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РОССИЙСКОЙ ФЕДЕРАЦИИ
ГОСУДАРСТВЕННОЕ ОБРАЗОВАТЕЛЬНОЕ БЮДЖЕТНОЕ
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«ТВЕРСКОЙ ГОСУДАРСТВЕННЫЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ»

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HEAT-AND-POWER ENGINEERING

Практикум по развитию иноязычной (английский язык) профессиональной компетенции студентов по направлению 13.03.01 «Теплотехника и теплоэнергетика»

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Предназначено для студентов, обучающихся по направлению подготовки «Теплотехника и теплоэнергетика» (13.03.01), а также широкого круга читателей, интересующихся вопросами в данной сфере.

Ставит целью обучить студентов читать иностранную литературу по специальности и осуществлять коммуникацию на профессиональные темы.

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PART I

UNIT I. GENERAL ASPECTS OF HEAT ENGINEERING

Vocabulary

principal – основной
fossil fuel – ископаемое топливо
burn – сжигать
solid – твердый
liquid – жидкий
coal – уголь
peat – торф
hydrocarbon – углеводород
firewood – дрова
furnace – печи
combustion – сгорание
pressure – давление
oxygen – кислород
quantity – количество
lump – кусок
conserve – экономить
source – источник
shale – сланец
waste – отходы
approximately – примерно
nuclear –ядерный
maintain – поддерживать
carbon dioxide – углекислый газ
generation – выработка
groundwater – подземные воды
spring – источник
tremendous – огромный
scale – масштаб
requirement – требование
hotbed – парник
household – бытовой
exhaust gases – выхлопные газы

Exercise 1. Practise the reading of the following words.
Dicovery [dɪs'kʌv(ə)rɪ], decisive [dɪ'saɪsɪv], automotive [ˌɔː.təˈməʊ.tɪv], kerosene [ˈker.ə.siːn], methane [ˈmiː.θeɪn], hydrocarbon [ˌhaɪ.drəʊˈkɑː.bən], dioxide [daɪˈɒk.saɪd], oxygen [ˈɒk.sɪ.dʒən], pulverize [ˈpʌl.vər.aɪz], design [dɪˈzaɪn], temperature [ˈtemprətʃə(r)], neutron [ˈnjuː.trɒn], agricultural [ˌæg.rɪˈkʌl.tʃər.əl], exhaust [ɪgˈzɔːst], geothermal [ˌdʒiː.əʊˈθɜː.məl].

Exercise 2. Make sure if you can read these words correctly and say what words in the Russian language help you to guess their meaning.
Method, natural, kerosene, diesel, thermal, gas, hydrocarbon, apparatus, generation, atmospheric, oxidant, design, neutron, inert, geothermal, practical, region, system, technical, economic, to distill, agricultural, production, electric, metallurgical, boiler.

Exercise 3.Give the initial forms of the following words.
Sources, engines, consists, developed, burned, oxidizing, enriched, pulverized, joined, becoming, using, found, collecting, cases, furnaces, utilized.

Exercise 4. State what parts of speech the following words belong to.

Principal, gaseous, combustible, possibility, tremendous, natural, requirement, directly, various, chiefly, smaller, industrial, generation, combustion, breeder, production, burner, practical, increasingly, density, equipment, radiation, higher.

HEAT PRODUCTION

The principal sources of heat today are the fossil fuels, which give off heat when burned. These fuels may be solid, liquid, or gaseous. Among the more common solid fuels are coals (lignites, anthracites), combustible shales, and peat. Petroleum is a natural liquid fuel, but it is seldom used directly to produce heat. Instead, it is refined to produce gasoline for automotive and piston aircraft engines, kerosene for jet engines and certain types of piston engines, and various types of diesel fuel and mazut, used chiefly in nonnuclear thermal power plants. The most important gaseous fuel is natural gas, which consists of methane and other hydrocarbons. On a smaller scale, wood (firewood, scrap wood) also serves as a fuel. Methods are now being developed to burn industrial and domestic waste materials for purposes of both disposal and heat generation.

Various types of apparatus, such as furnaces, stoves, and combustion chambers, are used for fuel combustion. Fuel is burned in furnaces and stoves at a pressure close to atmospheric with air as the oxidizing agent. In combustion chambers, the pressure may be higher than atmospheric and oxygen air or air enriched with oxygen may serve as the oxidant.

Coal is usually burned in furnaces. For burning larger quantities of coal (hundreds of tons per hour), chamber furnaces are used. Mazut furnaces and gas furnaces are similar to pulverized coal furnaces but they have different burner and nozzle designs.

Since the mid-1900's, nuclear fuel has joined organic fuel as a source of heat. In almost all reactors, the nuclear chain reaction is maintained by thermal neutrons. However, breeder reactors, which involve fast neutrons, are becoming increasingly common. Typical coolants for reactors using thermal neutrons are water, heavy water, and carbon dioxide; in fast-neutron reactors, they are liquid sodium and inert gases.

In addition to organic and nuclear fuels, geothermal and solar energy have been found to have practical value in heat generation. Geothermal energy manifests itself in hot groundwater, which often comes to the surface in regions of volcanic activity, and in the general temperature increase with depth inside the earth. While the heat from hot springs is already being put to use, the possibility of using heat from the earth's interior is as yet only being studied.

The sun is a tremendous source of heat. However, the density of solar energy at the earth's surface is low. Systems and equipment for collecting solar radiation on a large scale that meet both technical and economic requirements are now

being developed. And in many regions solar energy is being used to distill water and to heat water for agricultural (hotbeds, greenhouses) and household needs; in some cases, it is used in the production of electric power.

Of great importance in view of the need to conserve natural fuels is the use of secondary heat sources. These sources include the hot exhaust gases of metallurgical furnaces or internal-combustion engines whose heat is utilized in waste-heat boilers.

Exercise 5. Read the text and answer the questions.

1. What are the principal sources of heat today?
2. What common solid fuels do you know?
3. What is the most important gaseous fuel?
4. How is fuel burned in furnaces and stoves?
5. When are chamber furnaces used?
6. Where does geothermal energy manifest itself?
7. What is a tremendous source of heat?
8. The density of solar energy at the earth's surface is low, isn't it?
9. What are secondary heat sources?

Exercise 6. Give the English equivalents.

The principal sources; solid, liquid, or gaseous fuels; combustible shales; to produce heat; piston aircraft engines; nonnuclear thermal power plants; industrial waste materials combustion chambers; a pressure close to atmospheric; air enriched with oxygen; hundreds of tons per hour; burner and nozzle designs; the nuclear chain reaction; hot groundwater; regions of volcanic activity; the density of solar energy; on a large scale; to distill water; to heat water for agricultural needs; to conserve natural fuels; internal combustion engines.

Exercise 7. Complete the sentences.

1. … is refined to produce gasoline for automotive and piston aircraft engines…
2. Methods are now being developed….
3. In combustion chambers … serve as the oxidant/.
4. … are similar to pulverized coal furnaces but have different….
5. Since the mid-1900's….
6. … they are liquid sodium and inert gases.
7. … the possibility of using heat from the earth's interior is as yet only being studied.
8. Systems and equipment for collecting solar radiation….

Exercise 8. Read the text again and choose the best title for each passage from the list given below.

1. Coal furnaces.

2. Apparatus used for fuel combustion.
3. Geothermal energy.
4. Secondary heat sources.
5. Nuclear fuel.
6. Types of the fossil fuels.
7. Solar energy.

Exercise 9. Read the dialogue and act it:
Frank: Hello, Bob Peterson's office, Frank speaking.
Peter: This is Peter Jackson calling, is Bob in?
Frank: I'm afraid he's out at the moment. Can I take a message?
Peter: Yes, could you ask him to call me at. I need to talk to him about the heating plant line, it's urgent.
Frank: Could you repeat the number please?
Peter: Yes, that's 958-68-23, and this is Peter Jackson.
Frank: Thank you Mr. Jackson.
Peter: Thanks, bye.
Frank: Bye.

UNIT II. THE TOWN I LIVE IN

Vocabulary

be founded – быть основанным
principal – главный, основной
province – губерния
enterprise – предприятие
head – возглавлять
timber – лесоматериалы
restore – восстанавливать
work up – разработать
consider – считать, полагать
preserve – сохранить
Travel Palace – Путевой дворец
former – бывший
erect – воздвигать
bank – берег
merchant – купец
outskirts – окрестности
Catherine the Great – Екатерина Великая
carriage – вагон
appear – появляться, (являться, казаться)
combine – комбинат
artificial – искусственный
fibre – волокно
Octagonal Square – Восьмиугольная Площадь
textile mill – текстильная фабрика
Philharmonic Society – филармония
Cinema – кино(театр)
be housed in – располагаться в
educational – образовательное
establishment – организация
picturesque – живописный
advantageous – благоприятный

Exercise 1. Read the words with right pronunciation and stress.

Tver Province, provincial, architecture, Octagonal Square, embankment, monument, large textile mills, railway carriage building plant, enterprise, printing and publishing combine, artificial fibre and leather combines, industry, scientific, Drama Theatre, Philharmonic Society, picturesque, tourist.

Exercise 2.

a) Form verbs adding the suffix -en to the given adjectives and translate them.

Example: fast – крепкий →to fasten – прикреплять

bright, dark, sharp, wide, less, broad, deep, short, weak, hard.

b) Form verbs with an opposite meaning adding the prefix un-and translate them.

Example: to cover – покрывать → to uncover – раскрывать

to close, to load, to tune, to tie, to fasten, to charge, to balance, to fix, to lock, to pack, to bend.

Exercise 3. Match up the words with opposite meaning.

a) to cover, old, directly, much, more, rapidly, small, visible, powerful, long, before, to take, significant, effective, to restore;

b) to uncover, ineffective, to destroy, to give, after, powerless, short, large, invisible, slowly, less, little, new, indirectly, insignificant.

THE TOWN OF TVER

The town of Tver stands on the great Russian River Volga. The town was known as Kalinin from 1931 to 1990. It is one of the oldest Russian towns. Tver was founded in 1135, so it is 12 years older than Moscow. In 1755 Tver became the principle town of the Tver province.

In the 18th century Catherine the Great sent a group of architects headed by P.R. Nikitin to restore the town after two great fires. The best architects of Russia A.V. Kvasov and M.F. Kasakov worked up the town development plan. The town planning was considered to be a height of a three-rayed architectural composition. It has been preserved to our days. Many beautiful buildings designed by them are examples of Russian architecture. These buildings are: the Travel Palace, a number of buildings in Octagonal Square (now Lenin Square) and on the bank of the Volga River.

Many famous Russian poets and writers came to Tver many times. Some of them lived or stayed here for a long time: A.S. Pushkin, I.A. Krylov, M.Y. Saltykov-Shchedrin, L.N. Tolstoy. Monuments to these people were erected in our town. On the left bank of the Volga River we can also see the monument to the Tver merchant Afanasy Nikitin who was the first to visit India.

In the second part of the 19th century Tver became a large industrial town. Here appeared large textile mills, a steam mill, a timber mill and a railway carriage building plant. Now Tver is a big industrial and administrative center of the Tver Region. There are many large enterprises of engineering, machine building, metal working, chemical, polygraphical food and other industries.

Tver is also a big cultural centre of our country. Tver has Drama Theatre, Philharmonic Society, Children's Theatre as well as cinemas, clubs, palaces of culture, television centres and many libraries. The Gorky Regional Library, the largest library, has over 3,000,000 books.

There are many educational establishments in our town. Among them are State University, Technical University, State Medical University and Agricultural Academy.

The country around Tver is very picturesque. The town of Tver grows and becomes more beautiful from year to year. Its old history, advantageous geographical location between the two Russian capitals, rich nature, developed industry, intellectual, scientific and cultural potential are sure to attract tourists to the Tver Region.

Exercise 4. Re-read the text, answer the following questions.

1. Where does the town of Tver stand?
2. When was Tver founded?
3. Is Tver older than Moscow?
4. By whom was the centre of the city designed?
5. What buildings were built by these architects in Tver?
6. Which Tver square and three Tver streets form the famous three-rayed architectural composition?
7. Where is the Octagonal Square? What is its modern name?
8. What famous people lived and worked in Tver?
9. What large Tver enterprises do you know?
10. What is the largest library in Tver?
11. How many higher schools are there in Tver?
12. Why is our town so attractive for tourists?

Exercise 5. Translate the following sentenced into English.

1. Он расположен на Волге.
2. Тверь – один из старейших русских городов.
3. Город Тверь на 12 лет старше Москвы.
4. В Твери много современных предприятий.
5. В городе живет более 400 тысяч человек.
6. Тверь растет и становится краше с каждым годом.
7. Полиграфический комбинат выпускает сотни учебников и журналов.
8. Памятник Афанасию Никитину находится на берегу Волги.

9. Библиотека имени Горького – одна из старейших в городе.

Exercise 6. Complete the following sentences with suitable verbs in the right forms.

to build, to preserve, to found, to design, to erect, to surround, to house

1. Tver _____ in the 12th century.
2. The centre of the town _____ by Kasakov and Nikitin.
3. This centre _____ to our days.
4. A monument to Krylov _____ in our town.
5. Many new buildings _____ in the former «outskirts».
6. The Gorky Library _____ in a big building.
7. The town _____ by forests.

Exercise 9. Define the forms of the infinitive (active/passive, simple/ continuous/perfect).

To give; to be produced; to have been taken; to have been over; to be using; to have been conserving; to be served; shall discuss; to have been found; to consist; to be joining; to have developed.

UNIT III. PRINCIPLES OF HEAT ENGINEERING

Vocabulary

transfer – передача
concern – касаться, относиться
volume – объем
finite – конечный
emit – выделять
radiate – излучать
exchange – обмен
joint – совместный
divide – делить
occur – происходить
proceed – продолжаться
determine – определить
equilibrium – равновесие
irreversibility – необратимость
blackbody – черное тело
flow – поток
laminar – ламинарный, пластинчатый
emissivity – коэффициент излучения
narrow – узкий
media – среда
free-flowing – сыпучий
steam boiler – паровой котел

Exercise 1. Practise the reading of the following words.

Generate[ˈʤɛnəreɪt], record [ˈrekɔːd], thermodynamics [θɜːməʊdaɪˈnæmɪks], pattern [ˈpætən], physical [fɪzɪkəl], homogeneous [ˌhɒməʊˈʤiːnjəs], law [lɔː], agents[ˈeɪʤənts], equipment [ɪˈkwɪpmənt], characterized [ˈkærɪktəraɪzd], apparatus [ˌæpəˈreɪtəs], occur [əˈkɜː], characteristic [ˌkærɪktəˈrɪstɪk], turbulent [ˈtɜːbjʊlənt], manual [ˈmænjʊəl], means [miːnz].

Exercise 2.Make sure if you can read these words correctly and say what words in the Russian language help you to guess their meaning.
Modern, person, phonograph, code, signal, telegraph, symbol, method, diaphragm, experiment, poem, to reproduce, stereo, process, principle, line, microphone, original, music, laboratory, energy, apparatus, instrument, diameter, type.

Exercise 3. Form adjectives adding the suffix -less to the given nouns. Translate the nouns and adjectives into Russian.
Example: hope – hopeless – надежда – безнадежный
wire, noise, help, motion, friend, aim, shape, branch, cause, character, sense, respect, object, ground, harm, change, power, colour, limit, meaning, voice, weight, life.

Exercise 4. Read the words and say what suffixes they have and what parts of speech they belong to.
Use, useful, usefulness; invent, inventor, invention; transmit, transmitter, transmission; work, worker; special, speciality, specialist; practice, practical; contain, container; lecture, lecturer; create, creative, creation; accelerate, acceleration, accelerator; determine, determination; proper, properly, property; science, scientific, scientist; discover, discovery, discoverer; important, importance; react, reaction, reactor, reactivity; arrange, arrangement; capable, capability; apply, application.

THEORETICAL PRINCIPLES OF HEAT ENGINEERING

The processes of generating and using heat are based on theoretical principles in heat engineering, that is, on engineering thermodynamics and heat transfer.

Thermodynamics is concerned with the properties of macroscopic systems in a state of thermodynamic equilibrium and with the processes of transition between these states. An equilibrium state is completely described by a few physical parameters, for example, the state of a homogeneous liquid or gases determined by any two of the three quantities of temperature, volume, and pressure. The energy equivalence of heat and work is established by the first law of thermodynamics. The second law of thermodynamics determines the irreversibility of macroscopic processes that proceed at a finite rate; it limits the maximum efficiency possible in converting heat into work.

Heat transfer is concerned with processes of heat exchange between heat-transfer agents through a dividing space or wall and across an interface. In heat engineering equipment, heat can be transferred by radiant heat exchange, convection, and heat conduction.

Radiant heat exchange is typical of furnaces and combustion chambers, as well as of certain stoves. The total energy radiated by any body is proportional to the fourth power of the body's temperature. At a given temperature, a blackbody emits the most energy. Actual bodies are characterized by their emissivities (total or spectral), which represent the portion of the energy of an ideal blackbody that a given body radiates (over the entire wavelength range or in a narrow band) at the same temperature.

Heat exchange by convection is carried out through the flow of matter in liquids, gases, and free-flowing media. The heating or cooling of liquids and gases in various heat-engineering apparatus occurs through convection, as in hot-blast stoves and the economizers in steam boilers. Here, the heat is transferred either to or from the wall by the turbulent agitation of the flow. The intensity of this process is given by the heat-transfer coefficient.

Heat exchange by conduction is typical of solid bodies and of the laminar flow of liquids and gases in contact with a solid wall. In this case, heat is transferred by a microscopic process of energy exchange between the molecules or atoms of a body. In practice, the heat-transfer process is often caused by the joint effect of the above-mentioned types of heat exchange.

Exercise 5. Read the text and answer the questions.

1. What are the processes of generating and using heat based on?
2. Name the first law of thermodynamics.
3. What does the second law of thermodynamics determine?
4. How can heat be transferred in heat engineering equipment?
5. When does a blackbody emit the most energy?
6. What is heat exchange by convection carried out through?
7. What is given by the heat-transfer coefficient?
8. Heat is transferred by a microscopic process of energy exchange between the molecules or atoms of a body, isn't it?

Exercise 6. Choose the right word.

1. The processes of generating and using heat are based on … principles in heat engineering.

a) theoretical b) practical c) modern

2. Heat transfer concerns itself with processes of heat … between heat-transfer agents.

a) transfer b) exchange c) accumulation

3. Actual bodies are characterized by their … (total or spectral).

a) exchange b) energy c) emissivities

5. The heat-transfer process is … caused by the joint effect of the above-mentioned types of heat exchange.

a) always b) seldom c) often

Exercise 7. Complete the sentences.

1. Thermodynamics is concerned with ….
2. … is typical of furnaces and combustion chambers ….
3. … increases with the thickness of the radiating layer.
4. The heating or cooling of liquids and gases in various ….
5. … transferred either to or from the wall ….

Exercise 8. Give Russian equivalents.

Equilibrium state, energy equivalence, heat-transfer agents, heat engineering equipment, heat conduction, radiant heat exchange, combustion chambers, certain stoves, entire wavelength range, hot-blast stoves, steam boilers, solid wall, turbulent agitation, heat-transfer coefficient, the laminar flow.

Exercise 9. Read and say if the statements are true, false or not stated in the text.

1. An equilibrium state is completely described by a few physical parameters.
2. The total energy radiated by any body is proportional to the fifth power of the body's temperature.
3. The total emissivity of solid bodies usually lies in the range 0.5 – 0.8.
4. Heat exchange by conduction is typical of the laminar flow of liquids and gases in contact with a solid wall.

Exercise 10. Look at this job advertisement. Write a letter of application for a job.

National Canada Ltd. has an urgent need for PROCESSING ENGINEER. If you meet all or some of the requirements listed below, we would like to see you.
25 – 30 years old.
Work experience not less than 3 years.
Good computer skills.
In the event of a mail strike: to arrange an interview please call
1-519-884
and ask for:
Susan Deter,

Professional Placement Manager
National Canada Ltd.
158 Weber Street North
Waterloo, Ontario

UNIT IV. FAMOUS SCIENTIST

Vocabulary

Contribute – способствовать
blacksmith – кузнец
establish – установить
underlying – базовый
principle – правило
rotary – поворотный
capacitance – емкостное сопротивление
benzene – бензол
retire – уйти на пенсию
influential – влиятельный
direct current – постоянный ток
affect – влиять
similarly – аналогично
foundation – основа
due to – из-за
appoint – назначать
provide – обеспечить

Exercise 1. Read the following words. Pay attention to the pronunciation of the consonants and their combinations.

[θ]- think, throw, third, fifth, thin, teeth
[ð]- though, those, this, that, with, without
[ʒ]- usual, vision, measure, pleasure, decision
[dʒ]- Jam, Jim, Jane, January, George, badge
[ʃ]- ship, sheep, shoe, shop, share, finish
[tʃ]- cheese, chess, culture, fetch, match, chair
[v] - very well, very wet, wet weather, win victory, warm wind
[w]- white vase, violet whale, wise Wilde, wide valley
[ŋ]- think, thing, thank, interesting, building, engineering
[h]- his, her, high, hat, horse, hill, house, hope, husband

Exercise 2. One can make nouns, adjectives and verbs negative by using certain prefixes. Form nouns using the prefixes and translate them.

un- to pack, tidy, fair, employed, kind, happy, expensive, important
im- polite, modest, perfect
in- efficiency, correct
il- legal, literate
ir- relevant, responsible, replaceable
dis- to agree, to like, to appear, an advantage, to connect, loyal, to arm
non- sense

MICHAEL FARADAY

Michael Faraday [ˈfæ.rəˌdeɪ] is an English scientist who contributed to the fields of electromagnetism and electrochemistry.

Michael Faraday was born in 1791 in Newington Butts, Southwark, being the son of a Sandemanian blacksmith who had moved from the North West of England.

Although Faraday received little formal education, he was one of the most influential scientists in history. It was by his research on the magnetic field around a conductor carrying a direct current that Faraday established the basis for the concept of the electromagnetic field in physics. Faraday also established that magnetism could affect rays of light and that there was an underlying relationship between the two phenomena. He similarly discovered the principle of electromagnetic induction, diamagnetism, and the laws of electrolysis. His inventions of electromagnetic rotary devices formed the foundation of electric motor technology, and it was largely due to his efforts that electricity became practical for use in technology.

He was appointed Scientific Adviser to the Admiralty and was Professor of Chemistry at the Royal Military Academy. As a chemist, Faraday discovered benzene, investigated the clathrate hydrate of chlorine, invented an early form of the Bunsen burner and the system of oxidation numbers, and popularized terminology such as anode, cathode, electrode, and ion.

In June 1832, the University of Oxford granted Faraday a Doctor of Civil Law degree (honorary).

He was awarded a Civil List Pension in 1836. in 1858 the Queen provided him with a Grace and Favour House at Hampton Court where Faraday retired to live.

Faraday died at this house on 25 August 1867, aged 75 and was bured at Highgate Cemetery. The SI unit of capacitance is named in his honour: the farad.

Exercise 3. Answer the questions about Faraday.

1. When and where was Michael Faraday born?
2. Faraday received little formal education, didn't he?
3. What did Faraday establish?
4. What inventions formed the foundation of electric motor technology?
5. What is named in his honour and how?
6. Where was he Professor of Chemistry?
7. What did Faraday discover as a chemist?
8. When did the University of Oxford grant Faraday a Doctor of Civil Law degree?
9. Where did Faraday retire to live?
10. When did Faraday die?
11. Where was he bured?

Exercise 4. Give Russian equivalents.

Magnetic field, electromagnetic induction, diamagnetism, the laws of electrolysis, electromagnetic rotary devices, electric motor technology, the clathrate hydrate of chlorine, the Bunsen burner, the system of oxidation numbers, a Doctor of Civil Law degree, a Civil List Pension, a Grace and Favour House.

Exercise 5. Read the dialogue and act it:

Mr. Ivanov: You wanted to look at our manufacturing factory, didn't you, Mr. Grey?
Mr. Grey: Yes. I'd appreciate it if you could arrange for me a visit to your heating power unit manufacturers.
Mr. Ivanov: That's possible. We could take you to the plant in Tver, it's one of our biggest manufacturers.
Mr. Grey: That would be wonderful. I've heard a lot about their production and training facilities.
Mr. Ivanov: We can show you round the main shops and then we can have a talk in the chief engineer's office.
Mr. Grey: Good. Can you tell me how many workers employ here?
Mr. Ivanov: Roughly about 2 thousand.
Mr. Grey: I see you use up-to-date technology in your factory. The factory is not overmanned, is it?
Mr. Ivanov: Not if you take into account the total annual output and the range of production. In fact most of the shops are highly automated as you will see.

Exercise 6. Study the formal letter and put the following parts of the formal letter in the correct order.

- [ ] Yours truly
- [ ] City College
  14 Mountain View, WA 9999
- [ ] Would you please send me a copy of Heat Engineering Dictionary, unabridged second edition, 2012? I am inclosing a money order for $37.50 to cover cost and handling. If this amount is not correct, please let me know.
- [ ] Dear Ms Smith,
- [ ] September 15, 1997
- [ ] Miss R.J. Smith
- [ ] Blackstone Book Agency
  Sixth and Riverside Avenue
  Olympia, WA 9999
- [ ] Josephina Black
  Principal

PART II

UNIT I. HEATING PLANT

Vocabulary

refer - относиться
outlying – отдаленный, удаленный
handling – обращение, перемещение, транспортировка
feed – подача, питании,; снабжение
utilities – коммунальные предприятия
off-grid – зависящий от коммунальных служб
cooling tower - башенный охладитель
boiler – room котельная
facility – объект, устройство, установка
anticipate – ожидать
outage – простой, перебой
psig – pounds per square inch – фунт на квадратный дюйм
feedwater – питательная вода
downcomer – спускная труба, вертикальная труба
input – вход, ввод, подвод, подача, загрузка
fossil fuel – ископаемое топливо
municipal waste – городские отходы
side stream – боковой поток
reboiler – кипятильник
boost – повышать, повышение, увеличение, поддержка, усиление
distribution system – система распределения

Exercise. 1. Mind the rules of pronunciation.
[ai]: sight, life, style, derive, arise, combine, apply, rely, library, slide, side;
[ei]: basic, behave, maintain, contain, engage, debate, fake, occasional, domain;
[əu]: process, role, whole, remote, hope, social, close, probe, own, suppose;
[i:]: complete, equal, feel, deal, people, beat, feed, field, heat, stream;
[ʌ]: fundamental, structure, industrial, hundred, current, conduct, club;
[e]: intellectual, direction, expect, engineer, spread, development, extensive;
[æ]: aspect, action, satisfaction, standard, practice, systematic, manager;

Exercise 2. Form nouns or adjectives using the suffixes and translate them.
er: to transform, to own, to read, to teach, to realize, to organize, to manage;
or: to initiate, to operate, to protect, to invent, to direct, to process;
ion: to contribute, to invent, to consolidate, to demonstrate, to express;
ment: to commit, to manage, to improve, to develop, to pay, to agree, to judge;
ship: member, friend, partner, champion, author;

ful: beauty, meaning, harm, use, hope, help, success, color;
al: experiment, form, historic, industry, tradition, occasion, technology, practice.

WHAT IS A HEATING PLANT?

A heating plant refers to a steam or hot water heating system that serves a number of outlying buildings. It is specified by the type of equipment used. The equipment consists of the boiler, pumps, valves, the piping of the steam water system, and the storage, handling and feed equipment of the fuel system. The key components of a heating plant include operating conditions, type of boilers, and source of fuel.

Heating plants are common among older university campuses, rural or off-grid industrial sites and military complexes. Often these facilities are co-located with electric municipal or industrial utilities. Shared usage is common between processing plants that use high pressure steam and then forward the low pressure steam to a hospital or college to utilize the heat rather than discharge it to the environment via a cooling tower or cooling ponds. The space that houses a small boiler within the basement of single building is usually referred to as the boiler room, as opposed to a heating plant.

The capacity and operating pressure and temperature are key design questions determined by the anticipated heat load. To avoid complete outage, a heating plant usually has two or three boilers. Steam pressures are usually limited to less than 150 psig. A typical operating range is from 100 to 125 psig, but the most economical design will consider the higher cost of a higher pressure system versus the operating load required to heat the buildings.

A water-tube design is often used for boilers employed in heating plants. In this design, hot gases from the combustion of the fuel pass over steam-generating tubes in which water from the feedwater drum is heated to boiling. The steam rises to a steam separation drum where condensed water flows by gravity through large tubes called downcomers back to the feedwater drum to preheat that input. Additional energy is added to the steam by heating it above its boiling point by drawing steam from the steam separation drum back through the hot gas chamber one more time.

The boiler can be fueled from a variety of sources, including gas, coal, or other fossil fuel. Many renewable resources are used as well, including geothermal heat, wood, municipal waste or agricultural biomass. The energy source is selected based on availability, cost, and heat load requirements. When a high-energy fuel source is present and the heat load is relatively low, cogeneration of electricity is possible from a side stream of steam passing through a turbine. A heating plant that is using a waste steam line from a high-pressure steam source

may use a reboiler to boost the heating value of the incoming steam or may simply consist of the distribution system.

Exercise 3. Answer the following questions.

1. What does a heating plant refer to?
2. What does the heating equipment consist of?
3. What do the key components of a heating plant include?
4. Are heating plants common nowadays?
5. What are key design questions determined by the anticipated heat load?
6. What conditions are suitable to avoid complete outage of a heating plant?
7. What design is often used for boilers employed in heating plants?
8. How do hot gases operate in this design?
9. What fuel sources can the boiler be fueled from?
10. How is the energy source selected?
11. Are there any conditions suitable for cogeneration of electricity?
12. What is reboiler used for?

Exercise 4. Match the English and Russian equivalents.

1. water heating system	a. установка
2 heating plant	b. градирня
3. facility	c. отопительная система
4. cooling tower	d. теплоцентраль
5. capacity	e. спускная труба
6. downcomer	f. мощность

Exercise 5. Choose the right term from the list given below and complete the sentences.

Key components, shared usage, water-tube design, operating pressures, downcomers, renewable resources, equipment, heating plant, feedwater drum.

1. A ... refers to a steam or hot water heating system that serves a number of outlying buildings.
2. The ... consists of the boiler, pumps, valves, the piping of the steam water system, and the storage, handling and feed equipment of the fuel system.
3. The ... of a heating plant include operating conditions, type of boilers, and source of fuel.
4. ... is common between processing plants that use high pressure steam and then discharge it to the environment via a cooling tower or cooling ponds.
5. The capacity, ... and temperature are key design questions determined by the anticipated heat load.
6. A ... ... is often used for boilers employed in heating plants.
7. The steam rises to a steam separation drum where condensed water flows by gravity through large tubes called ... back to the ... ... to preheat that input.

8. Many ... ... are used as well, including geothermal heat, wood, municipal waste or agricultural biomass.

Exercise 6. Translate *noun+noun* structures into Russian.
Steam conditions, transmission medium, system tasks, key design, boiler types, security considerations, certification exams, heat-and-power engineer, environment protection, feed equipment, high-pressure steam, feedwater drum, plant capacity, energy source, heat load, energy fuel, distribution system.

Exercise 7. Here are some points to ponder. Ask your group mate
− if he / she has ever seen a heating plant.
− if so, what the heating plant he / she saw refers to.
− what kind of equipment this heating plant consists of.
− if a heating plant can be specified by the type of equipment used.
− what key design questions determined by the anticipated heat load are.
− what he / she thinks a typical heating plant has for avoiding complete outage.
− to explain how the energy source in a heating plant is selected.

UNIT II. GEOTHERMAL HEATING SYSTEMS

Vocabulary

sustainability–устойчивость, устойчивое развитие
harness – упряжь; запрягать; обуздывать
loop –цикл, петля, контур
pump unit – насосный агрегат
stored heat – аккумулированное тепло
convert - преобразовывать
refrigerant – хладагент
heat exchanger – теплообменник
evaporate – испаряться, улетучиваться
continually – непрерывно
maturity - зрелость
low maintenance техническое обслуживание небольшого объёма
heating efficiency – теплопроизводительность
furnace – печь
low maintenance - низкие эксплуатационные расходы
COP - coefficient of performance – коэффициент полезного действия
rated – номинальный, установленный; расчетный
buried –погруженный, подземный, заглубленный
efficiency improvement – эффективность модернизации
payback – окупаемость

Exercise 1. Mind the rules of pronunciation.
[ʧ]: nature, inch, lecture, temperature, feature, achievement, mixture;
[ʃ]: machine, sure, shop, pressure, shell, shock, action, fresh;

[ʒ]: measure, pleasure, persuasion, leisure, decision, treasure, provision;
[ʤ]: gesture, job, joke, change, subject, joy, jet, justice, jug, Japan, January;
[f]: phone, philosophy, alphabet, atmosphere, phase, phantom, photograph;
[kw]: question, square, quote, quality, qualify, quest, quite, inquire, quarter;
[a:]: mark, parking, farm, architect, arc, arsenal, bark, marshal, example, plant;
[ɔ]: software, box, responsible, operate, common, shop, dot.

Exercise 2. Form nouns or adjectives using suffixes and translate them.
er: to begin, to start, to fight, to drive, to lead, to export, to import;
ment: to pay, to employ, to develop, to improve, to judge, to move, to punish;
ion: to anticipate, to succeed, to accommodate, to appreciate, to allocate;
ism: capital, critic, liberal, race, hero, artist, national, opportune;
able: honour, to comfort, to accept, to drink, to believe, to achieve, to adapt;
ous: danger, courage, outrage, to continue, hazard, fame, fury.

GEOTHERMAL HEATING SYSTEMS

Geothermal heat represents about two percent of the total heating market in the U.S., with more than 1.3 million systems installed. A geothermal system does not burn fossil fuels to create heat. It transfers heat.

How Geothermal Systems Work

To harness the heat stored in the earth, a geothermal system captures and converts that heat for use in the home. System components include a loop of pipe, a liquid to absorb and transfer heat, and a heat-pump unit to process the heat for use. To capture heat, liquid circulates through a pipe buried in the ground. As it circulates, it absorbs the earth's stored heat, which remains constant at 50 to 60 degrees Fahrenheit 10 feet below ground level. The heated liquid enters a heat pump unit. In this unit, the heat from the piped liquid is absorbed by a liquid refrigerant sealed in the unit. That refrigerant evaporates and is compressed, which raises its temperature to about 100 degrees Fahrenheit. Now a gas, the refrigerant passes through a heat exchanger where the heat is removed and pumped into the house. With the heat removed, the refrigerant cools. It returns to its liquid state and continues to circulate, continually absorbing and using the heat transferred from the earth through the piped liquid.

Efficient Low Maintenance Heating

Geothermal heat pumps have become quite efficient. Their heating efficiency is indicated by the *coefficient of performance*, or COP, the ratio of heat provided per British thermal unit (BTU) of energy input. Energy Star-rated heat pumps have a heating COP starting at 2.8, meaning for every unit of energy used to power the system, 2.8 units of heat are supplied. Geothermal systems are simple to maintain. A properly installed and buried loop can last nearly 50 years. The

mechanicals are installed indoors and typically require only periodic checks and filter changes.

Costs and Payback

Initial installation and equipment costs for geothermal heat pumps vary with the maturity of the local market, type and size of the system, and the site. There is no doubt that the system will cost more at the start than a conventional fossil fuel furnace. If a home does not have ductwork, a homeowner may need to add that into the cost. However, a small home that uses baseboard heat may be able to forego duct installation. The cost appeal of geothermal heat is in the operating payback. The system delivers more energy per unit consumed than conventional systems, up to 400 percent efficiency compared with 75 to 90 percent efficiency for fossil-fuel furnaces. An existing home with an older furnace could expect an efficiency improvement of 50 percent by switching to geothermal. A new home with the best fossil fuel furnace would expect an improvement of 30 percent.

Exercise 3. Answer the following questions.

1. How much percent [pə`sent] of the total heating market does Geothermal heat represent in the U.S?
2. What components does geothermal system include?
3. What is a heat cycle in a heat pump unit?
4. What is heating efficiency indicated by?
5. What factors do initial installation and equipment costs for heat pumps vary with?
6. What is the maximum efficiency of geothermal heating system?

Exercise 4. Find out the English equivalents in the text.

Геотермальная система, ископаемое топливо, улавливать и преобразовывать, петлевой трубопровод, тепловой насос, жидкий хладагент, теплообменник, теплопроизводительность, показатель работоспособности, подземный петлевой трубопровод, система каналов, низкие эксплуатационные расходы, окупаемость.

Exercise 5. Complete the sentences.

1. To harness the heat stored in the earth, a geothermal system ... and ... that heat for use in the home.
2. System components include a ... , a ... to absorb and transfer heat, and a ... ... to process the heat for use.
3. The heated liquid enters a heat ... .
4. The heating efficiency is indicated by the... ... .
5. Initial installation and equipment costs for geothermal heat pumps vary with the maturity of the... ... , type and size of the... , and the... .
6. An existing home with an older furnace could expect an ... ... of 50 percent by switching to geothermal.

Exercise 6. Match the English and Russian equivalents.

1. a loop of pipe	a. теплопроизводительность
2. heat-pump unit	b. зрелость рынка
3. heating efficiency	c. механические устройства
4. maturity of the market	d. система каналов
5. mechanicals	e. плинтус
6. ductwork	f. тепловой насос
7. baseboard	g. контурный трубопровод

Exercise 7. Read the Dialogue and Act it out.

Teacher: − What do a geothermal heating system components include?
Student: − System components include a loop of pipe, a liquid to absorb and transfer heat, and a heat-pump unit to process the heat for use.
Teacher: − Quite right. Where does liquid circulate before it enters a fossil-fuel furnace?
Student: − It circulates on the roof of the building.
Teacher: − Geothermal heat pumps haven`t become quite efficient, have they?
Student: − They have. A properly installed and buried loop can last nearly 50 years.
Teacher: − What can you say about the costs of geothermal heat pumps?
Student: − It goes without saying; they vary with the season of the year.

Exercise 8. Summarize Text Geothermal Heating Systems. Make use of the words and the model pattern presented below.

the present paper – данная статья
theme (subject matter) – тема
the main (major) problem – основная проблема
the purpose – цель
the basic principle – основной принцип
problems relating to – проблемы, связанные с…
similarly (likewise) – аналогично
hence, therefore – поэтому, следовательно
on the contrary – наоборот
nevertheless (still, yet) – тем не менее
besides, in addition, furthermore – кроме того
at first – сначала
next, further, then – далее, затем
finally – наконец, итак
in short, in brief – вкратце

The Model Pattern.

I. Цель написания статьи:
1. The object (purpose) of this paper (extract) is to present (discuss, describe, show, develop, give)...

2. The paper (article) puts forward the idea (attempts to determine)...

II. Вопросы, обсуждаемые в статье:
1. The paper (article) discusses some problems relating to (deals with some aspects of, considers the problem of, presents the basic theory, provides information on, reviews the basic principles of)... .
2. The paper (article) is concerned with (devoted to)... .

III. Начало статьи:
1. The paper (article) begins with a short discussion on (deals with the problem of)... .
2. The first paragraph deals with... .
3. First (at first, at the beginning) the author points out (notes, describes)... .

IV. Изложение последующего материала статьи:
1. Then follows a discussion on... .
2. Then the extract goes on to the problem of... .
3. The next (following) paragraph deals with (presents, discuses, describes)... .
4. After discussing ... the author turns to... .
5. Next (further, then) the author tries to (indicates that, explains)... .
6. It must be emphasized that (should be noted that, is evident, is interesting to note)... .

V. Концовка статьи:
1. The final paragraph states (describes, ends with)... .
2. The conclusion is ... (the author concludes that, summarizes the)... .
3. To sum up (to summarize, to conclude) the author emphasizes (points out, admits)... .
4. Finally (at the end) the author admits (emphasizes) that... .

VI. Оценка статьи:
1. I think (in my opinion, to my mind)... .
2. The paper (article) is interesting (not interesting), of (little, much) importance, (in)valuable, up-to-date (out-of-date), useful (useless)... .

UNIT III. OPEN-CLOSED LOOP GEOTHERMAL HEATING SYSTEMS

Vocabulary

open-looped - разомкнутый
closed-loop – замкнутый
well-drilling−бурение скважин
code – код, (управляющая) программа, экспертная система
sealed system – герметизированная система

aquifer – водоносный слой, пласт
payback – окупаемость
baseboard – плинтус
weather stripping – герметик
heat gain – избыточное тепло
bid – заявка, предложение, цена
forced air – нагнетаемый воздух, сжатый воздух
blower – воздуходувка, нагнетатель, вентилятор, компрессор
variable-speed – регулируемая скорость
desuperheater – пароохладитель

Exercise 1. Mind the rules of pronunciation.
[ʧ]: nature, inch, lecture, temperature, feature, achievement, mixture, virtue;
[ʃ]: machine, sure, shop, pressure, shell, shock, tissue, action, fresh;
[ʒ]: measure, pleasure, persuasion, leisure, decision, treasure, provision;
[k]: technician, polytechnic, mechanics, calculate, computer, complex, practical;
[s]: ceremony, century, circus, cement, scientist, psychic, cite, citizen;
[d]: offered, remembered, ordered, considered, manufactured, desired, opened;
[id]: wanted, needed, added, reflected, constructed, completed, repeated.

Exercise 2. Insert the right proposition (in, of, out, out of, up, after, from).
to think… somebody, to be fond… something, to be… the house, to look… the window, to carry… the task, to make… the dialogue, to come… time, to start… a few weeks, to leave… the town, to look… a little brother, to graduate… University.

Exercise 3. Read and translate the nouns with suffixes.
-*ment*: commitment, development, equipment, fulfillment, government, requirement;
-*tion:* construction, demonstration, regulation, confirmation, consolidation;
-*ance:* appearance, importance, elegance, expectance, clearance, acceptance;
-*ness:* loneliness, absent-mindedness, hopelessness, sadness, kindness.

OPEN-CLOSED LOOP GEOTHERMAL HEATING SYSTEMS

Closed-Loop Systems

Geothermal heating systems operate as either closed-loop or open-loop configurations. Determining which loop to use depends on site factors like soil composition, landscaping, and underground utilities. A closed loop uses the liquid solution in a sealed piping loop installed horizontally or vertically underground. Horizontal loops are used when there is enough usable land available. Pipes are installed in trenches dug about six feet deep and 100 to 600 feet long, depending on the size of the system. Vertical loops are the only choice

when there is limited space available, if the homeowner does not want landscape disturbed, or where many rocks would be encountered when digging. To install the pipe, small-diameter holes are bored using well-drilling equipment. Vertical loops are connected to the house via a horizontal underground pipe. When boring for vertical loops, well-drilling codes apply. A sealed system can also be placed at the bottom of a pond if there is a pond available on the property. Pond loops may be the most economical option because much of the excavation cost can be eliminated.

Open-Loop Systems

An open-loop system uses the heat from well water rather than heat from the earth. Groundwater, which also remains at a relatively constant temperature year-round, is carried into the heat pump unit and the heat is extracted in a method similar to the closed-loop system. The water does not circulate but makes one pass and is eliminated. It might be released into a ditch, drainage tiles, or a pond. It might also be returned to the water table through a return well drilled into the ground. With concerns about declining and polluted aquifers, however, it's important to check local conditions and codes before deciding on this type of system.

Get the Most from Your Geothermal System

Don't expect a new system to solve your heating problems unless you reduce your heating load. Seal all leaks. Check to be sure the weather stripping is in good shape and the duct system is not leaking. Eliminate drafts. Consider having a heat loss/heatgain/leakage evaluation done of the home. Find a company that is certified, with people trained specifically in geothermal technology, and get more than bid. Ask for references and call those homeowners. Ask to see installations the company has completed. Discuss the benefits of a hybrid system. A ground-source heat pump can be added to an existing forced-air furnace and use its blower. Dual-source heat pumps are less costly to install and more efficient than the air-source unit alone. Ask about variable-speed blowers and multi-speed compressors on the system to improve comfort and efficiency. Consider the system's ability to produce hot water. A device called a "desuperheater" can supplement the production of domestic hot water by using the excess heat when the system is operating.

Exercise 4. Answer the following questions.

1. What is geothermal heat pumps efficiency indicated by?
2. What does loop usage determination depend on?
3. What is the working principle of a closed loop system / an open-loop system?
4. What factors do initial installation and equipment costs for geothermal heat pumps vary with?
5. What should be done to reduce the heating load?

Exercise 5. Choose the right word and complete the sentences.

1. A geothermal system captures and converts ... for a home.
a) energy b) heat c) current
2. In a heat pump unit the heat from the piped liquid is absorbed by a ... .
a) solid substance b) high pressure c) liquid refrigerant
3. Geothermal heat pumps heating efficiency is indicated by the ... .
a) coefficient of performance b) refrigerant in the heat pumps c) maintenance of the mechanicals
4. Geothermal heating systems operate as ... loop configuration.
a) low-maintenance b) open-closed c) high-efficient
5. A closed loop uses the liquid solution in a ... piping loop installed horizontally or vertically underground.
a) sealed b) compressed c) drilled
6. An open-loop system uses the heat of ... ... rather than heat from the earth.
a) melted water b) well water c) rain water
7. The cost appeal of geothermal heat is in the ... .
a) operating payback b) lowing maintenance c) marketing maturity
8. Check to be sure the weather stripping is in a ... ... and the duct system is not leaking.
a) sealed system b) good shape c) open loop
9. A device called a ... can supplement the production of domestic hot water.
a) desuperheater b) refrigerator c) circulator

Exercise 6. Match the English and Russian equivalents.

1. well-drilling	a. протечка
2. utilities	b. сквозняк
3. drainage	c. нагнетаемый воздух
4. aquifer	d. водоносный слой
5. forced air	e. водосбор
6. draft	f. коммунальные службы
7. leaking	g. бурение скважин

Exercise 7. Speak about

– the configurations of geothermal heating systems.
– the use of horizontal loops.
– the water cycle in an open loop system.

Exercise 8. Here is an envelope. Enumerate the answers.

(1)Jackson Bros
2520 Visit Avenue
(2)Olympia WA,98501
(3)USA

John Wilson
(4)4, New High Street
(5) Oxford, OX37AQ
(6) England

- [ ] the sender
- [ ] the country in the mailing address
- [ ] the town the letter comes from
- [ ] the addressee`s house number
- [ ] the town in the mailing address
- [ ] the country the letter comes from

Make an envelope of your own.

Exercise 9. Match English and Russian equivalents.

Resume (CV)	рекламное письмо
Cover Letter	письмо – запрос
Inquiry Letter	краткая биография
Advertizing Letter	сопроводительное письмо
Memo	служебная записка

Read the extract below. Define the type of a business document.

……

…With reference to your advertisement in yesterday`s "New-York Times", could you please send me a copy of your latest catalogue of software engineering tools. I would also like to know if it is possible to make purchases on-line … .

.....

a) Resume b) Cover Letter c) Inquiry Letter d) Advertising Letter e) Memo

Exercise 10. Arrange the items of a business letter in a right order.

- [ ] Thank you for your inquiry about our telephone answering machines and voice mail systems. I`m enclosing brochures on our products. A sales representative will be in London next week. We will call you to schedule an appointment.
- [ ] Charles Lyons
  General Television Services
  1201 East Grand Avenue

Chicago, Illinois 60611
Dear Mr. Lyons,
John Bonds
Marketing manager
The British Engineering Co,
12 New City Road
London, E.C.I

Exercise 11. Read the text below.

How to Write a Good CV

A CV (Curriculum Vitae) is a brief summary of your abilities, education, experience and skills. Its main task is to convince prospective employers to contact you. A CV has one purpose: to get you a job interview. The more thoroughly you prepare your resume now, the more likely someone is to read it.

1. Education – usually means post-secondary and can include special seminars, summer school or night school as well as College and University. List degrees and month / year obtained or expected; names and locations of schools, grades. A brief summary of important courses you've taken might also be helpful.

2. Experience includes full-time paid jobs, academic research projects, internships, part-time jobs or volunteer work. List month / years you worked, position, name and location of employer or place and responsibilities you had.
3. Skills. List computer languages and software, foreign languages indicating fluency, teaching or tutoring, communication or leadership, among others.
After you have all this information, check it for accuracy. You'll need full names, correct and consistent dates and correct spellings.

4. Position. What kind of position do you want for this job-search? Make notes. Now match your wishes up with positions that are actually available.
Highlight details that demonstrate your capabilities.

Look over what you've written and try to select details of your education, experience, qualifications, skills and activities that match an employer's needs in a few important areas.

Make up your own CV. See the useful hints in the form given below.

CV Template

Name

Address (home and term) E-mail

Telephone (mobile) Date of Birth

Personal Profile

Summary about what you have done.

Education and Qualifications

Date University, Course, Qualification (grade or predicted grade)
Subject
Modules studied, dissertation
Date School / College
A Levels (grades if good) / Other qualifications
Date School

Work Experience (most recent first), skills gained

Date Company Name, Job Title
Main responsibilities

Interests and Activities

UNIT IV. MY FUTURE SPECIALITY

Vocabulary

heat-and-power engineering – теплоэнергетика
urgent – крайне необходимый
essential – существенный
life span – продолжительность жизни
treating facilities – очистные сооружения
subsidiary – вспомогательный

HEAT-AND-POWER ENGINEERING

Let me introduce myself. I am a second-year student of Tver State Technical University. I study at the Nature Management and Engineering Ecology department. My speciality is heat-and-power engineering.

I consider my future profession to be very important and urgent. Our region like many others is facing the problem of developing fuel and energy policy directed at providing a new level and quality of life. So the branch becomes essential because of the steadily increasing demand for traditional energy resources (oil, gas, coal, and electrical energy). There are many factors contributing to this rise including rapid population growth and longer life spans. On the other hand, fossil fuels are becoming scarcer and their exploration and development – more expensive. It is common knowledge that human activities and the application of new technological processes have made the environment unhealthy. The major goal of heat-and-power engineering is to lower power consumption and protect environment, as well as to introduce and utilize renewable power resources.

In order to achieve these goals, a lot of skilled heat-and-power engineers are required. At the University we study a lot of various subjects which will be

necessary in our future profession. They are ecology, theoretical mechanics, resistance of materials, mechanism and machine theory, principles of personal and social safety, town gas treating facilities. In future we are expected to design, construct, install and maintain air, water, peat, and hydrogen power plants, chemical reactors as well as subsidiary equipment for them. We are to solve the problem of heat-and-power engineering in Tver Region orienting to the local resource potential.

I like my speciality and hope to find a proper job after graduation.

Exercise 1. Answer the questions.

1. Where do you study?
2. What is your speciality?
3. You consider your future profession to be important and urgent, don't you?
4. What problem is our region facing?
5. What is happening to fossil fuels nowadays?
6. What has made the environment unhealthy?
7. Why are skilled heat-and-power engineers required?
8. What subjects do you study?
9. What are you expected to do after graduation?

БИБЛИОГРАФИЧЕСКИЙ СПИСОК

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