Министерство образования и науки Российской Федерации
Федеральное государственное автономное образовательное учреждение
высшего образования
«Национальный исследовательский технологический университет «МИСиС»
Новотроицкий филиал

Кафедра гуманитарных и социально-экономических наук

Н.В. Боброва

ОСНОВЫ НАУЧНО-ТЕХНИЧЕСКОГО ПЕРЕВОДА

**методические указания
по организации самостоятельной работы
для студентов направления 13.03.02 «Электроэнергетика и электротехника»
заочной формы обучения**

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Рецензенты:

Нагорнова Е.А. - кандидат филологических наук, доцент кафедры теории и практики иностранных языков Федерального государственного автономного образовательного учреждения высшего образования «Российский университет дружбы народов».

Кушина И.Н. - старший преподаватель кафедры ГиСЭН ФГАОУ ВО «Национальный исследовательский технологический университет «МИСиС», Новотроицкий филиал.

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Методические указания предназначены для организации самостоятельной работы студентов направления 13.03.02 «Электроэнергетика и электротехника» 3 курса заочной формы обучения по дисциплине «Основы научно-технического перевода». Пособие способствует развитию практических навыков перевода профессионально ориентированных текстов.

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Введение

Данное издание предназначено для студентов 3 курса направления «Электроэнергетика и электротехника» заочной формы обучения. Цель изучения дисциплины «Основы научно-технического перевода» студентами – овладение основными видами перевода аутентичного текста на английском языке. В результате обучения студенты должны овладеть умениями видеть структуру английского предложения, выделять его части и связи между ними, выполнять литературный перевод; подбирать подходящий для данного контекста вариант перевода слов; составлять аннотационный перевод текста.

В ходе изучения дисциплины студенты познакомятся с разделом «Грамматические основы перевода. Синтаксис» - 6 часов аудиторных занятий и 62 часа самостоятельной работы.

Весь необходимый теоретический материал по разделам представлен в первой части данного пособия. Инструкция по выполнению полного письменного и аннотационного перевода изложена в приложении А. После прочтения содержания раздела и инструкции следует выполнить рекомендации по подготовке контрольной работы и приступить к их выполнению. Контрольная работа представлена в 16 вариантах. Выбор варианта осуществляется преподавателем согласно алфавитному списку студентов группы.

Форма промежуточной аттестации по дисциплине в пятом семестре – зачет. Допуском к зачету является зачтенная контрольная работа. После выполнения контрольной работы оформите ее следующим образом: титульная страница (Приложение Б), MS Word, Times New Roman, 14 пт., интервал – 1,5 (в таблицах – одинарный интервал), поля: слева 2 см, справа – 1 см, сверху и снизу – 2 см. Вложите работу в скоросшиватель с прозрачной обложкой.

Сдать работу следует за 2 недели до сессии. Если работа не зачтена, выполните работу над ошибками и предоставьте ее на проверку вместе со старым вариантом, не меняя титульный лист.

Пособие способствует формированию компетенции ОК-5 (способности к коммуникации в устной и письменной формах на русском и иностранных языках для решения задач межличностного и межкультурного взаимодействия).

1 Методические указания по выполнению контрольной работы и варианты контрольной работы за 5 семестр

1.1 Методические указания по выполнению контрольной работы за 5 семестр

1. Внимательно прочитайте представленный ниже справочный материал «Грамматические основы перевода. Синтаксис» и пошаговую инструкцию выполнения полного письменного и аннотационного перевода, представленную в приложении А.

Грамматические основы перевода. Синтаксис

Рассмотрим базовую классификацию предложений по структуре и типам связи (см. рис. 1).

Рисунок 1 – Структура предложений

Простое предложение имеет в своем составе одну основу (подлежащее + сказуемое).

Пример: During recent years methods of measurement have changed considerably – За последние годы методы измерений значительно изменились (methods – подлежащее, have changed – сказуемое).

Сложное предложение состоит из двух или более простых предложений, то есть может содержать две и более основ.

В сложносочиненном союзном предложении простые предложения связываются между собой сочинительными союзами **but, and**.

*Пример:*The wave always travels in a direction at right angles to the wave front **but** its motion depends upon the relative direction of the lines of electromagnetic and electrostatic flux. - Волна всегда распространяется в направлении под прямым углом к фронту волны, но ее движение зависит от относительного направления линий электромагнитного и электростатического потоков.

Сложноподчиненные предложения состоят из главного предложения и одного или более придаточных предложений. Придаточные предложения можно поделить на 5 групп:

придаточное подлежащее
придаточное сказуемое
придаточное дополнение
придаточное определительное
придаточное обстоятельственное.

Основные приемы перевода предложений

1. Рассмотрим основные приемы перевода предложений. Первый из них касается изменения типа предложений (см. рис. 2).

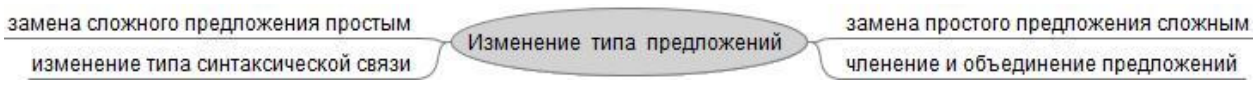

Рисунок 2 - Изменение типа предложения

а) Замена простого предложения сложным.

Пример: The new plants using radiation are more easily controlled and produce a purer material than the conventional plants. - Новыми предприятиями, которые используют этот метод, лучше управлять и, кроме того, они вырабатывают более чистые материалы (по сравнению с обычными).

Пример: We have in mind the survivors of the Hiroshima and Nagasaki atomic bomb explosions. - Мы имеем в виду тех, кто уцелел после атомной бомбардировки Хиросимы и Нагасаки.

Особенно часто этот прием используется при переводе сложных слов.

Пример: Prudence dictates that each reactor should be provided with a massive, *steellined* concrete containment structure. - В целях предосторожности каждый реактор должен размещаться в толстостенном железобетонном здании, стены которого изнутри покрыты стальными листами.

б) Замена сложного предложения простым.

Применение этого приема основано на замене различных видов придаточных предложений причастными оборотами и на использовании существительных, отглагольных существительных в сочетании с предлогами.

Пример: When application programs are being tested, it is sometimes necessary to simulate missing services.

Можно перевести, сохранив исходную структуру: *Когда проводятся испытания прикладных программ* ...Однако, можно придаточное предложение свернуть в словосочетание. *В ходе испытаний прикладных программ, иногда возникает необходимость в имитации отсутствующих функций обслуживания.*

Пример: Some terminals permit entries to be made before an expected response is received. - а) Некоторые терминалы позволяют передавать очередное сообщение до того, как поступит ожидаемое сообщение. б) … не дожидаясь ответа на предыдущее.

Свертывание сложного предложения в простое наблюдается при переводе конструкций there is, когда за существительным оборота следует определительное переложение:

Пример: There are a number of stages through which a message passes between keying and processing. - Продвижение сообщения от момента набора его на клавиатуре до начала обработки включает несколько стадий.

Пример: There may well be a variety of responses produced by an exchange which may be classified as normal, associated and error. - Множество ответов, вырабатываемых в процессе обмена, можно подразделить на обычные ответы, ассоциативные и уведомления об ошибках.

Этот прием можно рекомендовать и при переводе некоторых конструкций с местоимением в качестве формального подлежащего:

Пример: It is exactly this composition that will do for our purpose. - Этот химический состав точно подойдет для нашей цели.

Пример: It was not only this value that counted much. - Не только эта величина имела большое значение.

в) Членение и объединение предложений при переводе.

Одно исходное предложение (простое или сложное) преобразуется в 2 или более самостоятельных предложений. Основными причинами применения этого приема является *перегруженность предложения информацией или чрезмерная сложность структуры* переводимого предложения.

Пример: Another, related tool for the system manager is a monitor or trace program which, though normally used in testing, can be invoked for a suspect program on line. - Еще одним рабочим инструментом в руках системного администратора является контрольная программа, предназначенная для обнаружения неисправностей в системе. Хотя она обычно используется при испытаниях, ею можно воспользоваться для проверки в онлайновом режиме "подозрительной" программы.

Объединение предложений – это прием, состоящий в преобразовании двух или более самостоятельных предложений в одно (простое или сложное) предложение переводящего языка.

Пример: The physicist adopted the word "current" when he described the changed properties of a wire connected to a voltaic battery as an electric current. In 1827 G.S. Ohm discovered the constancy of the relation between electromotive force and current and gave the ratio the name of "resistance". - Физики обозначили словом "ток" процесс, протекающий в проводнике, соединенным с источником электрической энергии, а словом "сопротивление" ту постоянную величину, которая, согласно закону Ома, открытому в 1827 г., определяет силу тока при данном напряжении.

г) Изменение типа синтаксической связи.

Изменение типа синтаксических отношений – переводческий прием, который заключается в том, что в рамках единого сложного предложения (сложносочиненного или сложноподчиненного) меняется характер синтаксической связи между составными частями целого.

Замена типа придаточных предложений.

Придаточное предложение заменяется другим или же сложносочиненное предложение преобразуется в сложноподчиненное или наоборот.

Пример: If computers are ever to gain wide acceptance for process control they must be understood by the people who have to operate them. - Для того чтобы компьютеры получили широкое распространение в управлении технологическими процессами, люди, работающие с компьютерами, должны все о них знать. (Замена условного придаточного предложения обстоятельственным цели).

Пример: The problem is really of improving efficiency, so that nuclear fuel can compete with free sunlight. - Проблема заключается в повышении эффективности преобразования энергии до такого уровня, при котором ядерное топливо могло бы соперничать с бесплатным солнечным светом.

Замена подчинительной связи на сочинительную.

Этот прием чаще всего используется при переводе сложноподчиненных предложений с обстоятельственным придаточным уступки:

Пример: Although a.c. motors are more common, d.c. motors are unexcelled for applications requiring simple, inexpensive speed control or sustained high torque under low-voltage conditions. - Двигатели переменного тока имеют более широкое применение, однако двигатели постоянного тока незаменимы там, где требуется простое и недорогое регулирование тока или поддержание высокого крутящего момента в условиях низких напряжений.

Замена подчинения сочинением осуществляется и при переводе сложноподчиненного предложения, содержащего обстоятельственное придаточное времени, особенно, если последнее вводится такими союзами, как after или before.

Пример: It will not be long before more steel-making companies will be converting their existing facilities to the hybrid processes and will be taking advantages of higher efficiency in terms of

yield and production rates. - Пройдет немного времени, и многие сталелитейные компании станут приспосабливать уже существующие установки к новым гибридным процессам, используя их преимущества в плане повышения производительности и выпуска продукции.

Придаточное предложение – подлежащее и его перевод.

Придаточное предложение – подлежащее вводится союзами that, whether и союзными словами who, what, which, how, where, why, when.

Придаточное предложение-подлежащее с союзом that переводится с помощью союза "то, что" без изменения порядка слов или с помощью союзов «что», «чтобы» (в последнем случае перевод начинают с главного предложения).

Пример: It is not too far in the future when such designs may become practical. That they are possible is not hard to see. - Недалеко будущее, когда такие проекты станут осуществимы. В том, что они возможны, нетрудно убедиться. (Нетрудно убедиться, что они возможны).

Пример: That the method is too complicated is obvious. - То, что этот метод слишком сложный, очевидно. (Очевидно то, что этот метод слишком сложный).

Пример: What has been said above indicates one of the limitations of this method. То, что было сказано выше, указывает на один из недостатков этого метода. (Сказанное выше указывает …)

Пример: What remains to be briefly mentioned is the role of these units. - Остается кратко упомянуть о роли этих агрегатов.

Иногда придаточное предложение подлежащее, вводимое относительным местоимением what, преобразуется в главное, а главное – в придаточное.

Пример: What is revolutionary about this instrument is that, for the first time, the pilot is provided with an indication which permits him to fly and navigate an aircraft manually with a degree of accuracy and ease that approaches the performance of automatic control. - Этот прибор является новаторским в том, что впервые пилот обеспечен таким указателем, который позволяет ему легко и точно управлять самолетом в ручном режиме, близком к автоматическому управлению.

2. Ознакомьтесь с заданиями контрольной работы и сопоставьте каждое с темами раздела.

3. Выполните задания по порядку, начиная с полного письменного перевода текста.

1.2 Варианты контрольной работы

Вариант 1

I. Выполните полный письменный перевод текста.

II. Выполните аннотационный перевод текста.

III. Выполните следующие задания:

1. Выпишите из текста предложения, при переводе которых вы использовали приемы:
- замена простого предложения сложным,

- замена сложного предложения простым,
- членение предложений
- объединение предложений,
- изменение типа синтаксической связяи.

Укажите рядом с выписанным предложением прием перевода и перевод.

2. Найдите в тексте и выпишите 2 простых предложения. Переведите.

3. Найдите в тексте и выпишите 2 ложных предложения. Переведите.

Текст для перевода

Energy conservation has always proceeded along two main avenues. One involves new technology—by continually improving the efficiency of appliances or the mileage of automobiles, the overall energy intensity (energy use per person) of society decreases.

Both the government and private industry have spent large sums of research-and-development dollars on countless products that has lead to great improvements in the energy efficiency of products. The second major avenue is improvement of actual practice, whether at home, in a commercial building or on the factory floor. It is based on the assumption that through ignorance, poor operation, insufficient maintenance, priority conflicts or in some cases simply sloth, that energy is used less efficiently than the current state of technology allows.

One way of closing the gap between the current state of operations and what would be considered “best practice” is to formally examine energy use through energy audit. Using the term “audit” literally, one “counts” the energy consumed (and paid for) and matches that to necessary energy uses and practices that result in energy waste. Remedial actions arethen planned to minimize the energy waste and save money. In reality, a one-for-one accounting of energy in versus energy out is rarely done. The term audit is often avoided because of negative connotations.

Why are these negative connotations? Other terms used include “energy survey,” “energy assessment,” or “energy use analysis.” All do essentially the same thing, namely examine how energy is consumed and try to identify areas where energy and money can be saved.

Energy audits are classified according to the client served, falling generally under the categories of residential, industrial, and commercial. Commercial audits include public and semipublic buildings like schools and hospitals and are sometimes referred to as institutional audits.

Audits are done by a variety of groups and agencies, again depending on the type of audit. Most utilities have residential auditing programs. State and community agencies run a number of auditing programs for institutions and low-income housing. The people actually doing the work are either employees of the funding organizations (from nonprofits and universities), or work at “for profit” energy service companies (ESCOs), which either do contract work for the funding sources or work directly for the client.

The scope of the audit also varies considerably. It can consist of anything from a brief walkthrough by an auditor who notes possible areas for improvement to a several month forty-person study at a major manufacturing operation.

Nearly any type of audit is of some benefit. The simpler walkthrough type audits can be automated to point where a computer-printed report can be handed to the homeowner at the end of the audit. (Consequently, the costs are quite modest). In larger auditing efforts significant engineering

analysis often is required to generate customized recommendations that quantify both the costs and benefits of a particular project.

A common phrase, which has been attributed to many different people, is that "you can't control what you can't measure." This is particularly true of energy use and energy waste. One way energy audits provide information to the client or end-user is by making measurements that show energy waste and allow its magnitude to be calculated. Therefore the toolbox the auditor carries is almost as important as the auditor him.

Вариант 2

I. Выполните полный письменный перевод текста.

II. Выполните аннотационный перевод текста.

III. Выполните следующие задания:

1. Выпишите из текста предложения, при переводе которых вы использовали приемы:
- замена простого предложения сложным,
- замена сложного предложения простым,
- членение предложений
- объединение предложений,
- изменение типа синтаксической связяи.

Укажите рядом с выписанным предложением прием перевода и перевод.

2. Найдите в тексте и выпишите 2 простых предложения. Переведите.

3. Найдите в тексте и выпишите 2 ложных предложения. Переведите.

Текст для перевода

Capacitors store electrical energy in the form of an electric field between two electrically conducting plates. The simplest capacitor is two electrically conducting plates separated spatially. By inserting a dielectric material (a poor conductor of electricity) between the two plates the capacity can be greatly increased. The dielectric material used determines the major characteristics of the capacitor: capacitance, maximum voltage or breakdown voltage, and response time or frequency.

The first capacitor, the Leyden jar accidentally discovered in 1745, is a glass jar coated with copper on the inside and outside. The inside and outside copper coatings are electrically connected to a battery. The two spatially separated copper plates are the electrodes, and the glass is the dielectric of the Leyden jar capacitor. The capacity to store electrical energy at certain frequencies and to provide high-power discharges makes a capacitor an essential component in most electrical circuits used in electronics, communication, computers, manufacturing, and electric vehicles.

Capacitance is related to the area of the plates (A), the distance between the plates (d), and the dielectric constant (ε) of the material between the plates . The dielectric constant or permittivity of a material is the increased capacitance observed compared to the condition if a vacuum was present between the plates. Common dielectric materials are polystyrene ($\varepsilon = 2.5$), mylar ($\varepsilon = 3$), mica

(ε = 6), aluminum oxide (ε = 7), tantalum oxide (ε = 25), and titania (ε = 100).

In the Leyden jar the dielectric is silica A capacitor, previously called a condenser, stores electrical energy based on the relationship between voltage (V) and stored charge (Q) in coulombs as shown in the equation C=QU. One farad of capacitance is a coulomb per volt of stored charge. The voltage limit of a capacitor is determined by the breakdown potential of the dielectric material. Like a battery, a capacitor is an electrical energy storage device. There are, however, significant differences in how a battery and a capacitor store and release electrical energy. A battery stores electrical energy as chemical energy and can be viewed as a primary source. Capacitors need to be charged from a primary electrical source. During a constant current discharge, a battery will maintain a relatively constant voltage. In contrast, a capacitor's voltage is dependent on the "state of charge," decreasing linearly during a constant current discharge.

Capacitors are often combined in series or parallel, with the resulting circuit capacitance calculated. An important relationship is the time constant of a capacitor. The time constant is based on the product of the resistance and capacitance and is known as the RC time constant.

Electrochemical capacitors are also known as double layer capacitors, ultracapacitors, or supercapacitors. These devices are based on either double-layer charge storage or pseudocapacitance. Electrochemical double-layer capacitors, originally developed by Standard Oil Company during the 1960s, store charge at the interface between an electrically conducting electrode such as carbon and an ionically conducting electrolyte such as sulfuric acid. The double layer, first described by Hermann von Helmholtz in 1853, can be considered the equivalent of a parallel plate capacitor wherein the distance of charge separation is given by the ionic radius of the electrolyte, while the solvent continuum is the dielectric.

Вариант 3

I. Выполните полный письменный перевод текста.

II. Выполните аннотационный перевод текста.

III. Выполните следующие задания:

1. Выпишите из текста предложения, при переводе которых вы использовали приемы:
- замена простого предложения сложным,
- замена сложного предложения простым,
- членение предложений
- объединение предложений,
- изменение типа синтаксической свзяи.

Укажите рядом с выписанным предложением прием перевода и перевод.

2. Найдите в тексте и выпишите 2 простых предложения. Переведите.

3. Найдите в тексте и выпишите 2 ложных предложения. Переведите.

Текст для перевода

Cogeneration is the production of two useful forms of energy in a single energy conversion process. For example, a gas turbine may produce both rotational energy for an electric generator and heat for a building.

During the energy conversion process, an energy converter converts some form of energy to a form having a more suitable use. A light bulb and a gasoline engine are two familiar converters. People invest in electric energy to operate a light bulb because light is useful; likewise, people invest in gasoline for energy to run the automobile internal combustion engine because automobiles are useful. The laws of nature require that there be no loss of energy in the conversion. If 100 joules of energy are converted, then 100 joules remain after the conversion.

However, the laws of nature neither require the converted energy to be in the form we desire, nor do they require that the other forms be useful. If the converter of 100 joules were a light bulb, only about 10 joules would emerge as light. The other 90 joules would be heat. Touching an ordinary light bulb when lit attests to the heat that is produced.

Efficiency is a practical measure of the performance of a converter: efficiency is equal to the desired form of energy divided by the total energy converted. If the light converted 100 joules of energy into 10 joules of light energy, we would say its efficiency is $10 \div 100 = 0.1$ or 10 percent.

Heat is always produced to some extent in energy conversion. In fact, when energy has gone through all possible conversions, it ends up as thermal energy in the environment. The efficiency of a steam turbine at a large electric power plant is about 50 percent. This means that 50 percent of the energy converted is rejected as heat to the environment by massive cooling towers that are prominent at power plant sites.

Heat is a useful energy commodity, so one must wonder why rejected heat is not put to some use. The idea of cogeneration is to do just that. Evaluating the practical worth of thermal energy in a substance such as water requires consideration of both temperature and the amount of the substance.

To understand this we say the thermal energy of a substance is equal to the number of molecules times the energy per molecule. The thermal energy per molecule (i.e., the second factor) increases with increasing temperature. So, even if the temperature is high, making energy per molecule larger, the total will still be small if there are only a few molecules.

Similarly, if the temperature is low and a large number of molecules is involved, the total thermal energy can be large. The temperature of the water removing heat from a steam turbine is relatively low—only 10 to 15°C above the temperature of the environment—but a huge amount of water is needed to remove the heat from the turbine, so the thermal energy transferred to the water must be quite large. The thermal energy, although low-grade (about 80°F or 30°C), is appropriate for heating buildings. In a scheme of relatively small scale called district heating, buildings are heated in some towns and cities. But usually a power plant, especially a nuclear power plant, is well removed from the city and the economics of piping the heat to where it is needed is very unfavorable—requiring not only longer runs of piping, but resulting in greater heat loss from those longer runs.

Consequently, for remotely sited plants, the thermal energy is rejected to the environment and goes unused.

Вариант 4

I. Выполните полный письменный перевод текста.

II. Выполните аннотационный перевод текста.

III. Выполните следующие задания:

1. Выпишите из текста предложения, при переводе которых вы использовали приемы:
- замена простого предложения сложным,
- замена сложного предложения простым,
- членение предложений
- объединение предложений,
- изменение типа синтаксической связяи.

Укажите рядом с выписанным предложением прием перевода и перевод.

2. Найдите в тексте и выпишите 2 простых предложения. Переведите.

3. Найдите в тексте и выпишите 2 ложных предложения. Переведите.

Текст для перевода

Cogeneration or combined heat and power is the simultaneous production of heat and power in a single thermodynamic process that has a history going back several centuries. Originally employed to save labor, its inherent fuel economy took it to the forefront of the industrial revolution in the nineteenth century. More recently the environmental benefits тderived from reduced fuel consumption have made cogeneration a significant factor in global environmental strategies, while current trends towards utility deregulation and distributed power generation continue to bolster the market for this technology.

Cogeneration encompasses several distinct thermodynamic processes of simultaneous heat and power production. One utilizes air as a medium, another steam, a third employs heat rejected from a separate combustion process, such as an internal combustion engine, and a fourth utilizes a thermochemical process such as found in a fuel cell.

Although each process is distinct, they are often combined together to maximize the energy production in a single thermodynamic system. The oldest form of combined heat and power is the smokejack, developed in Tibet to turn prayer wheels during religious ceremonies. Captured Tartar slaves introduced this device into Europe by the early fourteenth century and Leonardo da Vinci sketched one around 1480. Commentators as diverse as Montaigne (1580), John Evelyn (1675), and Benjamin Franklin (1758) mention smokejacks, which were small windmills installed inside a chimney and powered by the hot air rising from fires. The rotary motion of the fan was used to power a spit or lathe.

The amount of power produced would be dependent on the velocity and mass flow of the heated air and the efficiency of the blades, but in general use the smokejack delivered approximately one dog-power. Turnspit dogs were specifically bred to turn spits and other apparatus requiring rotary motion, although children, slaves, and servants were also pressed into this labor, which was basically a larger version of a hamster in a wheel.

Prior to the widespread electrification of farms in the mid–to–late twentieth century, American farms often had similar devices allowing all members of the farm community to contribute to the

domestic workload, reminding us that the current leisurely life of our canine friends is a relatively recent phenomenon.

Franklin also noted that the natural draft of a chimney was also able to turn a smokejack, an idea recently promoted on a generative power using a large natural draft chimney with an air turbine. In 1832, Charles Busby used a smokejack to power a pump to circulate water through pipes for "warming and cooling the interior of buildings." It is uncertain if Busby's "Patent Circulation" achieved wide success, although it would have worked well since the flow of exhaust air through the chimney would be directly related to the amount of circulated needed.

By the end of the nineteenth century, smokejacks had evolved into the hot air turbine, which found application as aircraft turbosuperchargers before evolving into gas turbines. Some engines such as the General Electric LM2500 have a separate hot air power turbine that converts hot exhaust air into mechanical power.

An interesting use of air involved the use of compressed air for power distribution in urban areas. Still widely used as a power source within factories, several cities in the mid- to late-nineteenth century had compressed air public utility systems, with Paris being perhaps the largest example.

Вариант 5

I. Выполните полный письменный перевод текста.

II. Выполните аннотационный перевод текста.

III. Выполните следующие задания:

1. Выпишите из текста предложения, при переводе которых вы использовали приемы:
- замена простого предложения сложным,
- замена сложного предложения простым,
- членение предложений
- объединение предложений,
- изменение типа синтаксической связяи.

Укажите рядом с выписанным предложением прием перевода и перевод.

2. Найдите в тексте и выпишите 2 простых предложения. Переведите.

3. Найдите в тексте и выпишите 2 ложных предложения. Переведите.

Текст для перевода

A simple pendulum with ignorable friction illustrates the conservation of mechanical energy. Pulling the bob (the mass) from its lowest position and holding it, the pendulum has only potential energy; the mechanical energy is all potential. When released, the pendulum bob gains kinetic energy and loses potential energy, but at any instant the sum never differs from the sum at the beginning. At the lowest point of the movement the potential energy is zero and the mechanical energy is all kinetic. As the pendulum bob moves to higher levels, the potential energy increases, and the kinetic energy decreases.

Throughout the motion, kinetic energy and potential energy change continually. But at any moment the sum, the mechanical energy, stays constant. A simple pendulum isolated from nonconservative forces would oscillate forever. Complete isolation can never be achieved, and the pendulum will eventually stop because nonconservative forces such as air resistance and surface friction always remove mechanical energy from a system. Unless there is a mechanism for putting the energy back, the mechanical energy eventually drains and the motion stops.

A child's swing is a pendulum of sorts. If you release a swing from some elevated position it will oscillate for та while but eventually will stop. You can push the swing regularly and keep it going, but in doing so you do work and put energy back into the system.

When a spring is stretched by pulling on one end, the spring pulls back on whatever is pulling it. Like the gravitational force, the spring force is conservative. Accordingly, there is potential energy associated with the spring that is given by U = kx2 , where k, the spring constant, reflects the strength of the spring and x is the amount of stretching from the relaxed position.

A horizontal spring with a mass attached to one end is a form of oscillator—that is, something that periodically returns to the starting position. To the extent that the spring-mass system can be isolated, the mechanical energy is conserved. When stretched but not yet in motion, the system has only potential energy. When released, the mass gains kinetic energy, the spring loses potential energy, but the sum does not change; it is conserved. Much like the oscillating pendulum, both kinetic energy and potential energy change continually, but the sum is constant. Most people do not think of atoms in a molecule as being connected by springs, yet the forces that bind them together behave like springs, and the atoms vibrate.

The mechanical energy of the spring-like atomic system is an important energy attribute. A better understanding of the spring-like characteristics of atoms in materials has made possible many advances in sporting goods equipment, from graphite composite vaulting poles to titanium drivers for golfers.

Even though mechanical energy is rigorously conserved only when a system is isolated, the principle is elegant and useful. Water flowing over the top of a dam has both kinetic energy and potential energy. As it plummets toward the bottom of the dam, it loses potential energy and gains kinetic energy. Impinging on the blades of a paddle wheel, the water loses kinetic energy, which is transferred to rotational kinetic energy of the wheel. The principle provides an accounting procedure for energy.

Вариант 6

I. Выполните полный письменный перевод текста.

II. Выполните аннотационный перевод текста.

III. Выполните следующие задания:

1. Выпишите из текста предложения, при переводе которых вы использовали приемы:
- замена простого предложения сложным,
- замена сложного предложения простым,
- членение предложений
- объединение предложений,
- изменение типа синтаксической свзяи.

Укажите рядом с выписанным предложением прием перевода и перевод.

2. Найдите в тексте и выпишите 2 простых предложения. Переведите.

3. Найдите в тексте и выпишите 2 ложных предложения. Переведите.

Текст для перевода

Energy conservation typically involves making an investment that results in lower energy running costs. An investor (or policymaker) is often confronted with a list of possible conservation measures. The investor needs a way to rank the measures and then decide which are worth undertaking. He or she ranks the measures with the help of an investment metric, such as the simple payback time, the benefit-cost ratio, or return on investment. The investment metric provides a means of ranking the opportunities, and then separates the attractive investments from those in which the money would be better invested elsewhere.

Each investment metric has strengths and limitations. For example, the simple payback time indicates the time required to recover the investment, but it ignores any benefits that may occur after the payback time, so measures offering many years of benefits appear no better than short-lived ones. A common drawback of these investment metrics is that the price of energy must be assumed. If the energy price changes, then the payback time must be recalculated.

The CCE spreads the investment over the lifetime of the measure into equal annual payments with the familiar capital recovery factor. The annual payment is then divided by the annual energy savings to yield a cost of saving a unit of energy. A collection of conservation measures can be ranked by increasing CCE. The measures with the lowest CCE are the most economically attractive.

A measure is cost-effective if its cost of conserved energy is less than the price of the energy it displaces. For example, if a lighting retrofit has a CCE of 3 cents/kWh, then it will be worth doing wherever the electricity tariffs are above 3 cents/kWh. Note that the price of energy does not enter into the CCE calculation, only the decision about economic worthiness. A supply curve of conserved energy is a devices for displaying the cumulative impact of a sequence of conservation measures.

It shows the potential energy savings and CCE of each measure. Figure 1 is an example of a supply curve of conserved electricity for a commercial refrigerator. Each step represents a conservation measure. The step's width is its energy savings and the height is its cost of conserved energy.

The supply curve is useful because it shows which measures should be selected first—the ones on the left—and the cumulative energy savings. Measures with CCEs less than the price of the saved energy are cost-effective. In the example, an energy price line has been drawn to show the cut off point; those measures below the energy price line are cost-effective.

Behind the supply curve approach is a consistent bookkeeping framework. The same data for each conservation measure must be collected and the same CCE calculation performed. This encourages comparison among measures and is important when trying to assess the overall impact of many small measures. Consistent treatment also permits generalizations about the impact of alternative sequences of measures and errors in estimates of energy savings, and minimizes double-counting of energy savings.

For example, if a measure is implemented before its position in the sequence shown on the curve, then the energy savings will equal or exceed those indicated, and the CCE will be lower than in the original calculation. These features make the overall approach and results more robust even when some numbers are not accurately known.

Вариант 7

I. Выполните полный письменный перевод текста.

II. Выполните аннотационный перевод текста.

III. Выполните следующие задания:

1. Выпишите из текста предложения, при переводе которых вы использовали приемы:
- замена простого предложения сложным,
- замена сложного предложения простым,
- членение предложений
- объединение предложений,
- изменение типа синтаксической связяи.

Укажите рядом с выписанным предложением прием перевода и перевод.

2. Найдите в тексте и выпишите 2 простых предложения. Переведите.

3. Найдите в тексте и выпишите 2 ложных предложения. Переведите.

Текст для перевода

The U.S. government has tracked consumption by energy source since 1949, the year when petroleum overtook coal as the major source of energy. Petroleum consumption continued to increase throughout the 1950s and 1960s due to increases in transportation and industrial demand, and as a coal replacement for heating and electric power generation.

Natural gas consumption also increased during this period as it became the fuel of choice for home heating. Following the Arab oil embargo of 1973, natural gas consumption declined until the mid-1980s primarily due to the assumption that the nation was running out of natural gas and because of legislation outlawing the use of natural gas for "low priority" uses. Energy conservation efforts in the industrial, commercial, and residential sectors, primarily the improved energy efficiency of new furnaces and boilers, also were instrumental in this decline. Petroleum consumption peaked later, in 1978, and then began to fall as older vehicles were replaced by more fuel-efficient models, and because of the effort of utilities to switch from petroleum as a fuel for generating electricity.

In the early 1970s, coal consumption once again equaled its earlier peak in the early 1950s and continued to grab a larger share of the electricity-generation market due to the price and supply problems of petroleum and natural gas.

Beginning in 1986 and through the 1990s, natural gas consumption rose again as the Federal Energy Regulatory Commission began deregulating natural gas, and natural gas electricity generation became the choice due to innovations improving the efficiency of generating technology. These new plants were not only more efficient than coal-fired plants, but also less expensive and time-consuming to construct. By 1998, natural gas consumption equaled its 1972 peak of 22.6 quadrillion Btus.

Many nuclear power plants were ordered in the 1960s and early 1970s, but construction slowed in the mid-1970s and halted in the early 1980s because of the high cost of construction, prob-

lems with radioactive waste disposal, and political obstacles. Despite no new power plants being built, better management and technology resulted in more energy generation during the late 1980s and 1990s. In 1996, nuclear facility efficiency (the amount of power generated divided by the maximum possible generation) reached an all-time high of 76.4 percent. Although the amount of nuclear-generated electricity more than doubled between 1980 and 1996 (2.74 to 7.17 quadrillion Btus), the future contribution is certain to fall through 2020 for three important reasons: limited potential for further gains in efficiency, many nuclear facilities are scheduled for retirement, and no new facilities are planned.

Out of the 7 quadrillion Btus contributed by renewable energy, more than 95 percent comes from hydroelectric power and biofuels (waste energy, wood energy, and alcohol). Geothermal, solar, and wind are all very minor contributors. Renewable energy's share is unlikely to grow because hydroelectric power faces political and environmental concerns about dams, no new geothermal sites are planned, and biofuel potential is limited. Another major factor hindering growth in renewables was the much lower than expected electric generating cost for coal and natural gas.

The projections made in about 1980 for the year 2000 were way off target. In terms of dollars per million Btus of energy, coal was widely projected to reach $3 to $5, not $1, and natural gas was projected to reach $4 to $8, not $2.

Вариант 8

I. Выполните полный письменный перевод текста.

II. Выполните аннотационный перевод текста.

III. Выполните следующие задания:

1. Выпишите из текста предложения, при переводе которых вы использовали приемы:
- замена простого предложения сложным,
- замена сложного предложения простым,
- членение предложений
- объединение предложений,
- изменение типа синтаксической свзяи.

Укажите рядом с выписанным предложением прием перевода и перевод.

2. Найдите в тексте и выпишите 2 простых предложения. Переведите.

3. Найдите в тексте и выпишите 2 ложных предложения. Переведите.

Текст для перевода

The control of energy in its various forms was always a necessity that became more relevant with the increasing performance requirements of the twentieth century. The control of energy conversion contributes to the optimization in performance and energy efficiency for all processes, machines, and devices.

Technology developments from 1960 to 2000 in the areas of microelectronics and power elec-

tronics made possible the development of more complex, efficient and reliable energy controls. In this century there were significant technology mutations, with controls going from mechanical to electromechanical devices, evolving gradually to full electronic controls without moving parts. Since the 1970s electronic controls have been implemented more and more with programmable systems through the use of microcomputers.

The complexity and reduced time constants of modern processes imply the adoption of high performance programmable controllers. This requires not only higher processing speed but also more advanced control algorithms that can optimize the process operation in real time.

Today, with the pressing need to achieve sustainable development, the reduction of the energy losses and the optimization of all processes has promoted the continuous development and implementation of advanced energy control systems in all sectors. There is a need to have some measurements or observations made on the relevant variables of the controlled system. The data is compared to a reference, and that will cause some feedback on the process to be controlled, in order that value of the controlled variables approaches the desired reference value.

Types of Controls

Manual Controls. The first methods used in energy control involved human intervention. The operator was the sensor (i.e., using his eyes, ears, and hands or using additional devices to quantify the values of the controlled variables), and he was also the actuator controller. The control of the processes was slow and very ineffective. For example, in an old steam engine control the human operator sees the instantaneous pressure and then manually regulates the power of the device (e.g., by adding fuel to a boiler). But in today's industrial reality, this control is not only ineffective but in most cases is not possible.

Another example is the electric generators' excitation control. Early systems were manually controlled (i.e., an operator manually adjusted the excitation system current with a rheostat to obtain a desired voltage). Research and development in the 1930s and 1940s showed that applying a continuously acting proportional control in the voltage regulator significantly increased generator performance. Beginning in the 1950s most of the new generating units were equipped with continuously acting electronic automatic voltage regulators (AVRs).

Mechanical Controls. Mechanical controls have been widely used in steam and internal combustion engines. Although they are low-cost, they can only implement simple control strategies.

One of the oldest energy control systems is the steam engine speed control device, developed by James Watt, consisting in the regulation of motor speed through input steam flow. This device is purely mechanical.

Вариант 9

I. Выполните полный письменный перевод текста.

II. Выполните аннотационный перевод текста.

III. Выполните следующие задания:

1. Выпишите из текста предложения, при переводе которых вы использовали приемы:
- замена простого предложения сложным,
- замена сложного предложения простым,
- членение предложений

- объединение предложений,
- изменение типа синтаксической связяи.

Укажите рядом с выписанным предложением прием перевода и перевод.

2. Найдите в тексте и выпишите 2 простых предложения. Переведите.

3. Найдите в тексте и выпишите 2 ложных предложения. Переведите.

Текст для перевода

Electromechanical Controls. Electro-mechanical control devices are typically used for load control (lighting, ventilation, and heating) in buildings with no feedback signal. The most common device is the electromechanical timer, in which a small motor coupled to a gearbox is able to switch electrical contacts according to a predefined time schedule. They are still in use today, applied to loads with simple scheduling requirements.

Mechanical switches provide a simple manual interface to operate all sorts of loads, but they suffer from all the drawbacks of manual control, namely in terms of speed of response, and also requiring permanent operator awareness.

The first power control devices, with electric insulation between the low power input stage and high power output stage, were electromechanical relays, introduced in the late nineteenth century. They are still widely used today. Applying voltage to the magnetic field winding, an attraction force will be generated between the mobile and fixed iron core that will switch the mobile terminal COM (common terminal) between the normally closed (NC) and normally open (NO) position. Their main advantages are high electric input/output insulation, a high input/output power ratio, high efficiency, and low cost.

The disadvantages are the limitations in terms of commutation speed and the limited number of operations (105–107 cycles). With the invention of the transistor, this type of device evolved into the solid-state relay, which has the advantage of smaller size, higher reliability, and lower input power. The operation principle is based on a light emitting diode (LED), fed by a control signal, which with the emitted light will excite the fototransistor. The zero-cross detector module will then control the firing of the solid-state switches (thyristors), closing the load power circuit. In the late 1990s, the integrated silicon electrostatic relay was introduced, available in an integrated circuit package that has the advantages of small size and very low power consumption.

However, the output power is very limited, when compared to electromagnetic and solid-state relays. Basically, the input voltage between a conductive fixed plate and a flexible plate creates an electric field between them, which will generate an attraction force. The flexible plate will be deflected and its conductive terminal will switch the contacts.

Electronic Closed Loop Controls. After its development, the concept of closed loop control has become one of the most common tools for systems control. Initially, automatic closed loop controls were widely implemented with electronic analog circuits.

Electric power systems were one of the many applications that successfully used these types of controls in power plants.

In electric power systems, it is essential to have permanent control of the power in electricity production, transportation, and consumption. Because of speed and reliability requirements, electric power systems were the first large systems to use a variety of automatic control devices for the pro-

tection of different parts of the system.

A variety of electromechanical relays was used for the detection of abnormal operating conditions (e.g.,overload, short-circuit, etc.), leading to the isolation of the faulty components.

Вариант 10

I. Выполните полный письменный перевод текста.

II. Выполните аннотационный перевод текста.

III. Выполните следующие задания:

1. Выпишите из текста предложения, при переводе которых вы использовали приемы:
- замена простого предложения сложным,
- замена сложного предложения простым,
- членение предложений
- объединение предложений,
- изменение типа синтаксической связяи.

Укажите рядом с выписанным предложением прием перевода и перевод.

2. Найдите в тексте и выпишите 2 простых предложения. Переведите.

3. Найдите в тексте и выпишите 2 ложных предложения. Переведите.

Текст для перевода

One of the most recent trends in energy control is the use of fuzzy logic. Fuzzy logic is a multivalued logic that allows intermediate values to be defined between conventional evaluations such as yes/no, true/false, and black/white. Notions such as “rather warm” or “pretty cold” can be formulated mathematically and processed by computers. In this way an attempt is made to apply a more human-like way of thinking in the programming of computers. The employment of fuzzy control is commendable for very complex processes, when there is no simple mathematical model, in highly nonlinear processes, and if the processing of expert knowledge (linguistically formulated) is to be performed.

Some applications for fuzzy logic control in the energy field are: automated control of dam gates for hydroelectric power plants, prevention of unwanted temperature fluctuations in air-conditioning systems, improved efficiency and optimized function of industrial control applications, control of machinery speed and temperature for steel works, improved fuel con sumption for automobiles, and improved sensitivity and efficiency for elevator control. Fuzzy logic (control) is a way of interfacing inherently analog processes that move through a continuous range to a digital computer that likes to see variables as well-defined numeric values.

Let us consider for example the system to control the temperature in a building is directed by a microcontroller that has to make decisions based on indoor temperature, outdoor temperature, and other variables in the system. The variable temperature in this system can be divided into a range of “states”: “cold,” “cool,” “nominal,” “warm,” and “hot.”

However, the transition from one state to the next is hard to pin down. An arbitrary threshold might be set to divide “warm” from “hot,” but this would result in a discontinuous change when the input value passed over that threshold. The microcontroller should be able to do better than that. The way around this is to make the states “fuzzy,” that is, allowing them to change gradually from one state to the next. The input temperature states can be represented using “membership functions.”

The input variables’ state now no longer jumps abruptly from one state to the next, but loses value in one membership function while gaining value in the next. At any one time, the “truth value” of the indoor or outdoor temperature will almost always be in some degree part of two membership functions: 0.6 nominal and 0.4 warm, or 0.7 nominal and 0.3 cool, and so on. Given “mappings” of input variables into membership functions and truth values, the microcontroller then makes decisions as to which actions to take based on a set of “rules” that take the form: IF indoor temperature IS warm AND outdoor temperature IS nominal THEN heater power IS slightly decreased.

Traditional control systems are in general based on mathematical models that describe the control system using one or more differential equations that define the system response to its inputs. In many cases, the mathematical model of the control process may not exist or may be too “expensive” in terms of computer processing power and memory. In these cases a system based on empirical rules may be more effective. In many cases, fuzzy control can be used to improve existing controller systems by adding an extra layer of intelligence to the current control method.

Вариант 11

I. Выполните полный письменный перевод текста.

II. Выполните аннотационный перевод текста.

III. Выполните следующие задания:

1. Выпишите из текста предложения, при переводе которых вы использовали приемы:
- замена простого предложения сложным,
- замена сложного предложения простым,
- членение предложений
- объединение предложений,
- изменение типа синтаксической свзяи.

Укажите рядом с выписанным предложением прием перевода и перевод.

2. Найдите в тексте и выпишите 2 простых предложения. Переведите.

3. Найдите в тексте и выпишите 2 ложных предложения. Переведите.

Текст для перевода

Analog Displays

Analog displays are simple devices like mercury thermometers and pressure gauges in which the variation of a physical variable causes a visible change in the device display. This information can be used for monitoring purposes and for manual process control.

Although simple and low-cost, most analog displays suffer from poor accuracy. Analog displays have been progressively replaced by electronic sensors.

Sensors

Both electronic and microcomputer-based controls require information about the state of the controlled system. Sensors convert different physical variables into an electric signal that is conditioned and typically converted to a digital signal to be used in microcontrollers. The trend in the construction techniques of modern sensors is the use of silicon microstructures because of the good performance and the low cost of this type of device. In the energy control scope the main quantities to be measured are the temperature, pressure, flow, light intensity, humidity (RH), and the electric quantities of voltage and current.

Temperature. The simplest temperature sensor/control systems typically use a bimetallic thermostat that integrates two superimposed metal plates with different expansion coefficients. Thus, the deflection of the beam caused by a temperature increase will cause the opening of the contacts. This device is typically used to control electrical heater equipment operation. The most common used devices in temperature measurement are thermocouples, thermistors, semiconductor devices, platinum resistance thermometers, and infrared radiometers.

One widely used temperature sensor is the integrated circuit AD590 introduced by Analog Devices. It generates a current whose value in μA (microamperes) is equal to the temperature in degrees Kelvin (K).

Humidity. Any instrument capable of measuring the humidity or psychrometric state of air is a hygrometer, and the most common types used are psychrometers, dew-point hygrometers, mechanical hygrometers, electric impedance and capacitance hygrometers, electrolytic hygrometers, piezoelectric sorption, spectroscopic (radiation absorption) hygrometers, gravimetric hygrometers, and calibration. The sensor response is related to factors such as wet-bulb temperature, relative humidity, humidity (mixing) ratio, dew point, and frost point.

Pressure. Pressure so defined is sometimes called absolute pressure. The differential pressure is the difference between two absolute pressures. The most common types of pressure-measuring sensors are silicon pressure sensors, mechanical strain gauges, and electromechanical transducers.

Fluid Velocity. The flow of air is usually measured at or near atmospheric pressure. The typical instruments to measure fluid velocity are airborne tracer techniques, anemometers, pilot-static tubes, measuring flow in ducts.

Flow Rate. The values for volumetric or mass flow rate measurement are often determined by measuring pressure difference across an orifice, nozzle, or venturi tube. Other flow measurement techniques include positive displacement meters, turbine flowmeters, and airflow-measuring hoods.

Light. Light level, or illuminance, is usually measured with a photocell made from a semiconductor such as silicon.

Вариант 12

I. Выполните полный письменный перевод текста.

II. Выполните аннотационный перевод текста.

III. Выполните следующие задания:

1. Выпишите из текста предложения, при переводе которых вы использовали приемы:

- замена простого предложения сложным,

- замена сложного предложения простым,
- членение предложений
- объединение предложений,
- изменение типа синтаксической связяи.

Укажите рядом с выписанным предложением прием перевода и перевод.

2. Найдите в тексте и выпишите 2 простых предложения. Переведите.

3. Найдите в тексте и выпишите 2 ложных предложения. Переведите.

Текст для перевода

Lighting Controls

Generally in all sectors, light energy consumption is very significant, and typically, control has been done manually or by electromechanical timers. The most sophisticated systems integrate sensors and programmed microcomputer controls. In less important places or with irregular human presence, it is common to use occupancy sensors that activate the lights.

Photosensors packaged in various configurations allow the control ambient lighting levels using building automation strategies for energy conservation. Some examples include ceiling-mounted indoor light sensors that are used to continuously dim the available lights in order to produce the desired light level.

Motor Controls

Most induction ac motors are fixed-speed. However, a large number of motor applications would benefit if the motor speed could be adjusted to match process requirements. Motor speed controls are the devices which, when properly applied, can tap most of the potential energy savings in motor systems. Motor speed controls are particularly attractive in applications where there is variable fluid flow. In many centrifugal pump, fan, and compressor applications mechanical power grows roughly with the cube of the fluid flow. To move 80 percent of the nominal flow only half of the power is required.

Centrifugal loads are therefore excellent candidates for motor speed control. Other loads that may benefit from the use of motor speed controls include conveyers, traction drives, winders, machine tools and robotics.

Conventional methods of flow control used inefficient throttling devices such as valves, dampers, and vanes. These devices, although they have a low initial cost, introduce unacceptable running costs due to their inefficiency. Several speed control technologies can be used to improve motor system operation. Electronic variable speed drives are the dominant motor speed control technology. Figure 4 shows the power consumed by a motor driving a fan, using different flow control methods. The main benefits of adjusting motor speed through the use of VSDs include better process operation, less wear in mechanical equipment, less noise, and significant energy savings (50% or more for some type of applications).

With the development of power electronics, the introduction of variable speed drives (VSDs) to control induction motor speed has become widespread. VSDs produce a variable frequency and voltage output that will regulate the motor speed and torque. In the case of closed loop control, the use of speed sensors (encoders) allows more precise control of the speed.

The most common VSD type is the inverter based VSD, in which the 3-phase supply is con-

verted from ac to dc using a solid-state rectifier. Afterwards the inverter uses this dc supply to produce a 3-phase adjustable frequency, adjustable-voltage output which is applied to the stator windings of the motor.

The speed of the motor will then change in proportion to the frequency of the power supply. Usually output voltage waveforms can be synthesised over the frequency range of 0–100 Hz.

HVAC Controls

Heating, ventilation, and air conditioning (HVAC) system controls are the link between varying energy demands on a building's primary and secondary systems and the approximately uniform demands for indoor environmental conditions.

Вариант 13

I. Выполните полный письменный перевод текста.

II. Выполните аннотационный перевод текста.

III. Выполните следующие задания:

1. Выпишите из текста предложения, при переводе которых вы использовали приемы:
- замена простого предложения сложным,
- замена сложного предложения простым,
- членение предложений
- объединение предложений,
- изменение типа синтаксической связяи.

Укажите рядом с выписанным предложением прием перевода и перевод.

2. Найдите в тексте и выпишите 2 простых предложения. Переведите.

3. Найдите в тексте и выпишите 2 ложных предложения. Переведите.

Текст для перевода

The earliest energy theorists were largely physical scientists, some of whom held that the growth and increasing complexity of society were largely synonymous with "progress," construed as a movement toward the higher, the better, and the more desirable.

Nobel laureate chemist Wilhelm Ostwald (1907) was of this camp, although other eminent scholars such as the Nobel laureate physicist Fredrich Soddy (1912) and Alfred Lotka (1925), a founder of mathematical biology, also ventured ideas on the relation of energy and evolution yet made no explicit connection.

Energy theorists of cultural evolution are concerned with the whole sweep of cultural evolution, from prehistoric hunters and gatherers to modern industrial societies. This global, secular perspective is useful in assessing the relevance of ideas advanced to account for short periods of time in the history of particular societies. Those who propose an energy theory of cultural evolution emphasize the problem of causality-whether or not the amount of energy a society uses can be manipulated, and if so, to what extent, by what means, and to what effect (Nader and Beckerman, 1978).

In the social sciences, steps toward an energy theory of cultural evolution were made by Brit-

ish archeologists V. Gordon Childe (1936) and Graham Clarke (1946). However, the first figure in the social sciences who fully developed an energy theory of cultural evolution is anthropologist Leslie White. White (1959) held that culture advances as a consequence of the ability to harness more energy, although we are not to conclude that people, either individually or collectively, can choose to vary their energy harnessing technology and thus vary the rest of their culture.

Causality in White's view, runs from materialistic forces like environmental change, population pressure, culture contact, and the like, to "superorganic" technological systems, and thence to superorganic social and ideological systems. Technological systems may determine the rest of the culture, but specific technology in turn can come about and continue in use through forces completely outside the conscious command of the participants in culture.

Sociologist Fred Cottrell's thesis (1955, p. 2) was that "the energy available to man limits what he can do and influences what he will do." He later added that both material phenomena and choice are involved in any human situation. However, human choice for Cottrell is not directed. To varying degrees choices can be predicted, given information on individual values, the costs to the individuals of making various choices, and the power of the individuals in question to achieve their choices.

One assumes that some element of chance is involved, but in a given situation a particular choice may be predicted with a high level of confidence. Although Cottrell is far from White in his rejection of radical determinism, he is equally far from many political philosophers prominent in the history of the West, who assume that society simply represents the ongoing result of innumerable unconstrained individual choices.

Howard T. Odum (1971), an ecologist, is the most diligent in his attempts to reduce all-or nearly all-cultural phenomena to the currency of energy. On first examination his approach to causality is strikingly reminiscent of White. On closer examination, it seems that Odum holds a "possibilistic" position on causality, similar to that of Cottrell.

Вариант 14

I. Выполните полный письменный перевод текста.

II. Выполните аннотационный перевод текста.

III. Выполните следующие задания:

1. Выпишите из текста предложения, при переводе которых вы использовали приемы:
- замена простого предложения сложным,
- замена сложного предложения простым,
- членение предложений
- объединение предложений,
- изменение типа синтаксической связяи.

Укажите рядом с выписанным предложением прием перевода и перевод.

2. Найдите в тексте и выпишите 2 простых предложения. Переведите.

3. Найдите в тексте и выпишите 2 ложных предложения. Переведите.

Текст для перевода

Lastly, Richard N. Adams (1975) claims intellectual descent from White. He also ranks the cultural evolution of societies by the amount of energy harnessed, and sees the drive toward the harnessing of increasing amounts of energy by the whole fabric of human cultures as inevitable, as long as energy is available to be harnessed. However, this statement does not amount to a prediction of the course of any particular society.

Adams has modified White's determinism so that only global processes are held to be deterministic while local events may manifest a high degree of indeterminism (Lovins, 1976). Just how much room this reexpression allows for the manipulation of a particular society's energetic parameters by national policy decisions is an open question.

All four theorists agree that the amount of energy available constrains possibilities for social change and social action. They also agree on a relationship between energy use and the increase of what is socially desirable. White decouples increasing amounts of harnessed energy from ideas of what is more desirable. Cottrell is also concerned with cultural evolution on a macroscopic scale, focusing on the contrast and transition between "low energy" (unindustrialized, or "third world") societies and "high-energy" (industrialized) societies.

Cottrell also recognizes that there is no necessary coupling, especially in the short term, between cultural evolution (defined again as the harnessing of increasing amounts of energy) and the increase of what is socially desirable. Odum's emphasis on feedback loops is that intricate feedback linkages and a high degree of role specialization are necessary for the realization of individual worth. He places a positive value on systemic stability.

This stability is achieved through the use of more energy than that employed by tribal peoples, whom Odum considers to exist at the whims of a fickle natural environment, but less energy than currently employed by industrial countries, which Odum considers to be running, as cancer does, out of control. For him, the position seems to be that quality of life relates not to gross magnitudes of energy but to the complexity and stability of the system of energy production, distribution, and use.

There is explicit coupling of growth of energy use without feedback controls with a deterioration of something like the quality of life. On the other hand, Adams argues that a deterioration in the quality of life for some members of a society is an inevitable correlate of increased energy flow.

Energy policy debates having to do with the immediate future in the United States take a more restricted range of time and space than do the global schemes of energy theorists. Further, some of the primitive assumptions of these policy arguments run directly counter to assumptions of global theorists.

Policy statements almost always assume, for instance, that energy use is the dependent variable which can be manipulated at will by political decisions (Nader and Milleron, 1979). Despite general acceptance of some measure of harnessed energy as an index of cultural evolution, it has been more than fifty years since anyone seriously argued that cultural evolutionary "advance" was in itself a movement toward the higher, the better, and the more desirable.

Вариант 15

I. Выполните полный письменный перевод текста.

II. Выполните аннотационный перевод текста.

III. Выполните следующие задания:

1. Выпишите из текста предложения, при переводе которых вы использовали приемы:
- замена простого предложения сложным,
- замена сложного предложения простым,
- членение предложений
- объединение предложений,
- изменение типа синтаксической связяи.

Укажите рядом с выписанным предложением прием перевода и перевод.

2. Найдите в тексте и выпишите 2 простых предложения. Переведите.

3. Найдите в тексте и выпишите 2 ложных предложения. Переведите.

Текст для перевода

There is reason to believe that social organization, the framework within which we operate on a daily basis, may be strongly influenced by energy capability to produce, consume, store, or distribute. In one well-documented example (White, 1962), the pattern of energy control led to drastic change in social organization. The significant technological innovation responsible for the rise of feudalism in Europe was the introduction of the stirrup. The effect of the stirrup was to permit the concentration of greater force on the tip of a spear or the edge of a sword than could be achieved by a rider without stirrups, and to permit the rider to withstand greater force without being unhorsed.

The horse had been in common use in Europe for centuries. What changed was not the gross amount of energy available, but the proportion of it that could be concentrated, and the speed and precision with which that concentrated energy could be released. The single consequence of this innovation was that, as arms and armor evolved to the full potential of a cavalry, and the support and forage of horses became requisite for military success, warfare became too expensive for serfs, who could afford neither the equipment nor the land necessary for mounted war.

The result was the “flowering” of knighthood, the code of chivalry, the tying of ownership of land to the vassalage of its occupants, the tying of ownership of wealth to public responsibility, and the rest of the distinctive characteristics of feudalism. The control of a particularly important means of locally distributing energy led to a vast change in society itself.

It is anthropological commonplace that those who control scarce but necessary resources control, in large measure, the society that depends on those resources. Around the turn of the nineteenth century and somewhat later, railroads dominated large scale transportation in this country. The owners of railroad companies also dominated political life to an extraordinary degree (Boyer and Morais, 1955).

At the grassroots level there was distrust and outright hatred of the railroad companies and their owners which brought us perhaps closer than we have ever been to class warfare in the United States. Nevertheless, the building of railroads led inexorably to capital intensive, highly centralized control. The power of the railroads was diminished, not only by federal regulation, as history books sometimes argue, but also by the rise of motor vehicles and public roads as viable alternatives. With private trucks and cars the monopoly of a small segment of the population on the scarce “resource” of long range transportation was broken. There is some parallel with nuclear reactor technology since

nuclear power is centralized, heavily regulated, subsidized by government, and crucially dependent upon selling prowess quoting scientific and engineering expertise.

Discussions of technologies have not always related to organization and values. Certainly since 1945 the bulk of the discussion has concentrated upon technical issues, such as the adequacy of the emergency core cooling system in light water reactors or the question of nuclear waste. However, the breakthroughs on safety and vulnerability resulted from studies of the culture of nuclear power. Charles Perrow (1999) argues that accidents are "normal" because they are built into the system.

Вариант 16

I. Выполните полный письменный перевод текста.

II. Выполните аннотационный перевод текста.

III. Выполните следующие задания:

1. Выпишите из текста предложения, при переводе которых вы использовали приемы:
- замена простого предложения сложным,
- замена сложного предложения простым,
- членение предложений
- объединение предложений,
- изменение типа синтаксической связяи.

Укажите рядом с выписанным предложением прием перевода и перевод.

2. Найдите в тексте и выпишите 2 простых предложения. Переведите.

3. Найдите в тексте и выпишите 2 ложных предложения. Переведите.

Текст для перевода

The sociopolitical consequences of increased commitment to nuclear technologies which representonly 5 percent of world energy, raises questions of democratic decision-making to safeguard the environment and health and safety of the general public (Holdren, 1976). Some ask if it is worth the price.

Research on the social and political implications identifies the crucial contrast between vulnerable and nonvulnerable technologies, and between technological waste and social waste. Areas of consensus and dissent appear, suggesting that the way energy is used and the purpose to which it is put are important to acceptance if not satisfaction. For example, in Europe, North America, and elsewhere a consensus is forming against wasteful engineering design. Few people would express themselves against improved miles per gallon or improved efficiency of refrigerators. There is more likely to be dissent on social waste; people would be more likely to object to car-pooling or trading autos for mass transit. With regard to solar strategies there might be consensus on the democratizing effect of direct solar technology-after all, the sun falls on the rich and the poor, the weak and the powerful, the famous and the anonymous.

Particularly the issue of decentralized solar power is symbolic of a greater issue: the preserva-

tion of liberty and equity through maintaining some independence from the "big system" (Stanford Research Institute, 1976). Centralized solar energy systems would have few of the dangers associated with highly vulnerable supply technologies, but there is expressed dissent at least among experts. Whatever the disagreements, it is clear that at issue is the value placed on freedom.

A shift in values

Movement to redirect technological progress has brought about an "efficiency revolution" and the notion of a new industrial revolution incorporating, for example, the production of hypercars, compact fluorescent lamps, water drip systems, desk top computers that give more for less. Such movement is fueled by the realization that if Northern lifestyles spread globally it would take several globes to accommodate such life styles. It is well documented that the world's well–to–do minority uses the most energy, produces the greatest amount of pollution, and contributes greatly to the greenhouse effect.

The efficiency revolution is in direct contradiction to supply side wizardry or high tech fantasies of fast breeder reactors, mega-fertilizer factories, gigantic water projects, preferring instead direct solar, hydro power, wind power, biomass, fuel-cell cars and the like (Nader, 1995). In the United States and Europe a coalition of business executives, consumers, environmentalists, labor leaders and legislators are the new energy entrepreneurs in a world where oil and coal fuels are increasingly being viewed as sunset industries (Hawken, Lovins, and Lovins, 1999).

Energy is becoming a multi–disciplinary concern. Aspects which were of interest to physicists, chemists and engineers are now a fixed growing concern for a wide variety of people. All energy research is inextricably interwoven with values, such as those relating to scale, complexity, organization, scientific challenge, and cost.

2 Вопросы для промежуточной аттестации

Процедура проведения зачета

Для получения отметки «зачтено» студент должен ответить на вопросы билета, который он выбирает из 25 билетов. В билете два вопроса: первый требует письменный перевод текста с английского на русский, при этом текст студенту представляется впервые. Второй вопрос предполагает письменное выполнение нескольких заданий, представленных ниже. Тексты носят научно-технический характер и соотносятся с темами текстов контрольных работ. В 5 семестре тема текстов - «Электроэнергетика и электротехника».

Критерии оценивания

При проведении зачета отметка «зачтено» выставляется при условии, что при выполнении первого задания билета студент перевел не менее двух третей текста, не допустив ошибок, искажающих смысл переводимого текста. Выполнена половина второго задания.

Вопросы к зачету

1. Выполните полный письменный перевод текста с помощью словаря.
2. Выпишите из текста:
а) 1 простое предложение
б) 1 сложное предложение. Укажите его тип.
в) Выпишите из текста предложения, при переводе которых вы использовали один из следующих приемов: замена простого предложения сложным, замена сложного предложения простым, членение или объединение предложений, изменение типа синтаксической связяи. Укажите рядом с выписанным предложением прием перевода.

Рекомендованная литература

1 Агабекян И.П. Английский язык для бакалавров / И.П. Агабекян. - 2 изд. - Рн/Д: Феникс, 2012. 379 с. (Высшее образ.)

2 Слепович П.С. Перевод: (английский - русский): учебное пособие. Минск: ТетраСистемс, 2009. 336 с.

Приложение А

Техника выполнения разных видов перевода

Полный письменный перевод текста

Работа над полным письменным переводом предусматривает ряд шагов.

Шаг первый. Внимательное чтение всего текста с использованием, словарей, справочников, специальной литературы. На данном этапе необходимо понять, что выражено на языке оригинала. Для этого следует внимательно, и может быть не один раз, прочитать весь текст. Важно понять общее содержание.

Шаг второй. Деление текста на смысловые части - предложения, группы предложений, абзацы. Величина определяемой для перевода части текста зависит от 3-х факторов: смысловой законченности, сложности содержания, возможностей памяти переводчика. Такой частью текста может быть предложение, группа предложений, абзац, 11/2 абзаца и т.п., но эта часть должна быть обязательно законченной по смыслу. Чем сложнее текст - тем меньше такая часть, чем лучше память переводчика - тем она больше.

Читая текст по предложениям, нужно постараться понять синтаксический строй и смысл каждого предложения. Если синтаксический строй предложения неясен, следует выполнить грамматический анализ: определить вид предложения, найти подлежащее, сказуемое, второстепенные члены. Если предложение сложноподчиненное, найти главное и придаточное предложения, опираясь на формальные признаки. Обращаться к словарю следует в том случае, если были использованы все средства раскрытия значения незнакомых слов, включая догадку и грамматический анализ. При переводе последующего предложения необходимо постоянно удерживать в памяти смысл предыдущего, иначе теряется логическая связь между отдельными предложениями.

Шаг третий. Написание черновика. Работа над каждой выделенной частью текста последовательно. На данном этапе полностью усвоенный и понятый текст записывается по-русски. При этом следует полностью отвлечься от оригинала.

Шаг четвертый. Повторное (неоднократное) чтение оригинала, сравнение его с черновиком. После того, как письменно изложено содержание выделенной части текста, нужно обратиться к оригиналу для сверки. При переводе последующих частей текста необходимо постоянно следить за стилем, т.е. за качеством, единообразием и логикой изложения. Единообразие терминологии должно соблюдаться на протяжении всего текста. Между каждой последующей и предыдущей частью перевода была логическая связь.

Шаг пятый. Окончательное редактирование перевода с внесением поправок. При редактировании руководствуются правилами: а) если одну и ту же мысль можно выразить несколькими способами, то предпочтение отдается более краткому способу; б) если слово иностранного происхождения можно без ущерба заменить словом русского происхождения, то переводчик обязан это сделать; в) все термины и названия должны быть строго однозначны.

Шаг шестой. Перевод заголовка. Так как заголовок должен отражать суть содержания текста, он переводится в последнюю очередь.

Аннотационный перевод текста

Аннотационный перевод - вид технического перевода, заключающийся в составлении аннотации оригинала на другом языке. Аннотация - краткая характеристика оригинала, излагающая его содержание в виде перечня основных вопросов и иногда дающая критическую оценку.

Объем аннотационного перевода обычно составляет не более 500 печатных знаков. Выполняя аннотационный перевод, Вы сообщаете о том, что изучается, описывается, обсуждается и т.д. При этом, для английского языка наиболее характерны предложения со сказуемым в пассивном залоге и прямой порядок слов, а для русского языка - предложения со сказуемым в страдательном залоге, но с обратным порядком слов.

Например:

The problem of programming is studied. Изучается вопрос программирования.
The main principles are discussed. Изложены основные принципы.
The advantages of the method are outlined. Описаны преимущества данного метода.

Примерная схема аннотационного перевода

1. Постановка проблемы.
2. Методы решения проблемы.
3. Выделение узловых пунктов статьи.
4. Рекомендации.

Основные клише и штампы, используемые при аннотационном переводе:

1. Статья посвящена вопросу...
Речь идет о...
2. Предлагаются методы...
Описываются преимущества методов...
3. Особое внимание уделяется...
Автор подчеркивает важность...
4. Статья представляет интерес для...

БОБРОВА НАТАЛЬЯ ВЛАДИМИРОВНА

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методические указания по организации самостоятельной работы
для студентов направления 13.03.02 «Электроэнергетика и электротехника»
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ФГАОУ ВО
Национальный исследовательский технологический университет «МИСиС»
Новотроицкий филиал
462359, Оренбургская обл., г. Новотроицк, ул. Фрунзе, 8.
E-mail: nfmisis@yandex.ru
Контактный тел. 8 (3537) 679729.