable arrangement in which said first gate member selectively receives said second gate member such that said primary aperture is aligned with said primary slot; a fastener selectively extending through said primary aperture and said primary slot for coupling said second gate member to said first gate member at a selected width; said upper panel of said first gate member defines an auxiliary aperture proximate said terminal end thereof; said upper panel of said second gate member defines an auxiliary slot extending longitudinally therealong; said first and second gate members are situated in an overlapping and slidable arrangement such that said auxiliary aperture is aligned with said auxiliary slot; said safety gate further comprising an auxiliary fastener that selectively extends through said auxiliary aperture and said auxiliary slot for coupling said second gate member to said first gate member at a se-

lected width; wherein said auxiliary slot is displaced from and generally parallel to said primary slot.

Questions.

1. Find stylistically marked words and phrases.
2. What sphere of human activities does the patent belong to?
3. Find patent formula and omnibus. Justify your answer.
4. Find the section where there is a short description of the invention.

Which stylistically marked words point to it?

5. Name which devices were used before.
6. Define the drawbacks of the invention.
7. Identify the advantages of the invention.
8. Find the section which is about the short and complete descriptions of the figures.
9. Are there any extending sections in the patent?
10. Define the objects of the invention.

TESTS

КОНТРОЛЬНА РОБОТА З НАУКОВО-ТЕХНІЧНОГО ПЕРЕКЛАДУ (1 МОДУЛЬ)

Варіант 1

I. Translate the following text paying attention to the peculiarities of scientific texts.

Space Radio Stations

Man has made numerous inventions to increase the range of radio and TV transmissions. He has learnt to design high power transmission stations, sensitive aerials and amplifiers and to build relay lines. But the problem of increasing the range of radio and TV transmissions is still rather complicated. To ensure reliable radio communications over vast distances and vast areas of several million sq. km., to build radio bridges between continents of the Earth, very high aerials, very large quantities of relay units and thousands of amplifiers for cable lines are needed. To set up a radio relay line ten thousand kilometers long we shall have to install 120-169 ground based relay sets. A cable line of similar length will require more than a thousand amplifying units. It has been estimated that one ground station is able to cover an areas of 16,000 sq. km, and one relay aircraft 19,000 sq. km. One TV channel is supposed to cover a frequency band which would be sufficient for 600 radio broadcasting stations.

II. Find equivalent for the following English term combinations and state their structure.

- 1)
- 2) circular polarization
- 3) emergency position-indicating radio beacon station
- 4) frequency conversion
- 5) mobile satellite service
- 6) extremely high frequency
- 7) passive microwave sensor
- 8) coast radiotelephone station
- 9) composite system
- 10) frequency separation
- 11) station keeping

- a) кругова поляризація
- b) частотне перетворення
- c) рознесення частот
- d) пасивний мікрохвильовий датчик
- e) станція радіомаяка - показника місця лиха
- f) складна система
- g) надто висока частота
- h) утримання супутнику на орбіті
- i) берегова радіотелефонна станція
- j) рухлива супутникова служба

III. Translate the following term-combinations into Ukrainian.

Strong man, strong forces, strong paper, strong magnetic field; the treatment of a problem, the treatment of metal, the treatment of disease.

IV. Translate the following words paying attention to the meanings of the prefixes.

Reconstruct, superheat, subdivision, enable, overcharge, interact, undervalue, discontinuous, inaccurate, semiautomatic, non-standard, mislead, antitank (gun), counteraction, self-loaded (gun).

V. Translate the following words and word combinations.

To control traffic, to supply with gas, combination lock, public utilities, formal invitation.

КОНТРОЛЬНА РОБОТА З НАУКОВО-ТЕХНІЧНОГО ПЕРЕКЛАДУ (1 МОДУЛЬ) Варіант 2

I. Translate the following text paying attention to the peculiarities of scientific texts.

Meteorological satellites

For the first time in history, there exists an observing platform, which can detect atmospheric conditions long before local meteorologists relying on conventional techniques may be aware of them. This platform is the meteorological satellite, which, even in its present primitive stage, has already contributed significantly to meteorological developments through depiction of cloud systems and their interpretation for daily weather prediction, and by collecting basic physical data such as measurements of the radiative exchange between the Earth and Sun and space. Future observations will include the temperatures of cloud tops and the Earth's surface, the average temperatures of layers of the clear atmosphere, con-

centrations of water vapor, ozone and other properties not yet envisaged. Man is immersed in a working fluid of a global extension – the Earth's atmosphere – a fluid, so massive that there are nearly 2 million tons of it for each person on Earth.

II. Find equivalents for the following English term combinations and state their structure.

- 1)
- 2) protection ratio
- 3) right-hand polarized wave
- 4) space radio communication
- 5) automatic communication device
- 6) permissible interference
- 7) mean solar time
- 8) call sign
- 9) navigation warning signal
- 10) land mobile service
- 11) angle of elevation of the horizon

- a) захисне відношення
- b) сухопутна рухлива станція
- c) позивний сигнал
- d) космічний радіозв'язок
- e) кут місця горизонту
- f) автоматичний пристрій зв'язку
- g) правостороння поляризована хвиля
- h) середній сонячний час
- i) сигнал навігаційного попередження
- j) допустима перешкода

III. Translate the following term-combinations into Ukrainian.

Solid particles, solid argument, solid book; the development of science, the development of new methods, the development of new devices.

IV. Translate the following words paying attention to the meanings of the prefixes.

Reuse, supercritical, subway, enforce, overcool, interconnection, underestimate, discharge, illogical, semicircle, non-durable, misuse, antipersonnel, counteroffensive, self-cooled (device).

V. Translate the following words and word combinations.

Domestic policy, combination lock, national paper, maiden voyage, formal invitation.

**КОНТРОЛЬНА РОБОТА З НАУКОВО-ТЕХНІЧНОГО ПЕРЕКЛАДУ
(1 МОДУЛЬ)
Варіант 3**

I. Translate the following text paying attention to the peculiarities of scientific texts.

Meteorologists and forecasts

Meteorologists have traditionally been handicapped by having only fragmentary knowledge of what is going on in the atmosphere at any time. About a century ago, national meteorological services were established to provide forecasts to the public. As observing networks expanded geographically and in altitude, meteorologists continued their audacious attempts to predict the future state of a three-dimensional system whose initial state was inadequately known. Because of insistent public demand, the forecaster makes his daily predictions and up to a certain point is generally successful. His successes, however, are generally limited to forecast for not more than a few days in the future and for areas in the midst of or close to a fairly dense observing network so that unknown disturbances from distant and sparsely observed regions have not had time to exert significant influence. Even so, disturbances such as severe thunderstorms can develop suddenly or slip through the mesh of observing stations.

II. Find equivalents for the following English term combinations and state their structure.

- 1)
 - 2) ship earth station
 - 3) artificial earth satellite
 - 4) broadcasting service
 - 5) community reception
 - 6) counterclockwise
 - 7) flight identification number
 - 8) international monitoring
 - 9) maritime radio navigation service
 - 10) satellite network
 - 11) radio frequency channel
-
- a) супутникова мережа
 - b) міжнародний контроль
 - c) судова земна станція
 - d) колективний прийом
 - e) розпізнавальний номер рейсу

- f) радіочастотний канал
- g) радіо віщальна служба
- h) морська радіонавігаційна служба
- i) проти часової стрілки
- j) штучний супутник Землі

III. Translate the following term-combinations into Ukrainian.

Fine weather, fine wire, fine edge, fine sand; the performance of a plane, the performance of a task; the handling of an instrument, the handling of dangerous products.

IV. Translate the following words paying attention to the meanings of the prefixes.

Reproduction, superbomb, subnormal, enrich, overheat, interchange, underground, disclose, immovable, semiconductor, non-essential, mislead, anti-aircraft, counterattack, self-directing missile.

V. Translate the following words and word combinations.

Actual state of affairs, strong bonds, public utilities, specialist education, national paper.

КОНТРОЛЬНА РОБОТА З НАУКОВО-ТЕХНІЧНОГО ПЕРЕКЛАДУ (2 МОДУЛЬ) Варіант 1

1) Translate the following instruction paying attention to the peculiarities of scientific texts.

Deicing/Anti-icing Fluid Application

A. General

(1) These procedures show the recommended methods for the deicing and anti-icing of the aircraft on the ground for a safe takeoff and flight.

(2) When the aircraft surfaces contain frozen moisture, they must be deiced before the aircraft is dispatched. When there is freezing precipitation and the precipitation adheres to the surfaces at the time of dispatch, the aircraft must be deiced/anti-iced.

(3) Deicing/anti-icing will prevent a large quantity of snow or ice accretion on the aircraft and surfaces. Ice accretion on the wing and flight control surfaces affects airflow over the affected surface, and can create lift or flight control problems for aircraft and affect flight safety. Ice accretion on the leading edge of engine inlets causes flow problems and can lead to ice ingestion.

(4) If deicing and anti-icing are necessary, the procedure can be done in one or two steps. For the selection of the more correct method, you must know see the conditions that you have: weather conditions, available equipment, available fluids, and the holdover time.

2) Translate the following sentences paying attention to the international words and “pseudo friends” of the translator.

- 1) Together with **companion** device, it can also be used.
- 2) Computers have found their **niche** primarily as small computers in offices.
- 3) For example, suppose that improvements in receivers allow for the relaxation of some of the **taboos**.
- 4) Some **styles** are available with the ballast resistors incorporated for 12-, 24- or 48-V direct current.
- 5) To take full advantage of the microprocessor’s **talents**, designers usually need long shopping list of additional chips.
- 6) **Industry** looks at the expense of a large-scale system for testing microprocessors and says it’s too costly.

3) Translate the following words paying attention to the meaning of forming prefixes and suffixes.

Non-linear, omnipresent, overbending, **unseaworthy**, **gellike**, **unhomogeneous**, to subcool, postfrontal, odor-free gas, underadjust, selfenergy, inaccurate, motionless, solidify, counteroffensive.

4) Give the words with the similar meaning and translate them into Ukrainian.

Power, for example, to continue, artificial, to supply, job, to determine, precise,

5) Give the words with the opposite meaning and translate them into Ukrainian.

Obsolete, regular, outer, strengthen, include, possible, powerless, efficient.

**КОНТРОЛЬНА РОБОТА З НАУКОВО-ТЕХНІЧНОГО ПЕРЕКЛАДУ
(2 МОДУЛЬ)
Варіант 2**

1) Translate the following instruction paying attention to the peculiarities of scientific texts.

Deicing/Anti-icing Fluid Application

I. Guidelines

(1) General

(a) There are many conditions for a decision on the method for removal of ice, snow, slush, and frost. Thus, the best method must agree with the operator’s experi-

ence and the local conditions. Table 201 gives a summary of the guidelines to help you use a good method for removal of ice, snow, slush and frost.

(b) To find the quantity of deicing/anti-icing fluid to use in the deicing mixture at a given temperature, refer to the airline procedure or the manufacturer's specifications for the fluid that you use.

(c) Use hot water or heated deicing fluid for best results in ice, frost, or snow removal. A fine-to-medium spray is recommended for best dispersion of the fluid across a large area of ice, frost, or snow for maximum melting.

(d) Refer to the manufacturer's specification for the deicing fluid dilution versus the temperature measured. The lower of the ambient temperature or aircraft surface temperature must be used as the reference temperature.

2) Translate the following sentences paying attention to the international words and "pseudo friends" of the translator.

1) The **academic** community understands very well the importance of computer use in basic **academic** sciences.

2) The location of the pits dislocation can then be compared with the **positions** of interference fringes.

3) Nickel is an **adequate** conductor, but experiences an oxide buildup while on the shelf.

4) The geometric simplicity of the configuration makes it an attractive structural **candidate**.

5) Such devices would greatly reduce the cost of present day ones, yet their performance would barely be **compromised**.

6) For the third year in a row, the people at the American Federation of Information Processing Societies are **orchestrating** their immensely popular Personal Computing Festival.

3) Translate the following words paying attention to the meaning of forming prefixes and suffixes.

Non-availability, omniscience, overfiring, postmedieval, selfstarting, substation, to uncoil, underdone, nuclear-free zone, ape-like, flightworthy, roughness, purify, magnetize, disclose.

4) Give the words with the similar meaning and translate them into Ukrainian.

Predominance, various, satellite, application, powerful, to detect, to spread, to investigate

5) Give the words with the opposite meaning and translate them into Ukrainian.

Unlimited, accurate, conductor, inside, low, vast, enhance, reduce

**КОНТРОЛЬНА РОБОТА З НАУКОВО-ТЕХНІЧНОГО ПЕРЕКЛАДУ
(2 МОДУЛЬ)
Варіант 3**

1) Translate the following instruction paying attention to the peculiarities of scientific texts.

Deicing/Anti-icing Fluid Application

(2) If there is snow or ice accumulation on the airplane surface, do the procedure that follows for the mechanical removal:

(a) You can mechanically remove soft snow if you blow cold air across the airplane surface, or use brooms, ropes, soft hand or rubber scrapers, or a squeegee as follows:

1 With a maintenance lift truck or deicer equipment to get access, pull the snow off the surfaces. Do not try to walk or stand on the aircraft.

2 Control the vehicle along the leading and trailing edges and remove as much snow as possible.

3 A squeegee with a 0.609-meter (24 inch) non-marking hard rubber edge works best. But stiff-bristle brooms can be used. Metal surfaces on the broom or squeegee (attaching hardware included) must be correctly padded to prevent damage to the aircraft surfaces.

4 A 1/2-inch rope with knots approximately 1.524 meters (5 feet) apart can be used to remove snow from the fuselage. Put the rope on the fuselage and, with a person on each side, move the rope rearward and forward in a sawing movement while you slowly move along the length of the aircraft.

2) Translate the following sentences paying attention to the international words and “pseudo friends” of the translator.

1) Another **bonus** with most commercial plasma reactors is their fully automated operation.

2) This representation was **originally** developed as a tool for proving theorems in projective geometry.

3) This article discusses some of these programming issues and how they were **addressed** in the system.

4) After three years of intensive research, this company has **triumphed** with a \$ 49 a touch-activated control module.

5) They are developing an **ambitious** network approach for remotely located equipment».

6) Today, optical-fiber communication systems have entered the phase of **actual** use at several power companies in Japan.

3) Translate the following words paying attention to the meaning of forming prefixes and suffixes.

Non-equilibrium, omnipotence, overpress, postsurgical, self-refrigeration, sublease, uncontrollability, underframe, phosphate-free detergent, hormonlike, creditworthy, electrify, to crystallize, blackness, anti-aircraft.

4) Give the words with the similar meaning and translate them into Ukrainian.

Permanent, a beam, to guide, a shape, actual, to utilize, significance, to apply

5) Give the words with the opposite meaning and translate them into Ukrainian.

Exact, input, powerful, include, huge, probable, sufficient, tiny

ПІДСУМКОВА КОНТРОЛЬНА РОБОТА З НАУКОВО-ТЕХНІЧНОГО ПЕРЕКЛАДУ

Варіант 1

1) Translate the following terms.

1. actual reading of the scale
2. periodically operated switch
3. artificial horizon
4. low water
5. radio-controlled bomb
6. surface-launched missile
7. battery- fed receiver
8. strong magnetic field
9. engine driven pump
10. liquid-cooled system

2) Give Ukrainian equivalents to the international words and “pseudo friends” of the translator.

Pressure, vacuum, differential pressures, balance, diaphragm, instrument, specially, operate, construction, capillary.

3) Translate the words and define the structural type of the term.

Superheat, mechanism, voltage regulating system, neutron, pump, gym-goer, receiver, artificial satellite, goalkeeper, experiment.

4) Translate the sentences into Ukrainian.

1) It would be fruitless and purposeless to list all the things that are communicated in our world.

2) Radio is cheap because the transmitting equipment is relatively simple, and because, unlike telephony, switching is not required.

3) There is much talk of providing a two-way capability in cable TV systems.

4) The fibers being so small, thousands could be put in one tiny cable, and the material cost is minute compared with that for any sort of a metallic cable.

5) Satellites using very short microwaves could make high-volume communication between cities cheaper.

6) The first revolutionary success of cable TV was to bring distant programs into areas starved on a diet of one or two stations.

7) To make use of the wide bandwidth capability of an optical communication system using fibers, coherent light sources must be used.

8) A semiconductor laser operating at room temperature seems to be particularly suitable.

9) Exciting as it may sound, there is still a long way for integrated optics to go from being laboratory curiosities to becoming actual practical components.

10) Considerable research has been performed on the criterion for optimizing the filter tap coefficients.

5) Do summary translation of the following text.

Heating, cooling and ventilation

In the United States, heating, ventilation and air conditioning (HVAC) systems account for 30% (4.65 EJ) of the energy used in commercial buildings and nearly 50% (10.1 EJ) of the energy used in residential buildings. Solar heating, cooling and ventilation technologies can be used to offset a portion of this energy.

Thermal mass is any material that can be used to store heat—heat from the Sun in the case of solar energy. Common thermal mass materials include stone, cement and water. Historically they have been used in arid climates or warm temperate regions to keep buildings cool by absorbing solar energy during the day and radiating stored heat to the cooler atmosphere at night. However, they can be used in cold temperate areas to maintain warmth as well. The size and placement of thermal mass depend on several factors such as climate, daylighting and shading conditions. When properly incorporated, thermal mass maintains space temperatures in a comfortable range and reduces the need for auxiliary heating and cooling equipment.

A solar chimney (or thermal chimney, in this context) is a passive solar ventilation system composed of a vertical shaft connecting the interior and exterior of a building. As the chimney warms, the air inside is heated causing an updraft that pulls air through the building. Performance can be improved by using glazing and thermal mass materials in a way that mimics greenhouses.

Deciduous trees and plants have been promoted as a means of controlling solar heating and cooling. When planted on the southern side of a building, their leaves provide shade during the summer, while the bare limbs allow light to pass during the winter. Since bare, leafless trees shade 1/3 to 1/2 of incident solar radiation, there is a balance between the benefits of summer shading and the corresponding loss of winter heating. In climates with significant heating loads, deciduous trees should not be planted on the southern side of a building because they will interfere with winter solar availability. They can, however, be used on the east and west sides to provide a degree of summer shading without appreciably affecting winter solar gain.

ПІДСУМКОВА КОНТРОЛЬНА РОБОТА З НАУКОВО-ТЕХНІЧНОГО ПЕРЕКЛАДУ

Варіант 2

1) Translate the following terms

1. electronically controlled filter
2. horizontally polarized antenna
3. remote control
4. acceleration factor
5. surface cooled reactor
6. ground based computer
7. combined findings
8. picture tube
9. direct current
10. continuously measuring control system

2) Give Ukrainian equivalents to the international words and “pseudo friends” of the translator.

Master, conductor, periodic element, industry, precision, distance, indicator, figure, application, combination, inorganic.

3) Translate the words and define the structural type of the term.

Semiconductor, direct current, disconnect, nucleus, hydrogen bomb, artificial satellite, goalkeeper, space exploration, element, gym-goer.

4) Translate the sentences into Ukrainian.

1) As a general rule, detection techniques based on the minimization of the probability of an error are nonlinear.

2) To complete the computation on performance, it is assumed that the total noise is Gaussian.

3) The results described are largely existence theorems and therefore, do not prescribe a specific method of synthesizing data compression system.

4) The objective of a communication system designer is to choose an encoder and a decoder to minimize the effects of the distortion when transmitting information from the source to the user.

5) To begin with, there are some overall statistics which give a general idea of the importance of telephony today.

6) If the signal shape is not preserved during amplification, the signal is said to have been distorted.

7) To do this all that needs to be done is to use the small distorted pulse to act as a trigger to a pulse generator designed to produce one well-sized pulse whenever the trigger works.

8) Engineers use the word noise in a broad sense to mean any signal interfering with a wanted signal.

9) The use of relay satellites is not the only way of improving free space communication systems.

10) A semiconductor laser operating at room temperature seems to be particularly suitable.

5) Do summary translation of the following text.

Solar lighting

The history of lighting is dominated by the use of natural light. The Romans recognized a right to light as early as the 6th century and English law echoed these judgments with the Prescription Act of 1832. In the 20th century artificial lighting became the main source of interior illumination but day lighting techniques and hybrid solar lighting solutions are ways to reduce energy consumption.

Day lighting systems collect and distribute sunlight to provide interior illumination. This passive technology directly offsets energy use by replacing artificial lighting, and indirectly offsets non-solar energy use by reducing the need for air-conditioning. Although difficult to quantify, the use of natural lighting also offers physiological and psychological benefits compared to artificial lighting. Day lighting design implies careful selection of window types, sizes and orientation; exterior shading devices may be considered as well. Individual features include saw tooth roofs, clerestory windows, light shelves, skylights and light tubes. They may be incorporated into existing structures, but are most effective when integrated into a solar design package that accounts for factors such as glare, heat flux and time-of-use. When day lighting features are properly implemented they can reduce lighting-related energy requirements by 25%.

Hybrid solar lighting is an active solar method of providing interior illumination. HSL systems collect sunlight using focusing mirrors that track the Sun and use optical fibers to transmit it inside the building to supplement conventional lighting. In single-story applications, these systems are able to transmit 50% of the direct sunlight received.

Solar lights that charge during the day and light up at dusk are a common sight along walkways.

Although daylight saving time is promoted as a way to use sunlight to save energy, recent research has been limited and reports contradictory results: several studies report savings, but just as many suggest no effect or even a net loss, particularly when gasoline consumption is taken into account. Electricity use is greatly affected by geography, climate and economics, making it hard to generalize from single studies.

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APPENDICES

How to Write a Scientific Report

Scientific report is a common academic writing during the study in the university, and it is important to pay particular attention to its structure, style, and presentation. Writing a scientific report may seem intimidating. Various parts of a scientific report are examined and guidelines are given.

The steps toward writing a scientific report can be summarized as follows:

Choose one of the topics (**Technology, Global Warming, Human Resources, Overpopulation**) to research extensively and write about. Your paper should be 6-15 pages long, and very accurately written.

A well-written report is scientifically accurate, informative, concise, and precisely credits sources with quotations. There are a few general suggestions:

1. Spend a minimum of 8 hours gathering sources from the library and net to learn more about your topic.

2. Excellent papers follow a logical order. Write an outline to help organize your ideas.

3. Use as few words as possible to communicate your information.

4. Choose a title that accurately expresses the subject matter of your paper. Give sections of the paper and subtitles to alert the reader of topic changes. These subtitles can be often taken directly from your outline.

5. Each paragraph should be dealt with a particular point. One effective approach is to begin each paragraph with a strong declarative statement, or question, and finish the paragraph with a conclusion or closing statement.

6. Do not plagiarize! Use your own words to cite other people's facts. Cite the sources of your information throughout the text and prepare a literature cited section using the described format.

7. Have others (who are good writers) carefully read your paper and make suggestions on how you can improve it. When reviewing a paper, carefully examine each sentence and paragraph to be sure that they are clear and concise. Also, consider whether the sentences and paragraphs of the whole paper are tied together to provide effectively the readers with an "interesting story" systematically.

8. Do not underestimate the time it takes to write a good report. Please, do not wait until the last minute!

Report format:

Pages 1-3

Provide background information, convince the readers in the significance of your topic, describe the content of your report (i.e. provide the readers with a general outline).

Pages 3-8

Expand your thesis

Pages 9-15-

Draw conclusions and provide a closure for the questions that you posed in the introduction.

Cite as minimum as 10 sources throughout the report using the described format. The scientific report will usually have the following sections. Those which are optional are given in brackets ().

Section	Description
Title page and ID details	<ul style="list-style-type: none">• provides your name and student ID number• if the title is not given, ensure that your title is informative
(Abstract)	gives a very brief indication of: <ul style="list-style-type: none">• the aim of the report• what you did• what you found• what you concluded
Introduction	provides the context of the report <ul style="list-style-type: none">• states why the topic is important or useful• expresses the topic in question, gives information about the scholars who have worked or work on the topic• explains any abbreviations or special terms
Method	sets out what you did in sequence <ul style="list-style-type: none">• explains how you did it• indicates what materials, techniques or equipment you used• provides the sufficient information for the reader to replicate the study
Results	presents what you found <ul style="list-style-type: none">• includes clearly titled and labelled graphs, tables and figures appropriate• shows that you do not simply cut and paste some information into your report• gives detailed calculations may be provided in the appendix
Discussion	<ul style="list-style-type: none">• explains what the results mean• indicates, whether the results were consistent or inconsistent with your expectations• explains what possible sources of error there are• indicates, how the situation on the topic be improved in the future
Conclusion	<ul style="list-style-type: none">• briefly restates the main results• briefly explains the significance of the findings
References	<ul style="list-style-type: none">• provides a list of sources of information which you have used, following the referencing conventions required for the unit
(Appendices)	<ul style="list-style-type: none">• provides a supporting information such as schemes, graphs or calculations

SUGGESTED TOPICS FOR SELF-TESTING AND CLASS DISCUSSION

1. Terminology as a branch of linguistics.
2. The historical outlook on terminology.
3. Terminology and other branches of linguistics, science and technology.
4. Different terminological schools.
5. Definition of a term.
6. Systematic nature of a term.
7. Classification of terms.
8. Types of term-combinations.
9. Shortened terms.
10. Types of abbreviations and curtailed terms.
11. Terms and everyday words.
12. Terms and the items of nomenclature.
13. Terminological key.
14. The main ways of translating terms.
15. Translating proper names in terminology.
16. Translation of international terms.
17. Main principles of translating term combinations consisting of multiple elements.
 18. The stages in the process of term translation.
 19. Non-equivalent terms and difficulties of their translation.
 20. International terms and the ways of their translation.
 21. Translator's false friends or misleading words.
 22. The main peculiarities of scientific and technical style.
 23. Linguistic features of scientific and technical translation.
 24. General characteristic of Languages for Special Purposes (LSP).
 25. Classification of English for specific purposes (ESP).
 26. Terminology systems and their classification.
 27. The linguistic processes that influence the existence of terminology systems.
28. Linguistic peculiarities of International Scientific Vocabulary (ISV).
29. English for Science and Technology (EST).
30. Translation of new terminological vocabulary.
31. Latin and Greek roots and their semantics.
32. Motivation of a term.
33. Semantic way of term formation.
34. Terminological borrowings.
35. Morphological way of term formation.
36. Syntactic way of term formation.

37. Conversion or morphological syntactic way of term formation.
38. Modern tendencies in term formation.
39. Semantic processes in terminology (terminologization, determinologization and transterminologization).
40. Polysemantic terms and methods of their translation.
41. Synonymy of terms.
42. Antonymy of terms.
43. Dictionaries and the language development.
44. Classification of terminological dictionaries.
45. The role of the Internet in translating scientific and technical literature.
46. The ways of how to work with terminological dictionaries.
47. Different types of translating scientific and technical texts.
48. The basic features of translating patent and patent literature.

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