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АНГЛИЙСКИЙ ЯЗЫК

**Тексты, упражнения
и терминологический словарь
для студентов I–II курсов факультета ТТЛП
специальностей 1-46 01 01 «Лесоинженерное
дело», 1-46 01 02 «Технология
деревоперерабатывающих производств»,
1-36 05 02 «Машины и оборудование
лесного комплекса»**

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Английский язык : тексты, упражнения и терминологический словарь для студентов I–II курсов факультета ТТЛП специальностей 1-46 01 01 «Лесоинженерное дело», 1-46 01 02 «Технология деревоперерабатывающих производств», 1-36 05 02 «Машины и оборудование лесного комплекса» / сост. : Е. В. Кривоносова, С. М. Рыбакова. – Минск : БГТУ, 2018. – 108 с.

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Данное пособие включает текстовый материал из оригинальной научно-технической литературы и практические задания. Оно поможет совершенствовать навыки просмотрового чтения, анализа и перевода аутентичных текстов по специальности, а также расширит кругозор студентов. Пособие может использоваться в аудиторной работе и для организации самостоятельной деятельности.

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ПРЕДИСЛОВИЕ

Пособие составлено в соответствии с требованиями программы по иностранным языкам для неязыковых вузов. Целью его является совершенствование навыков чтения, понимания и перевода, а также расширение кругозора студентов и развитие навыков устной речи в беседах по предложенным темам. Материалом для включения послужили тексты из энциклопедий и справочников, учебных пособий, адаптированные статьи из оригинальных журналов, изданных в Великобритании и США.

Пособие состоит из разделов, посвященных следующим темам: «Лес и его значение»; «Типы лесов»; «Лесозаготовительные работы»; «Способы транспортировки древесины»; «Внешний вид и свойства древесины»; «Способы сушки древесины»; «Естественные пороки древесины»; «Защита древесины и виды отделки»; «Двигатели. История создания двигателя»; «Классификация двигателей: бензиновые и дизельные»; «Классификация пил»; «Строгание. Типы строгального оборудования. Режущие инструменты». В разделах представлены различные упражнения для совершенствования грамматических и лексических навыков, тематически связанные с представленными текстами.

Пособие предназначено для студентов I–II курсов факультета ТТЛП специальностей «Лесоинженерное дело», «Технология деревоперерабатывающих производств», «Машины и оборудование лесного комплекса». Тексты упражнений могут использоваться при составлении сообщений по заданной теме, а также ведении бесед на английском языке. Задания к текстам скомпанованы таким образом, чтобы акцентировать основное внимание на развитие у студентов умения читать и понимать литературу по специальности, дифференцировать более и менее важную информацию. Упражнения, включенные в пособие, соответствуют нормам грамматики английского языка.

UNIT 1

I. Forests and their Importance

Exercise 1. Make sure you know the following words and expressions.

Moss – мох; shrub – кустарник; wood – лес, древесина; lumber – бревно, пиленый лес, пиломатериалы; plywood – фанера; forestland – лесной массив; wildlife – дикая природа; remains – остатки, останки; fungi – грибы; insect – насекомое; stretch – участок, пространство, протяженность; break down – разлагать, распадаться; clear-cutting – сплошная рубка; renewable – возобновляемый; environmental value – ценность для окружающей среды; gum – смола, живица; complicate – усложнять; soak up – впитывать; underestimate – недооценивать; enrich – обогащать; relationships – отношения; continuous – продолжительный, непрерывный; source – источник; cover – покрывать; in turn – в свою очередь; determine – определять; make up – составлять; although – хотя; clear – очищать, вырубать; soil – почва, strip-mining – открытая добыча угля, science of forestry – наука о лесном хозяйстве; count on – рассчитывать; environment – окружающая среда; enjoyment – радость, удовольствие; mitigate – смягчить, уменьшить, oleoresin – канифоль; steady – постоянный, устойчивый, стабильный.

Exercise 2. Read and translate the following text.

Forests. Forest – is a large area of land covered with trees. But a forest is much more than just trees. It also includes smaller plants, such as mosses, shrubs, and wildflowers. In addition, many kinds of birds, insects, and other animals make their home in the forest. Millions upon millions of living things that can only be seen under a microscope also live in the forest.

Climate, soil, and water determine the kinds of plants and animals that can live in a forest. The living things and their environment together make up the forest ecosystem. An ecosystem consists of all the living and nonliving things in a particular area and the relationships among them.

The forest ecosystem is highly complicated. The trees and other green plants use sunlight to make their own food from the air

and from water and minerals in the soil. The plants themselves serve as food for certain animals. These animals, in turn, are eaten by other animals. After plants and animals die, their remains are broken down by bacteria and other organisms, such as fungi. This process returns minerals to the soil, where they can again be used by plants to make food.

Although individual members of the ecosystem die, the forest itself lives on. If the forest is wisely managed, it provides us with a continuous source of wood and many other products.

Before people began to clear the forests for farms and towns, great stretches of forestland covered about 60 per cent of the earth's land area. Today, forests occupy about 30 per cent of the land. The forests differ greatly from one part of the world to another.

Importance of forests. Forests have always had great importance to people. Prehistoric people got their food mainly by hunting and by gathering wild plants. Many of these people lived in the forests and were a natural part of it. With the development of civilization, people settled in towns. But they still went to the forest to get timber and to hunt.

Today, people depend on forests more than ever, especially for their (1) economic value, (2) environmental value and (3) enjoyment value. The science of forestry is concerned with increasing and preserving these values by careful management of forestland.

Economic value. Forests supply many products. Wood from forest trees provides lumber and plywood. It is used in making furniture, tool handles and thousands of other products. Various manufacturing processes change wood into such products as paper, plastics, fibers, etc. Different gums, oils and waxes used in manufacture also come from trees. In many parts of the world wood serves as the chief fuel for cooking and heating. And in some primitive societies forest plants and animals make up a large part of people's diet.

Unlike most other natural resources, forest resources are renewable. As long as there are forests people can count on a steady supply of forest products.

Environmental value. Forests help to conserve and enrich the environment in several ways. For example, forest soil soaks up large amounts of rainfall. It thus prevents the rapid runoff of water that can cause erosion and flooding. In addition, rain is filtered as it

passes through the soil and becomes ground water. This ground water flows through the ground and provides a clean, fresh source of water for streams, lakes and wells.

Forest plants, like all green plants, help to renew the atmosphere. As the trees and other green plants make food, they give off oxygen and remove carbon dioxide from the air. Forests also provide a home for many plants and animals that can live nowhere else. Without forests many kinds of wildlife could not exist.

Enjoyment value. The natural beauty and peace of the forest offer a special source of enjoyment. In many countries huge forestlands have been set aside for people's enjoyment. Many people use these forests for such activities as camping, hiking and hunting. Others visit them simply to enjoy the scenery and relax in the quiet beauty.

The importance of forests cannot be underestimated. We depend on forests for our survival, from the air we breathe to the wood we use. Besides providing habitats for animals and livelihoods for humans, forests also offer watershed protection, prevent soil erosion and mitigate climate change. Yet, despite our dependence on forests, we are still allowing them to disappear.

Exercise 3. Choose the best continuation for each of the following sentences.

1. Forest also includes ...

a) cities, rivers, lakes, etc.

b) smaller plants, such as mosses, shrubs, and wildflowers.

c) insects, animals, berries, mushrooms.

2. ... determine the kinds of plants and animals that can live in a forest.

a) Trees, wildflowers, mushrooms ...

b) Climate, soil, and water ...

c) Rivers, geographical position, weather ...

3. An ecosystem consists of ...

a) all the living and nonliving things in a particular area and the relationships among them.

b) birds, insects, plants, trees in a particular area.

c) people, flora and fauna and the relationships among them.

4. Sunlight is used to ...

a) promote the growth of plants in the forests.

b) feed the plants and animals.

c) make the food from the air and from water and minerals in the soil.

5. The plants themselves serve as ...

a) food for certain animals.

b) source of energy for people.

c) food for other plants.

6. The remains of plants and animals are ...

a) decomposed by people and animals.

b) broken down by bacteria and other organisms, such as fungi.

c) used by people in different activities.

7. If the forest is wisely managed ...

a) it provides us with a continuous source of wood and many other products.

b) flora and fauna vigorously develop.

c) animals and plants are exterminated.

8. The forests differ greatly ...

a) in different regions of the Republic.

b) from one part of the world to another.

c) within one area.

9. People depend on forests for their ...

a) economic value, environmental value, and enjoyment value.

b) such activities as camping, hiking and hunting.

c) fungi, flora, and fauna.

10. Wood from forest trees provides ...

a) a clean, fresh source of water for streams, lakes and wells.

b) lumber and plywood.

c) habitats for animals and livelihoods for humans.

Exercise 4. Match the words to their definitions.

1. soil	a) any member of the kingdom of the living things (as mushrooms, molds, and rusts) that have no chlorophyll, must live in or on plants, animals, or decaying material, and were formerly considered plants;
2. wildflower	b) to find out or come to a decision about by investigation, reasoning, or calculation;
3. ecosystem	c) to free from what obstructs or unneeded;
4. moss	d) to take or hold possession or control of;
5. determine	e) to extend in length;

6. occupy	f) a woody plant that has several stems and is smaller than most trees;
7. fungi, pl. (fungus, sg.)	g) the flower of a wild or uncultivated plant or the plant bearing it;
8. stretch	h) the complex of a community of organisms and its environment functioning as an ecological unit;
9. shrub	i) the upper layer of earth that may be dug or plowed and in which plants grow;
10. clear	j) a small flowerless green plant which lacks true roots, growing in low carpets or rounded cushions in damp habitats.

Exercise 5. Complete each sentence using a word derivationally related to the word given in brackets.

1. In many parts of the world wood (service) as the chief fuel for cooking and heating. 2. Millions of (live) things that can only be seen under a microscope also live in the forest. 3. Climate and water (determination) the kinds of plants and animals that can live in a forest. 4. An ecosystem consists of all the living and nonliving things in a particular area and the (relate) among them. 5. The plants themselves (service) as food for certain animals. 6. After plants and animals die, their remains are (breakable) down by bacteria. 7. Forest provides us with a (continuation) source of wood and many other products. 8. Forests (occupation) about 30 per cent of the land. 9. The forests (different) greatly from one part of the world to another. 10. Wood is used in (make) furniture, tool handles and thousands of other products. 11. The natural beauty and peace of the forest offer a special source of (enjoy). 12. The importance of forests cannot (underestimation).

Exercise 6. Complete the sentences with the correct preposition.

The trees and other green plants use sunlight to make their own food ... the air and ... water. 2. Climate and soil, determine the kinds of plants and animals that can live ... a forest. 3. Before people began to clear the forests ... farms and towns, forestland covered about 60 per cent of the earth's land area. 4. The animals are eaten ... other animals. 5. The forest itself lives ... , though individual members of the ecosystem die. 6. An ecosystem consists ... all

the living and nonliving things in a particular area. 7. The remains of plants and animals are broken down ... bacteria. 8. This process returns minerals ... the soil. 9. Forest provides us ... a continuous source of wood and many other products. 10. The forests differ greatly ... one part of the world to another. 11. Various manufacturing processes change wood ... such products as paper, plastics, fibers, etc. 12. Rain is filtered as it passes ... the soil and becomes ground water. 13. We depend ... forests for our survival.

Exercise 7. Read the text again and mark the sentences T (true), F (false), or DS (doesn't say).

1. Forest – is a large area of land covered with trees only. 2. Many kinds of birds, insects, and other animals make their home in the forest. 3. Geographical position determines the kinds of plants and animals that can live in a forest. 4. An ecosystem implies a complex ecological unit in a particular area. 5. The trees and other green plants use wind and rain to make their own food from the air and from water and in the soil. 6. If the forest is wisely managed, it provides us with a continuous source of wood and many other products. 7. Some individual members of the ecosystem die, other members of the ecosystem are exterminated, but the forest itself lives on. 8. Today, forests occupy about 60 per cent of the land. 9. The forests are similar in different parts of the world. 10. The plants themselves serve as food for certain animals. 11. With the development of civilization, people settled in forests. 12. As long as there are forests people can count on a steady supply of furniture products. 13. As the trees and other green plants make food, they give off oxygen and remove carbon dioxide from the air.

Exercise 8. Make up the sentences or questions.

1. of, include, does, kinds, forest, birds, What, and, a, insects?
2. complicated, forest, Is, highly, ecosystem?
3. the, as, plants, animals, themselves, food for, serve, Do, certain?
4. use, and, sunlight, What, trees, soil, the, air, water, minerals, the, from, for, in, do?
5. much, do, today, How, forests, occupy, land?
6. of, plants, broken down, When, bacteria, are, the, by, remains, animals, and?
7. birds, insects, animals, Where, make, do, and, their, many, other, home?

Exercise 9. Complete the text by writing the suitable form of the verb in brackets in each space.

1. Forests (threaten) by more than demand for lumber and fuels. 2. Like agricultural land, much privately owned forested land (disappear) each year under highways, airports, and other development projects. 3. Strip-mining (destroy) thousands of acres, in a process even more destructive for the soil than clear-cutting. 4. Inevitable erosion and flooding often (accompany) by severe water pollution. 5. Reforestation often even (not to attempt). 6. Although with care it can (achieve). 7. In the recreational areas the trees often (damage) by the crowds of visitors. 8. In some areas trees (kill) by smog.

Exercise 10. Read the text and give the most appropriate title.

The rapid development of science and technology, the appearance of new, varied materials (including polymers) have not reduced the industrial use of timber. Timber, the most widespread construction material, has become a universal material of tremendous importance. Large quantities of timber are still used in various industrial areas. Wood is widely used in finishing, the interiors of homes, vessels, furniture, sports gear, and musical instruments. Timber is the raw material for pulp out of which paper, paperboard, synthetic fabric are made. One should not forget about such kind of forest utilization as getting oleoresin and processing non-standard wood. Forest-chemical production is widely used now: tars, turpentine, wood charcoal, coniferous extract, coniferous vitamin meal, etc.

The significance of forests is not restricted to timber use. They are an important geographical and ecological factor. They protect the soil and water resources better than the most excellent artificial measures.

Forest prevent soil erosion, retain surface water, making them clean and still. In this respect, watershed forests are a kind of reservoir for useful moisture. The fact that forests regulate the flow of rivers, prevent their pollution, prevent floods, reduce them in size, makes them extremely valuable.

The forest is powerful accumulator of the solar energy, it has a considerable influence on the formation of the climate, gas exchange in the atmosphere, and therefore it creates the living conditions for the people. Photosynthesis is the start of this circulation.

The forest, being the greatest biological composition in the world, assisting in air purification against dust and enriching it with oxygen, is an important regulator for gas balance in nature. It is necessary to provide people with optimal rate in the amount of 400 kg per capita annually. One big tree while consuming carbon dioxide, is producing as much oxygen as one person needs a day for respiration. Under the conditions of the industrial city the energy of photosynthesis is ten times decreased being affected by air pollution. It means that one person needs 10 trees instead of one.

Exercise 11. Transform the sentences from acive voice into passive one; write down two variants if it is possible.

1. They sold the ring to the lady yesterday. 2. The principal introduced our new English teacher to us. 3. Haven't you agreed on all the most important details yet? 4. She'll certainly show us her new picture. 5. They report that a dangerous criminal is missing. 6. Did the teacher explain anything new to you at the lesson? 7. She didn't even send me a birhday card! 8. By 5 o'clock the committee hadn't announced the winner yet. 9. Professor Brand always gives these recommendations to his students. 10. We never laugh at his jokes because they aren't funny. 11. Don't disturb him. He's dictating a very important letter to his secretary. 12. She was describing accident to passers-by when the police arrived. 13. Oh, dear! She's been waiting for me for a quarter of an hour already. 14. What are they looking for? 15. Some stranger offered his help when I fell down in the street. 16. When did he write this book? 17. He speaks in such a low voice that nobody ever listens to him. 18. Mr. Brown is buying a new car. 19. Every woman is pleased when somebody pays her a compliment. 20. They haven't bought anything new lately.

Exercise 12. Correct the possible mistakes in the sentences concerning the passive voice form.

1. There's something wrong with the piano. It is been tuned now. 2. When will be the picture finished? 3. The boy was made to stay after classes. 4. The plan we agreed looked perfect. 5. They were recommended to call the police. 6. You'll have to wait. The documents are looking through. 7. She was looked at with curiosity when she entered. 8. Mary was sure she had been watched

all the way. 9. Who was the book written? 10. The message was written by a pencil. 11. The question has been being discussed for two hours already. 12. What were you being explained when the principal entered? 13. He was seen leave the building at 8 o'clock. 14. It was arranged that the incident would never be mentioned in the family. 15. She was said to go home at once. 16. This event has been much spoken lately. 17. He was promised another day-off on Friday. 18. What are these cakes made of? 19. The child was bought new shoes yesterday. 20. The children are always read a good-night tale by their Granny.

Exercise 13. Open the brackets in the sentences, use the proper form of the passive voice.

1. What's going on here? What's all that noise? – Sorry! My flat ... (to redecorate). 2. If the work ... (not/to finish) by evening, you'll be in trouble. 3. By the time I left the problem ... (not/ to solve) though it ... (to discuss) actively for quite a long time. 4. Why ... (this information/ever/ to use)? It's so interesting! 5. Such clothes ... (not/to wear) now. 6. Don't worry. Nobody will notice such a tiny spot. It ... (not/to pay attention to). 7. She suddenly realized that she ... (to listen to) in complete silence. 8. She ... (not/to introduce) by the hostess and felt embarrassed as she herself didn't know anybody. 9. I'll take a picture of you when you ... (to give) the prize. 10. What was that book about? – It ... (to devote) to the writer's brother who ... (to kill) in the war. 11. He ... (to offer) several times. – What made him refuse it? 12. I ... (to tell) that the problem ... (not/to consider) yet but when it was I ... (to inform) immediately. 13. They say a new play ... (to rehearse) by the school theatre. – Oh, yes, all the parents and teachers. 14. The girl was crying because she ... (to made fun of) by her classmates. 15. It was the third time the name ... (to mention) and I wondered who the man was. 16. I was sure that if the figures ... (to check) properly the mistake ... (to find) easily. 17. I'm fed up. I ... (to keep) waiting for half an hour! I'm not going to stay here any longer. 18. Now that the situation ... (to study) thoroughly what ... (to do) to improve? 19. This is the only thing that ... (to talk about) for several days. 20. I doubted if the child ... (to look after) properly though I ... (to promise) complete care.

II. Types of Forests

Exercise 1. Make sure you know the following words and expressions.

Categorize – распределять по категориям, классифицировать; tropical rainforest – тропические дождевые леса; lush – сочный, обильный, пышный (о растительности); precipitation – осадки; leach – выщелачивать, вымывать питательные элементы (о почве); soluble nutrients – растворимые питательные вещества; vital – жизненно важный, насущный; storehouse – хранилище, кладовая, склад; biodiversity – биоразнообразие; occur – случаться, происходить, встречаться; drought – засуха; inland – территория, удаленная от моря, внутренний, вглубь страны; coniferous – хвойные; deciduous – лиственные; shed leaves – сбрасывать листья; undergrowth – подлесок, подрост; cloud forests – влажный тропический лес, моховой лес, туманный лес; adverse – неблагоприятный, вредный; sustainable – устойчивый; development – развитие; multipurpose – многоцелевой, универсальный; forest management – лесоуправление; species – вид(ы); thrive – пышно расти, разрастаться, процветать; boreal – арктический, северный, бореальный; canopy – древесный полог.

Exercise 2. Read and translate the following text.

Forests thrive in diverse climatic regions throughout the world, and can be categorized by their locations and elevations.

Tropical rainforests are lush, dense forests found near the equator. They can be characterized in two words: hot and wet. Average monthly temperatures exceed 18°C during all months of the year. Average annual rainfall typically lies between 1.750 mm and 3.000 mm. This high level of precipitation often results in poor soils due to leaching of soluble nutrients in the ground. Tropical rainforests are vital storehouse of the planet's biodiversity. They are home to half of all the living animal and plant species on the planet.

Subtropical forests are found to the north and south of the tropical forests. Though these forests occur in climates that are warm year-round, and may receive several hundred centimeters of rain per year, they consist of trees that can resist the summer drought. Deciduous trees predominate in most of these forests, and during the drought a leafless period occurs, which varies with species type.

Mediterranean forests are located to the south of temperate regions and made up primarily of evergreen trees. They are generally characterized by dry summers and rainy winters; although in some areas rainfall may be uniform. Summers are typically hot in low-lying inland locations but can be cool near colder seas. Mediterranean forests are generally composed of broadleaf trees, such as the oak and mixed forests.

Temperate forests represent a mix of coniferous evergreen and deciduous trees, which shed their leaves during the autumn. There is less undergrowth. Temperate forests grow in the temperate region where winters are mild and rainfall is moderate. They are found in North America, northeastern Asia and Europe.

Coniferous forests are found in areas that have long winters and moderate to high annual precipitation and contain both conifers and hardwoods. The northern Eurasian coniferous forest is called the taiga or the boreal forest; it has many lakes, bogs and rivers. Coniferous forests also cover mountains in many parts of the world.

Montane forests are also known as cloud forests. They contain mainly conifers and are found in high-elevation tropical, subtropical and temperate zones. In general, the higher is the altitude, the lower is the canopy height. Fewer plant and animal species are found in montane forests compared to lowland forests because montane regions have adverse climate, a lack of shelter and food shortages.

Forests of Belarus. In the Republic of Belarus forests are one of the main renewable natural resources and the major national wealth. The wood resources are of great importance for sustainable social and economic development of the country, ensuring its economic, energy, ecological and food security. For a number of the key indicators characterizing forest fund Belarus is among the top ten forest states of Europe.

Forestry of Belarus, successfully implementing the principles of sustainable multipurpose forest management, is important for stable functioning of the forest sector of the country and contributes to the development of allied industries of economy. It also makes a significant contribution to the implementation of the signed international treaties at the global level in the field of environment protection. All this gives grounds to say that in modern conditions the forestry sector has become one of the key sectors of the national economic complex, especially in the rural areas of the country.

The forests species structure of Belarus is the following: 60.6% are coniferous woods. The most widespread wood species is pine, it occupies 51.1%, and spruce occupies 9.5%. Birch (22.6%) and black alder (8.4%) prevail among deciduous species; the broadleaf forests are presented generally by oak – 3.5%; 4.0 % of the area covered by forest is under aspen, alder and hornbeam.

Forests in the Republic of Belarus belong exclusively to the state.

Exercise 3. Choose the best continuation for each of the following sentences.

1. Tropical rainforests can be characterized as ...

a) lush, dense forests found near the equator.

b) hot and wet.

c) wild, rare stand.

2. Subtropical forests are found ...

a) to the north and south of the tropical forests.

b) off the tropical rainforests.

c) everywhere near the equator.

3. Mediterranean forests are located ...

a) near the Mediterranean sea.

b) to the south of temperate regions.

c) to the west of the Irish sea.

4. Temperate forests represent a mix of ...

a) broadleaf trees, such as the oak and the poplar.

b) broadleaf trees that are found in areas that have long winters and moderate to high annual precipitation.

c) coniferous evergreen and deciduous trees.

5. Montane forests are also known as ...

a) the taiga or the boreal forest.

b) cloud forests.

c) Mediterranean forests.

6. In the Republic of Belarus forests are ...

a) one of the main renewable natural resources and the major national wealth.

b) implementing the principles of sustainable multipurpose forest management.

c) contributing to the development of allied industries of economy.

7. The forestry sector has ...

a) become one of the key sectors of the national economic complex.

b) played an important role in the industrial sphere of the economy.

c) a lot of subdivisions.

8. The forests species structure of Belarus is the following:

a) coniferous, deciduous trees.

b) tropical rainforests.

c) conifers and hardwoods.

Exercise 4. Match the words to their definitions.

1. precipitation	a) the process of making something active or effective;
2. species	b) hail, mist, rain, sleet, or snow that falls to or condenses on the ground;
3. implementation	c) not depleted when used, capable of being renewed;
4. contribute	d) low growth on the floor of a forest including seedlings and saplings, shrubs, and herbs;
5. average	e) a period of dryness especially when prolonged; one that causes extensive damage to crops or prevents their successful growth;
6. renewable	f) something that covers or affords protection;
7. undergrowth	g) to play a significant part in bringing about an end or result;
8. sustainable	h) relating to a method of harvesting or using a resource so that the resource is not depleted or permanently damaged;
9. drought	i) an estimation of or approximation to an arithmetic mean; level (as of intelligence) typical of a group, class, or series;
10. shelter	j) a group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding.

Exercise 5. Complete each sentence using a word derivationally related to the word given in brackets.

1. Tropical rainforests are lush, (density) forests found near the equator. 2. High level of (precipitate) often results in poor

soils. 3. These forests (occurrence) in climates that are warm year-round. 4. Mediterranean forests (location) to the south of temperate regions. 5. Mediterranean forests are (general) composed of broadleaf trees. 6. The (north) Eurasian coniferous forest is called the taiga or the boreal forest. 7. Forests are one of the main (renew) natural resources. 8. Forest sector makes a significant (contribute) to the development of the national economy. 9. For a number of the key (indicate) characterizing forest fund Belarus is among the top ten forest states of Europe. 10. Forests in the Republic of Belarus belong (exclusive) to the state.

Exercise 6. Complete the sentences with the correct preposition.

1. Intimately related ... fresh water supplies is another renewable source – forests. 2. Deforestation results ... heavy soil erosion, floods, etc. 3. Local changes in climate have been known ... centuries. 4. Forests thrive ... diverse climatic regions ... the world. 5. Forestry contributes ... the development ... allied industries of economy. 6. Forests can be categorized ... their locations and elevations. 7. Small area covered by forest is ... aspen, alder and hornbeam. 8. Coniferous forests are found ... areas that have long winters and moderate to high annual precipitation. 9. Fewer plant and animal species are found ... montane forests compared ... lowland forests. 10. The wood resources are ... great importance ... economic development ... the country.

Exercise 7. Read the text again and mark the sentences T (true), F (false), or DS (doesn't say).

1. Subtropical forests can resist the summer drought. 2. The most widespread wood species is spruce. 3. The broadleaf forests are presented by oak, aspen, alder, and hornbeam. 4. For a number of the key indicators characterizing forest fund Belarus is among the top three forest states of Europe. 5. In modern conditions the forestry sector has become one of the flourishing sectors of the national economic complex, especially in the rural areas of the country. 6. The northern Eurasian coniferous forest is called the tundra or the boreal forest. 7. Temperate forests grow in the temperate regions where winters are severe and rainfall is excessive. 8. Montane forests are also known as cloud forests. 9. The lower is the altitude, the higher is the canopy height. 10. In the Republic of Belarus there are private-owned and state-owned forests.

Exercise 8. Read the text and choose the most appropriate title.

a) Changes in forest management practices in the USA.

b) The damaging practice of "clear-cutting".

c) Forests in the North American region.

Today many valuable woods have disappeared entirely. Most of Europe, Northern Asia, the Eastern one-third and vast areas of Northwestern United States were once covered with forests. Only a fraction of the forest of the Eastern United States and of Western Europe remains today, largely preserved through conscious conservation and reforestation policies. Large reserves of coniferous forest also remain in North America, from Nova Scotia to Alaska. Forest management practices have been established in most American states. But reforestation takes from 50 to100 years, depending on the tree and the climate.

What remains of temperate forests is under increasing pressure, especially in the United States. Lumber interests, in the effort to meet rising demand for construction wood and paper are increasing harvest, often at considerable expense of the forest environment. Particularly damaging is the practice of "clear-cutting" – the wholesale removal of large tracts of mature forest. Even if this is followed by immediate replanting a good deal of erosion and flooding can take place before the young trees are well established. Large stands of young trees are also more susceptible to diseases, pests, and fire than are forests containing trees of varied age. Loggers defend the practice of clear-cutting on the grounds that certain valuable species of trees need direct sunlight and space in which to grow: that is, cleared land. Presumably some less destructive procedure can be used, such as clear-cutting of small stands, if selective cutting and replanting of individual trees are unsatisfactory.

UNIT 2

I. Logging Operations

Exercise 1. Make sure you know the following words and expressions.

Logging operation – лесозаготовительные работы; felling – рубка, валка леса; processing – обработка, переработка; branching – обрубка сучьев; bucking – раскряжевка; skidding – трелевка леса, перемещение деревьев, хлыстов или сортиментов от места валки до лесопогрузочного пункта; stump – пень; trunk – ствол; loading – погрузка; hauling – транспортировка, буксировка, перевозка; feller-buncher – машина для валки леса и формирования пачек хлыстов; harvester – харвестер, лесозаготовительная машина для валки и обработки деревьев; lodge – зависать (о дереве при валке), упираться в препятствие (о трелюемом грузе); wedge – клин, зубец; undercut – подпил, подруб, недорез; crawler tractor – гусеничный трактор; skidder – трелевочная машина, лесотаска с механической лебедкой, скиддер; landing – место погрузки / выгрузки (бревен); brancher – сучкорезная машина; load – грузить, нагружать; timber – древесина, бревна, лесоматериал; lumber – пиломатериалы, бревна, пиленый лес; wedge-shaped section – клиновидная, заостренная часть, срез; swampy road – болотистая, топкая дорога; tree-length log – древесный хлыст; yield – размер выработки, количество добытого или произведенного продукта; busy sort – ценный сорт.

Exercise 2. Read and translate the following text.

Every logging operation consists of the following phases:

felling – the trees are cut down;

processing (branching and bucking) – trees are cut into logs and limbs are removed (processing can occur at different phases, depending on the harvest system used);

skidding – logs are moved from the stump to the landing;

loading – logs are loaded for transport to the mill;

hauling – transport to the mill (usually by truck).

The process of cutting down a tree is called felling. It is the first step in converting trees into lumber, paper and other products. Trees are felled either manually with a chainsaw or mechanically with a feller-buncher or harvester. The men who do it are called fellers or cutters. The task of the feller or felling crew in the woods is to fell a tree so that it will not lodge against another, will not break because of the uneven ground and will lie so that it can be trimmed of branches, cut into logs and skidded to the landing with the least difficulty. The lean of the tree and the side that has the heaviest part of the crown will determine to some extent which way it must fall. Driving wedges in the saw cut will sometimes change this: and a skillfully placed undercut will provide a very accurate dropping of the tree. An undercut is made by removing a wedge-shaped section of the trunk. The back-cut will then be made and the tree will fall in the direction of the undercut. A narrow strip of wood left between the undercut and the back-cut will prevent the tree from rotating on the stump as it falls.

The tree must be cut at the lowest point in order to reduce the height of the stump. Care must be taken to avoid damage to young trees in selecting the place to drop the tree.

Skidding. Skidding means bringing trees from the felling site to landings. Depending on the timber and operating conditions skidding may be done with horses, crawler tractors or skidders.

Tractors have great advantage over other methods of skidding and hauling and reduce their cost. They have greater speed and power than animals and skid larger, longer and heavier timber. Tractors provide more trips per day with a higher average load. Distances, swampy roads, fallen timber offer little difficulty to tractors. They have greater flexibility in skidding logs for varying distances. Tractors do less damage to young trees on logging areas than cable skidders.

Tractors are used for performing so many different operations in lumber industry that a tractor may be classed as one of the most flexible and valuable pieces of logging equipment.

The resistance of the load, when skidding full trees, depends upon the character of the tree, the ground surface as well as on the method of skidding. Spruce and fir lend themselves particularly well to the full-tree method, usually better than pine. Good results have also been obtained with birch, poplar and a number of other species.

Landing. Landings are places to which logs are skidded from felling sites before being loaded and transported to the mill or other destinations. They are situated at some point between minor and major transportation. At landings logs are unloaded from one transportation medium and loaded onto another or major transportation medium. The frequency of landings depends on the type and density of timber and the areas that are topographically tributary to them. Thus, only a few logs may be assembled on one landing, whereas several million may be skidded to another type.

Branching and Bucking. Branching means clearing a tree from branches. Special equipment is required for mechanical branching of timber. It may be a hand tool, powered by a motor, a light circular saw or a spade-shaped blade with a hammer action.

For branching an electric brancher was designed. The brancher is light. The disc of the saw is 7 1/6 inches in diameter with a kerf of 1/3 inches. The brancher can cut off twigs of up to nearly 5 inches in diameter. If branches are very thick a small chain saw blade can easily be fitted instead of the disc saw blade. The current for the brancher is provided by a portable power station through a light insulated power cable.

Bucking means cutting a fallen tree into logs. The standard length of lumber determines the length of logs. Bucking of tree-length logs is done mainly on landings. Rational bucking of tree-length logs gives the possibility of complete utilization of felled trees and increases the yield of valuable busy sorts of wood, particularly high-quality grades.

Exercise 3. Choose the best continuation for each of the following sentences.

1. The process of cutting down a tree is called ...

a) bucking.

b) felling.

c) brunching.

2. Landings are places ...

a) to which logs are skidded from felling sites before being loaded and transported to the mill or other destinations.

b) required for mechanical branching of timber.

c) used for performing so many different operations in lumber industry.

3. Trees are felled ...

a) either manually with a chainsaw or mechanically with a feller-buncher or harvester.

b) with the special equipment required for mechanical branching of timber.

c) at some point between minor and major transportation.

4. Tractors have ...

a) greater flexibility in skidding logs for varying distances.

b) great advantage over other methods of skidding and hauling and reduce their cost.

c) been used in converting trees into lumber, paper and other products.

5. If branches are very thick ...

a) the saw with the disk 7 1/6 inches in diameter with a kerf of 1/3 inches is used.

b) a hand tool, powered by a motor, a light circular saw or a spade-shaped blade with a hammer action can be used.

c) a small chain saw blade can easily be fitted instead of the disc saw blade.

6. Every logging operation consists of the following phases: ...

a) converting trees into lumber and producing paper and other products.

b) felling, branching, bucking, skidding, loading, hauling.

c) cutting, transporting, clearing, and landing.

7. Bucking means ...

a) cutting a fallen tree into logs.

b) complete utilization of felled trees and increases the yield of valuable busy sorts of wood, particularly high-quality grades.

c) brining trees from the felling site to landings.

8. Tractors have greater speed and power than ...

a) a light circular saw or a spade-shaped blade with a hammer action.

b) animals and skid larger, longer and heavier timber.

c) an electric brancher.

9. The tree must be cut ...

a) at the lowest point in order to reduce the height of the stump.

b) to avoid damage to young trees in selecting the place to drop the tree.

c) with a light circular saw or a spade-shaped blade with a hammer action.

10. The standard length of lumber determines ...

a) the type and density of timber.

b) the yield of valuable busy sorts of wood, particularly high-quality grades.

c) the length of logs.

Exercise 4. Match the words to their definitions.

1. chainsaw	a) a river or stream flowing into a larger river or lake;
2. twig	b) the purpose for which something is predetermined;
3. frequency	c) to bring together (as in a particular place or for a particular purpose);
4. flexibility	d) to specify the value, position or form of an object;
5. damage	e) portable power saw that has teeth linked together to form an endless chain;
6. tributary	f) the number of times that a periodic function repeats the same sequence of values during a unit variation of the independent variable;
7. assemble	g) the width of cut made by a saw or cutting torch;
8. destination	h) a small shoot or branch usually without leaves;
9. kerf	i) a ready capability to adapt to new, different, or changing requirements;
10. determine	j) loss or harm resulting from injury to person, property, or reputation.

Exercise 5. Complete each sentence using a word derivationally related to the word given in brackets.

1. Processing can (occurrence) at different phases, depending on the harvest system used. 2. The standard length of lumber (determination) the length of logs. 3. They are situated at some point between minor and major (transport). 4. Special equipment (requirement) for mechanical branching of timber. 5. Trees are (manual) felled with a chainsaw. 6. Landings are places to which logs are skidded from felling sites before being loaded and (transportation) to the mill or other destinations. 7. Tractors

have greater (flexible) in skidding logs for varying distances. 8. Rational bucking increases the yield of (value) busy sorts of wood. 9. The tree must be cut at the lowest point in order to (reduction) the height of the stump. 10. The men who are engaged in the process of felling are called (fell) or (cut).

Exercise 6. Complete the sentences with the correct preposition.

1. The process ... cutting down a tree is called felling. 2. An undercut is made ... removing a wedge-shaped section of the trunk. 3. A narrow strip of wood left ... the undercut and the back-cut will prevent the tree ... rotating on the stump as it falls. 4. Wood has been used by man ... the beginning of time. 5. Branching means clearing a tree ... branches. 6. The brancher can cut ... twigs of up to nearly 5 inches in diameter. 7. Tractors are used ... performing so many different operations in lumber industry. 8. Trees are felled mechanically ... a feller-buncher or harvester. 9. Distances, swampy roads, fallen timber offer little difficulty ... tractors.

Exercise 7. Read the text again and mark the sentences T (true), F (false), or DS (doesn't say).

1. The process of cutting down a tree is called bucking. 2. Branching means clearing a tree from branches. 3. The task of the feller or felling crew in the woods is to cut off twigs of up to nearly 5 inches in diameter. 4. Spruce and fir lend themselves particularly well to the full-tree method, usually better than pine. 5. The frequency of landings depends on the possibility of complete utilization of felled trees. 6. For branching an electric brancher was designed. 7. The tree must be cut at the lowest point in order to increase the yield of valuable busy sorts of wood. 8. An undercut is made by removing a wedge-shaped section of the trunk. 9. Distances, swampy roads, fallen timber offer significant difficulty to tractors. 10. A narrow strip of wood left between the undercut and the back-cut is left on the stump as it falls.

Exercise 8. Read the text and express the main idea of it.

Although cutting down a tree isn't difficult to do, the process can be dangerous. Before you fire up the chainsaw, make sure that you've got the right tools for the job and the proper safety gear. Dress accordingly, with work pants (made of denim or another

tough fabric) and a long-sleeved shirt to protect your arms and legs from flying debris. Always use protective glasses and ear plugs. Steel-capped boots and nonslip gloves are also recommended. It's also a good idea to consider a work helmet to protect your head from falling branches, especially if you're working in a thickly wooded area.

Once you've got your safety gear on and you've inspected your chainsaw to make sure it's in good working order, you are ready to get started felling a tree. Before you fire up the chainsaw, you'll need to determine the best direction for the tree to topple and land after you cut it. This is called the fall path. Visualize the fall path in all directions and identify points that are free of other trees. The clearer your fall path, the less likely the tree you are cutting will get logged against other trees or rocks as it comes down. A clear path also reduces the chance of the falling tree kicking up debris that could strike and injure you.

Always observe the lean of a tree. It is generally easier and safer to fell a tree in the direction that it is already leaning. Fell in a direction that minimizes the chance that the tree will roll or slide. To make removal easier, fell the tree so the butt faces the road (or path of removal). If you are clearing several trees, make sure the fall path is consistent with the felling pattern of the other trees. This also makes for efficient limbing and removal.

II. Logs Transportation

Exercise 1. Make sure you know the following words and expressions.

Vehicle – транспортное средство, машина; railway car – железнодорожный вагон; tractor-drawn wagon – буксир на тракторной тяге; sawmill – лесопилка, пилорама; scattered stand of timber – разряженный древостой; power loader – погрузочная машина; forwarder – форвардер, самозагружающийся трактор для трелевки лесоматериалов; cut-to-length logging operation – операция по разрезанию бревен на мерные длины; clear cutting – сплошная рубка; expensive – дорогой; stream – ручей, небольшая речка; boom – бон (заграждение в виде бревен), запань (заграждение на реке для собирания сплавляемого леса); dam – дамба, плотина; floatable –

плавучий, пригодный для сплава; driving – молевой лесосплав; floating – плотовой лесосплав; lumber company – лесозаготовительная компания; hardwood – древесина, лесоматериалы твердолиственных пород; softwood – хвойный лес, древесина мягких пород; harvester – харвестер, лесозаготовительная машина, лесозаготовительный комбайн.

Exercise 2. Read and translate the following text.

After the logs have been assembled at landings, they are generally loaded on vehicles: railway cars, motor trucks, tractor-drawn wagons and so on. They are then hauled directly to the sawmill or to landings along a stream or to further methods of transportation.

Log transportation methods depend upon the kind and size of trees, climate, topography, volume of log supply. Log transportation methods must be constantly analyzed to find the cheapest possible method of bringing logs from the woods to the mill.

In the 19th century log transportation by stream driving and floating prevailed. In winter the transportation of logs to the mill was done by horses.

At the beginning of the 20th century power skidding and railroad logging began to develop. Tractors and motor trucks came into use for logging purposes.

Trucks are now the most common means of hauling logs from the landing in the forest to the mill. The efficiency of the truck or tractor-trailer type of log transportation depends largely on its ability to penetrate the forest more easily than can locomotives. Trucks are also better suited for use in scattered stands of timber or where logs are picked up here and there as in certain cutting systems.

Truck loading is accomplished by numerous methods, the type depending on the log size, truck size and so on. Hand loading is very costly and inefficient. Several types of power loaders are in use today. They are used not only to load but also to skid logs for short distances.

Among logging equipment harvesters and forwarders have a special place. A harvester is a type of heavy forestry vehicle employed in cut-to-length logging operations for felling, branching and bucking trees. Harvesters are employed effectively for clear cutting operations. A forest harvester is typically employed together with a forwarder – a forestry vehicle that carries big felled

logs from the stump to a landing. A forwarder carries logs clear of the ground, which reduces soil impact but tends to limit the size of the logs it can move. Forwarders are commonly classified according to their load carrying capabilities. They can carry from 250 kg to 20 tons.

Water transportation. The utilization of natural waterways is the oldest and generally the least expensive form of log transportation. The streams and rivers in nearly all forested districts serve to bring logs from the woods to the mill or market. On many of these streams permanent improvements have been made such as booms, dams and the like – that are used year after year. The cost of log transportation is greatly minimized where stream improvements are made. Log transportation by water is generally the cheapest form when available.

There are several types of water transportation: driving, floating and the combination of driving and floating. Driving means the process of logs transportation in loose aggregation, it is possible on small streams. Floating means the process of logs transportation by floats, it is possible on large streams. The efficiency of driving and floating depends on many factors: the size and depth of the stream, the character of the banks, the rate of the flow and the improvements of the stream.

Floating and driving are adapted only to floatable species and to relatively small short logs. Some mistakes have been made in attempting to use streams non-adapted for log transportation. They have resulted in failures and great expense to the lumber companies. Attempts to drive combined hardwoods and softwoods resulted in considerable loss of logs since most of the hardwood did not float.

Exercise 3. Choose the best continuation for each of the following sentences.

1. After the logs have been assembled at landings ...

a) they are generally loaded on cars, motor trucks, tractor-drawn wagons.

b) they are hauled directly to the sawmill or to landings along a stream or to further methods of transportation.

c) they have been transported by water as the cheapest form when available.

2. Log transportation methods depend upon ...

a) the kind and size of trees, climate, topography, volume of log supply.

b) the cheapest possible method of bringing logs from the woods to the mill.

c) stream driving and floating available.

3. The efficiency of the truck or tractor-trailer type of log transportation depends largely on ...

a) the size and depth of the stream, the character of the banks.

b) a forestry vehicle that carries big felled logs from the stump to a landing.

c) its ability to penetrate the forest more easily than can locomotives.

4. Trucks are also better suited for use ...

a) in loading and skidding operations for transporting logs on short distances.

b) in scattered stands of timber or where logs are picked up here and there as in certain cutting systems.

c) to floatable species and to relatively small short logs.

4. A harvester is a type of heavy forestry vehicle ...

a) that resulted in failures and great expense to the lumber companies.

b) that minimizes the cost of log transportation.

c) employed in cut-to-length logging operations for felling, branching and bucking trees.

5. Forwarders ...

a) carry logs clear of the ground, which reduces soil impact but tends to limit the size of the logs it can move.

b) are commonly classified according to their load carrying capabilities.

c) can carry from 250 kg to 20 tons.

6. The streams and rivers in nearly all forested districts serve ...

a) to bring logs from the woods to the mill or market.

b) to improve streams such as booms, dams and the like.

c) to maximize the cost of log transportation where stream improvements are made.

7. Log transportation by water is generally the cheapest form ...

a) when available.

b) that is adapted only to floatable species and to relatively small short logs.

c) of logs transportation in loose aggregation.

8. The efficiency of driving and floating depends on ...

a) the size and depth of the stream, the character of the banks, the rate of the flow and the improvements of the stream.

b) floatable species and relatively small short logs.

c) attempting to use streams non-adapted for log transportation.

9. Truck loading is accomplished by ...

a) numerous methods, the type depending on the log size, truck size and so on.

b) by hand loading that is very costly and inefficient.

c) skidding logs by power loaders for short distances.

10. Floating and driving are adapted to ...

a) floatable species and to relatively small short logs.

b) using streams non-adapted for log transportation.

c) combining hardwoods and softwoods that results in considerable loss of logs since most of the hardwood does not float.

Exercise 4. Match the words to their definitions.

1. haul	a) to transfer from one place to another;
2. aggregation	b) large in extent or degree;
3. utilization	c) to cause (something) to move by pulling or drawing;
4. stump	d) the part of a plant and especially a tree remaining attached to the root after the trunk is cut;
5. skidding	e) the process of turning to a practical use;
6. assemble	f) the collecting of units or parts into a mass or whole; the condition of being so collected;
7. bucking	g) a state of inability to perform a normal function;
8. carry	h) to bring together; to fit together the parts of;
9. failure	i) sawing a felled tree into logs;
10. considerable	j) hauling (logs or something similar) by dragging; sliding without rotating.

Exercise 5. Complete each sentence using a word derivationally related to the word given in brackets.

1. Log transportation methods (dependence) upon the kind and size of trees. 2. On many of the streams permanent (improve) have been made such as booms, dams, etc. 3. The (efficient) of driving and floating depends on many factors. 4. In winter the (transport) of logs to the mill was done by horses. 5. A forest

harvester is (typical) employed together with a forwarder. 6. Floating and driving are adapted only to (float) species. 7. Tractors and motor trucks came into use for (log) purposes. 8. The efficiency of the truck depends largely on its (able) to penetrate the forest. 9. Several types of power (load) are in use today. 10. (Harvest) are employed effectively for clear cutting operations.

Exercise 6. Complete the sentences with the correct preposition.

1. Having been assembled at landings, the logs are generally loaded ... vehicles. 2. Floating means the process of logs transportation ... floats. 3. Floating and driving are adapted only ... floatable species. 4. Attempts to drive combined hardwoods and softwoods resulted ... considerable loss of logs. 5. Forwarders are commonly classified ... their load carrying capabilities. 6. The logs are hauled directly to the sawmill or to landings ... a stream. 7. The streams and rivers in nearly all forested districts serve to bring logs ... the woods to the mill or market. 8. Harvesters are employed effectively ... clear cutting operations. 9. Tractors and motor trucks came ... use for logging purposes. 10. Trucks are also better suited ... use in scattered stands of timber.

Exercise 7. Read the text again and mark the sentences T (true), F (false), or DS (doesn't say).

1. The logs are generally loaded on railway carriages, motor racing cars, etc. 2. Truck loading is accomplished by hand loading, power loading, etc. 3. Driving combined hardwoods and softwoods resulted in considerable loss of logs. 4. Floating and driving are adapted to any species available. 5. There are several types of water transportation: driving, floating and the combination of driving and floating. 6. The utilization of natural waterways has been known for several decades. 7. Among logging equipment harvesters and forwarders have occupied the least important place. 8. On many of these streams permanent improvements such as booms, dams are made every year. 9. Trucks are used to pick up logs. 10. The cost of log transportation is greatly minimized where stream improvements are made.

Exercise 8. Read the text and answer the following questions.

Log Transport by Tractor and Trailer

1) Where are the heavy loads admitted?

2) What load do the front wheels of the tractor-trailer support?

3) The total weight of the load is carried by the two rear axles of the tractor, isn't it?

4) Are heavy loads admitted on first class highways or on low-class roads?

5) What is the total weight of the heaviest tractor-trailer type?

6) What can you say about the load capacity of a tractor-trailer unit?

7) What influences the stress of the tractor-trailer unit on the road?

8) In which is this stress greater?

The timber load on a tractor-trailer unit is so distributed that the front wheels of the tractor have to support only the weight of the motor and of the driver's cabin. The total weight of the load is carried by the two rear axles of the tractor, thus permitting loading of all axles to capacity, which is up to two tons per wheel.

Such heavy loads are admitted only on first class highways, for travel speeds of up to 80 kilometers per hour, and never on lower-class forest roads. The total weight of the heaviest tractor-trailer types does not exceed 30 tons, carrying a pay load of about 22 tons. The eight wheels of the tandem axles of the tractor with trailer could, theoretically, also support two tons each, thus increasing the load capacity from 26 to 36 tons; or 16 tons on two tandem axles. The smaller the spacing between the tandem axles, the greater the stress on the road for a given load and speed.

Tractors and trailers are built today to any required size and loading capacity. The driving power for tractors and for trucks is usually provided by diesel motors but some vehicles are still using petrol.

Exercise 9. Transform the sentences, use the appropriate infinitive.

1. It seems she has done everything. 2. It appears that they know nothing. 3. She believed that she saw him yesterday. 4. The child pretends that he is sleeping. 5. Jack pretends that he understands the task very well. 6. It appears that he is very clever. 7. He claims that he can speak English. 8. It seems to me that you have your hair cut. 9. She claims that she has lost the papers. 10. It seems to me that they are listening to music. 11. He pretends that he is working hard. 12. It seems to me that he is a good manager. 13. It appeared that it was a funny story. 14. It seems

to me that he is telling the truth. 15. She claims that she has sold it for fifty pounds. 16. It seems to me that the letters have been signed. 17. It appeared that everybody was ready. 18. The boy pretended that he was crying. 19. It seems to me that the book is translated into almost all languages. 20. They claim that they don't understand anything.

Exercise 10. Open the brackets, use the particle or the infinitive where necessary.

1. I can't afford ... (stay) at such an expensive hotel. 2. I think I'll manage to ... (do) the work tomorrow. 3. You'd better ... (spend) the evening at home. 4. Who taught you ... (skate)? 5. I can't make the child ... (go) to bed? 6. They agreed ... (help) us. 7. I'd rather ... (go) to the cinema. 8. I was let ... (visit) the sick man. 9. Tell him ... (come) at once. 10. Let him ... (have a look) at the photo. 11. The doctor forbade him ... (smoke). 12. You'd better ... (help) them now. 13. Make him ... (clean) the flat. 14. He failed ... (get) Sam on the phone. 15. I can't let you ... (go) there alone. 16. The child was made ... (learn) the poem. 17. He refused ... (work) with us. 18. I advise you ... (visit) this exhibition. 19. Jack decided ... (not/answer) the letter. 20. The man was made ... (pay) the fine.

UNIT 3

I. Appearance and Properties of Wood

Exercise 1. Make sure you know the following words and expressions.

Embed – вставлять, встраивать, внедрять; attain – достигать, приобретать; coloring – окраска, расцветка; cell cavity – клеточное углубление, полость; impregnate – пропитывать, насыщать; tanning materials – дубильные вещества; grain pattern – структура волокна, зернистая структура; mellow gloss – мягкий блеск; derivative – производное; heterogeneous – гетерогенный, неоднородный; hygroscopic – гигроскопичный; anisotropic material – анизотропный, неравномерный материал; hardness – твердость, прочность, жесткость; strength property – прочностная характеристика; specific gravity – удельная плотность, вес; ratio – соотношение; moisture – влажность, влага, сырость; shrinkage – усадка, коробление; swelling – набухание, утолщение; attendant – сопутствующий, сопровождающий; dimension – измерение; fiber-saturation point – предел насыщения клеточных стенок, точка насыщения волокна; imbibed water – связанная вода; strength – сила, крепость, прочность.

Exercise 2. Read and translate the following text.

Wood is a hard substance that forms branches and trunks of trees and can be used as a building material, for making things or as a fuel. Wood is a porous and fibrous organic material, a natural composite of cellulose fibers that are strong in tension and embedded in a matrix of lignin that resists compression.

The color and appearance of wood is influenced by a variety of physical and chemical properties. Especially the chemical composition and the surface structure play a major role. Wood attains its coloring from substances which are contained in cell cavities or which impregnate their walls: pigments, tanning materials, resins and their oxidation products. The color of wood depends on the climate, its species, age and conditions of growth of the tree.

The decorative appearance of many timbers is due to the texture, or figure, or colour of the wood, and often to a combination of two, if not all three of these characteristics. Warm colors, varied grain patterns, and mellow gloss are attractive surface features of wood, and have impacts on the psychological and physiological states of observers. Wood is an exceptional material that has benefits beyond just aesthetic and structural properties, and possibly beyond our imagination. It has an ability to create relaxing, healthy environments for people to live in.

Wood has been used for thousands of years for fuel, as a construction material, for making tools and weapons, furniture and paper, for the production of purified cellulose and its derivatives. Wood is a heterogeneous, hygroscopic, cellular, and anisotropic material. Wood is strong for its weight, it is little affected by temperature changes, it is easily worked into various shapes and easily fastened together by nail or screw. Some woods are ornamental without finish, while all woods are readily painted or varnished. On the other hand wood is limited in hardness and strength and varies in its strength properties.

The single most revealing property of wood as an indicator of wood quality is specific gravity, as both pulp yield and lumber strength are determined by it. Specific gravity is the ratio of the mass of a substance to the mass of an equal volume of water; density is the ratio of a mass of a quantity of a substance to the volume of that quantity and is expressed in mass per unit substance, e.g., grams per milliliter (g/cm^3 or g/ml). Upon drying, wood shrinks and its density increases. Minimum values are associated with green (water-saturated) wood and are referred to as basic specific gravity. Within an individual tree, the variation in wood density is often as great as or even greater than that between different trees.

The chemical composition of wood varies from species to species, but is approximately 50% carbon, 42% oxygen, 6% hydrogen, 1% nitrogen, and 1% other elements (mainly calcium, potassium, sodium, magnesium, iron, and manganese) by weight. Wood also contains sulfur, phosphorous, chlorine, silicon and other elements in small quantity.

One of the most important physical properties of wood is its ability to absorb moisture quite easily. This property is sometimes useful, but very often it is detrimental because it causes shrinkage

and swelling with the attendant changes in dimensions and affects the mechanical properties of wood.

Because of its hygroscopic nature wood tends to reach equilibrium with its surroundings when it is exposed to the air or submerged in water. When it contacts with the air, wood either gives up some of its moisture or absorbs more, depending upon the relative humidity of the surrounding air. When the relative humidity reaches 100%, wood approaches the fiber-saturation point. When the relative humidity is zero, wood tends to become completely dry.

Water is held in individual cells in two different ways: 1) free water which merely fills the cell cavity, and 2) imbibed water which penetrates the cell walls and is held by the porous structure of the walls.

Aside from water, wood has three main components: cellulose (41–43%), hemicellulose (20% in deciduous trees but near 30% in conifers) and lignin.

Exercise 3. Choose the best continuation for each of the following sentences.

1. Wood is ...
a) a porous and fibrous organic material.
b) a natural composite of cellulose fibers.
c) a substance that is employed in industry.
2. The color and appearance of wood is influenced by ...
a) the coloring and tanning properties.
b) the age of the tree.
c) a variety of physical and chemical properties.
3. The color of wood depends on ...
a) the climate, its species, age and conditions of growth of the tree.
b) the method of log transportation.
c) the chemical composition of wood.
4. Wood is ...
a) easily worked into various shapes.
b) little affected by temperature changes.
c) easily fastened together by nail or screw.
5. The decorative appearance of many timbers is due to ...
a) the climate and conditions of growth of the tree.
b) the texture, or figure, or colour of the wood.
c) the relative humidity of the surrounding air.

6. Warm colors, varied grain patterns, and mellow gloss ...

a) are attractive surface features of wood.

b) have impacts on the psychological and physiological states of observers.

c) are influenced by the most important physical properties of wood.

7. Wood has been used for thousands of years ...

a) for fuel, and as a construction material.

b) for making tools and weapons, furniture and paper.

c) for the production of purified cellulose and its derivatives.

8. Specific gravity ...

a) is the single most revealing property of wood.

b) determines pulp yield and lumber strength.

c) is the ratio of the mass of a substance to the mass of an equal volume of water.

9. Wood shrinks ...

a) and its density decreases.

b) and its density increases.

c) before drying.

10. When wood contacts with the air ...

a) wood gives up some of its moisture.

b) absorbs more moisture.

c) it changes its properties depending upon the relative humidity of the surrounding air.

Exercise 4. Match the words to their definitions.

1. fuel	a) a state in which opposing forces or influences are balanced;
2. penetrate	b) the degree of compactness of a substance, the quantity per unit volume;
3. deciduous	c) a moderate degree of wetness especially of the atmosphere;
4. submerge	d) to produce as return from an expenditure or investment;
5. density	e) mostly evergreen trees and shrubs having usually needle-shaped or scale-like leaves and including forms (such as pines) with true cones;
6. equilibrium	f) (tree or shrub) shedding its leaves annually;
7. humidity	g) a material used to produce heat or power by burning;

8. yield	h) harmful, damaging;
9. detrimental	i) to pass into or through; to enter by overcoming resistance;
10. conifer	j) to cover or to overflow with water.

Exercise 5. Complete each sentence using a word derivationally related to the word given in brackets.

1. Wood is a (porosity) and fibrous organic material. 2. The color and appearance of wood is influenced by a variety of (physically) and chemical properties. 3. The decorative (appear) of many timbers is due to the texture or color of the wood. 4. Warm colors, varied grain patterns, and mellow gloss are (attraction) surface features of wood. 5. Wood is an (exception) material. 6. The chemical (compose) of wood varies from species to species. 7. This property is (use), but very often it is detrimental. 8. Wood has been used for thousands of years as a (construct) material. 9. When the relative humidity is zero, wood tends to become (complete) dry. 10. Water is held in individual cells in two (differ) ways.

Exercise 6. Complete the sentences with the correct preposition.

1. Wood can be used as a building material ... making things or as a fuel. 2. Wood changes its properties depending ... the relative humidity of the surrounding air. 3. The decorative appearance of many timbers is due ... the texture, or figure, or colour ... the wood. 4. ... water, wood has three main components. 5. This property causes ... shrinkage and swelling with the attendant changes in dimensions. 6. Wood also contains sulfur, phosphorous, chlorine, silicon ... small quantity. 7. Pulp yield and lumber strength are determined ... specific gravity. 8. ... its hygroscopic nature wood tends to reach equilibrium with its surroundings. 9. Wood is easily worked ... various shapes. 10. When wood contacts ... the air, wood either gives up some of its moisture or absorbs more.

Exercise 7. Read the text again and mark the sentences T (true), F (false), or DS (doesn't say).

1. Cellulose fibers are strong in tension and embedded in a matrix of lignin that resists compression. 2. One of the most important physical properties of wood is its ability to liberate moisture quite easily. 3. Wood is influenced by hardness and strength and varies in its strength properties. 4. Hygroscopic

nature of wood is shown when it is exposed to the air or submerged in water. 5. The variation in wood density is often inconsiderable than that between different trees. 6. The chemical composition of wood comprises carbon, oxygen, hydrogen. 7. Age of the tree affects the mechanical properties of wood. 8. When the relative humidity reaches 100%, wood approaches the fiber-saturation point. 9. When the relative humidity is zero, the tree tends to die. 10. Density is the ratio of a mass of a quantity of a substance to the exerted pressure.

Exercise 8. Read the text and answer the following questions.

About Wood

1) What is wood made up of?
2) How are the wood cells called?
3) What are they like?
4) What are the properties of lignin?
5) What is the function of dead air spaces in seasoned wood?
6) What kinds of wood are hard and difficult to work?
7) What is cellulose composed of?
8) What are pores and their function?
9) What is the function of wood rays?
10) What do the annual rings make up?
11) What does sapwood gradually change into?
12) What affects the grain figure?
13) What are the mechanical properties of wood?

Although woods from different trees have different qualities, all woods are essentially the same, physically and chemically. All wood is made up of cells which are called fibers. A non-fibrous material, lignin, holds the fibers together and makes the wood tough and flexible. The cell cavities in seasoned wood are dead air spaces that make the wood light in weight and effective as heat and sound insulation. Woods with very small cell cavities are hard and difficult to work.

Chemical nature of wood. The solid part of wood is chiefly cellulose, which is composed of carbon, hydrogen, and oxygen. About 60% is cellulose, and about 28% is lignin. In addition, other substances, such as minerals, starches, sugars, resins, dyes, oils, and gums, are found in wood. Wood is approximately 50% carbon, 6% hydrogen, and 44% oxygen.

Pores are tubes made up of large cells. They conduct sap from roots to the leaves. Coarse-textured woods such as oak and ash are called open-porous, because the cavities can be clearly seen on the surface of the wood. The fine-textured woods such as maple and cherry are close-porous, because the cavities can be seen only with a magnifier.

Medullary or wood rays are rows of cells that in some woods can be seen running across the end grain from the center of the log to the edge. They serve to transfer foodstuffs in the tree from bark to pitch and to store foodstuffs. In a piece of oak one will find the rays clearly defined; in pines they can be seen only with a magnifier.

Annual rings are made up of cells. Those which are produced in the spring growth of the tree, next to the bark, are generally much larger than those produced late in the season. Together they make up the annual ring. Normally, the rings can be counted in a log to determine the age of the tree. The early growth is called springwood, the late, summerwood.

In the growth of a tree, new cells are produced under a cambium layer, as sapwood. This gradually changes into heartwood, which becomes the wood characteristics of a tree. It is usually darker in colour than sapwood.

The differences in cell structure produce a distinct pattern within the wood itself. This becomes characteristic for each kind, but never identical in any two pieces of the same wood. Distortion of the fibers due to misshapen growth, limbs affects the grain figure. The way a log is sawed also affects the figure. Those woods that have considerable difference between springwood and summerwood are called coarse-grained; when there is little contrast, they are called fine-grained.

The mechanical qualities of wood are those qualities by which it resists changes in size or shape when it is affected by mechanical forces. These properties are: strength of compression, tension, bending, and the qualities of stiffness, toughness, and hardness.

II. Ways of Wood Drying

Exercise 1. Make sure you know the following words and expressions.

Adhesive – клей, склеивающее вещество; overall manufacturing quality – общее качество производства; air-drying – воздушная

сушка; pre-drying – предварительная сушка, подсушка; kiln drying – камерная сушка; stickers – рейки в качестве прокладок при сушке материалов; foundation – основание; exposure – выставление наружу, подвергание; softwood – хвойные породы; hardwood – твердолиственные породы; batch process – периодический технологический процесс, обработка порциями; compartment kiln – сушилка периодического действия; stationary – неподвижный, стационарный; be liable to checking and splitting – склонный к растрескиванию и раскалыванию; seasoning conditions – условия сушки (на открытом воздухе); pressure gradient – градиент давления; vent – вентиляционное отверстие, отдушина; platen – пластина, плита; warp – деформация, коробление; bending properties – свойства изгибания, склонности к деформации.

Exercise 2. Read and translate the following text.

Most lumber must be dried prior to use since drying reduces shrinkage, increases strength, reduces weight, allows wood to be treated and adhesives to be applied, and improves overall manufacturing quality. Lumber is typically dried using some combination of air-drying, accelerated air-drying or pre-drying, and kiln drying, where proper control of the drying process allows the highest quality to be attained. Control usually consists of the timely application of the appropriate temperature, relative humidity and air circulation. Poor control of the drying process leads to defects that can adversely affect the value and quality of the product and higher drying costs.

The methods used to dry wood and to control the process vary based on species, desired moisture content (MC), size of the material, quality aspects, and economics.

Air-drying is the drying of timber by exposing it to the air. The technique of air-drying consists mainly of making a stack of sawn timber (with the layers of boards separated by stickers) on raised foundations, in a clean, cool, dry and shady place. Rate of drying largely depends on climatic conditions, and on the air movement (exposure to the wind). For successful air-drying, a continuous and uniform flow of air throughout the pile of the timber needs to be arranged.

While air-drying is commonly used for large timbers or in combination with kiln drying at some point in the process, most

lumber is dried in a kiln. The most common kiln types are convectional steam, vacuum, and solar. The majority of softwood and hardwood lumber is dried in convectional steam-heated kilns. Convectional steam kilns vary between those that are a batch process or progressive or continual process.

The process of kiln drying consists basically of introducing heat. This may be directly, using natural gas and/or electricity or indirectly, through steam-heated heat exchangers, although solar energy is also possible. In the process, deliberate control of temperature, relative humidity and air circulation is provided. For this purpose, the timber is stacked in chambers, called wood drying kilns, which are fitted with equipment for manipulation and control of the temperature and the relative humidity of the air and its circulation rate through the timber stack.

Compartment-type kilns are most commonly used in timber companies. A compartment kiln is filled with a static batch of timber through which air is circulated. In these types of kilns, the timber remains stationary. The drying conditions are successively varied from time to time in such a way that the kilns provide control over the entire charge of timber being dried. This drying method is well suited to the needs of timber companies, which have to dry timbers of varied species and thickness, including species that are liable to checking and splitting.

In progressive kilns lumber gradually moves along the length of the kiln on trucks, starting under seasoning conditions suitable for given wood and passing through changing conditions until the other end of the kiln. In any one part of the kiln the air conditions are maintained constant.

Vacuum kilns can be the fastest to dry and most efficient with energy usage. At a vacuum kiln water boils at a lower temperature and one of the driving forces of moving water vapor is the pressure gradient. In addition to speed a vacuum kiln can also produce an improved quality in the wood.

A solar kiln is a cross between kiln drying and air-drying. These kilns are generally a greenhouse with a high-temperature fan and either vents or a condensing system. Solar kilns are slower due to the weather, but are low cost.

Compression drying is a technique where wood is subject to compression forces from heated platens, with the purpose of increasing moisture loss and reducing warp. Compression drying

does not significantly change the specific gravity or bending properties, but can decrease work to maximum load under some conditions.

While the methods to dry wood have not significantly changed over the last decade, there have been many advances in improving the technology and understanding the process. The modification of technology has allowed for the more rapid drying and attainment of better quality for specific species and thicknesses of materials. Efforts to develop new methods to control the drying process to further reduce drying times and improve quality continue.

Exercise 3. Choose the best continuation for each of the following sentences.

1. A vacuum kiln can produce ...

a) an improved quality in the wood.

b) a cross between kiln drying and air-drying.

c) an improved quantity in the wood.

2. Lumber is typically dried using ...

a) some combination of air-drying, accelerated air-drying or pre-drying, and kiln drying.

b) alternatively air-drying or pre-drying, and kiln drying.

c) appropriate temperature, relative humidity and air circulation.

3. Control usually consists of ...

a) the methods suited to the needs of timber companies.

b) the timely application of the appropriate temperature, relative humidity and air circulation.

c) the methods based on species, desired moisture content (MC), size of the material, quality aspects, and economics.

4. In progressive kilns lumber gradually moves ...

a) along the length of the kiln on trucks.

b) through changing conditions until the other end of the kiln.

c) to any one part of the kiln.

5. The principal reasons for air-drying are ...

a) to reduce weight.

b) to reduce cost.

c) to change susceptibility to decay.

6. Compression drying is a technique ...

a) where wood is subject to compression forces from heated platens.

b) which decreases moisture loss and reducing warp.

c) that significantly changes the specific gravity.

7. A compartment kiln is filled ...

a) with a static batch of timber through which air is circulated.

b) with timber that remains stationary.

c) with moving water vapor.

8. Efforts to develop new methods to control the drying process ...

a) to reduce the cost continue.

b) to increase the profit continue.

c) to further reduce drying times and improve quality continue.

9. A solar kiln ...

a) is a cross between kiln drying and air-drying.

b) is generally a greenhouse with a high-temperature fan and either vents or a condensing system.

c) is quicker due to the weather and higher cost.

10. Vacuum kilns can be ...

a) the fastest to dry and most efficient with energy usage.

b) presented as water boilers.

c) speeded up by an improved technology of the wood drying.

Exercise 4. Match the words to their definitions.

1. lumber	a) orderly movement through a circuit;
2. significantly	b) moving in a gas (as air) or a liquid in which the warmer portions rise and the colder portions sink;
3. accelerate	c) a twist or curve that has developed in something originally flat or straight;
4. moisture	d) timber sawn into rough planks or otherwise partly prepared;
5. warp	e) an act of putting something to use;
6. circulation	f) liquid diffused or condensed in relatively small quantity;
7. convectional	g) to move faster; to gain speed;
8. successively	h) a body of technical methods (as in a craft or in scientific research); a method of accomplishing a desired aim;
9. application	i) following in order; following each other without interruption;
10. technique	j) of a noticeably or measurably large amount.

Exercise 5. Complete each sentence using a word derivationally related to the word given in brackets.

1. Plywood consists of an (assemble) of sheets of wood bonded together. 2. Veneering and plywood making are ancient arts which were (practical) in Egypt and Greece. 3. The adhesives (common) used in plywood manufacture are soybean, vegetable protein, etc. 4. In the (construct) field plywood is used in housing. 5. Wood is easily worked into (vary) shapes. 6. (Compress) drying does not significantly change the specific gravity or bending properties. 7. Dry timbers can be of varied species and (thick). 8. The (major) of softwood and hardwood lumber is dried in convectional steam-heated kilns. 9. Wood is (easy) fastened together by nail or screw. 10. Wood does not rust, it (absorption) shock and vibration.

Exercise 6. Complete the sentences with the correct preposition.

1. The first operation in the process of converting trees ... lumber is to cut down a number of trees and saw them ... logs. 2. Wood is limited ... hardness and strength; it varies ... its strength properties. 3. Wood decays, burns, swells, and shrinks with moisture changes, splits easily, and is susceptible ... insect damage and rot. 4. The anatomical structure of wood is extremely complex; its physical properties vary, not only ... different species, but within species and even ... the parts of an individual tree. 5. Compartment-type kilns are most commonly used ... timber companies. 6. In progressive kilns lumber gradually moves ... the length of the kiln on trucks. 7. Poor control of the drying process leads ... defects that can adversely affect the value and quality of the product and higher drying costs. 8. While the methods to dry wood have not significantly changed ... the last decade, there have been many advances in improving the technology and understanding the process. 9. Rate of drying largely depends ... climatic conditions. 10. Control usually consists ... the timely application of the appropriate temperature, relative humidity and air circulation.

Exercise 7. Read the text again and mark the sentences T (true), F (false), or DS (doesn't say).

1. Lumber is typically dried using kiln drying, where proper control of the drying process allows the highest quality to be

attained. 2. Compression drying significantly changes the specific gravity or bending properties. 3. There have been many advances in improving the technology and understanding the process of drying wood. 4. Vacuum kilns are the slowest to dry and least efficient with energy usage. 5. Solar kilns are slower due to the weather, but are low cost. 6. Compartment-type kilns are seldom used in timber companies. 7. The drying conditions are successively varied from time to time in such a way that the kilns provide control over the entire charge of timber being dried. 8. At a vacuum kiln water boils at a high temperature and one of the driving forces of moving water vapor is the pressure gradient. 9. A solar kiln is filled with a static batch of timber through which air is circulated. 10. The compartment-type kilns are generally a greenhouse with a high-temperature fan and either vents or a condensing system.

Exercise 8. Read the text and make up the questions to the text.

Wood and Moisture

Perhaps the most important aspect of woodworking deals with the relationship between wood and moisture. A fundamental fact is that wood is hygroscopic. This means that wood, almost like a sponge, will gain or lose moisture from the air based upon the conditions of the surrounding environment.

But not only does wood gain or lose moisture, it will also expand or contract according to the magnitude of such changes; and it is this swelling and shrinking in finished wood products that is responsible for so much mischief and so many malfunctions in woodworking.

When a tree is first felled, it is considered to be in the green state, and contains a very large amount of moisture. This moisture exists in two different forms: as free water that is contained as liquid in the pores or vessels of the wood itself, and as bound water that is trapped within the cell walls.

Once a fresh log or piece of lumber is cut and exposed to the air, it will immediately begin losing free water. At this point, the wood does not contract or otherwise change in dimension since the fibers are still completely saturated with bound water. It is only once all the free water has been lost that the wood will reach what is called the fiber saturation point, or simply FSP.

Below the FSP, the wood will then begin to lose moisture in the form of bound water, and an accompanying reduction in

the wood's volume will occur. At this point, the wood is no longer considered to be in the green state, but is now in a state of drying.

Just how much bound moisture is lost during the drying phase will ultimately depend upon the temperature and relative humidity (RH) of the surrounding air. At 100% no bound water will be lost. At 0% RH, all the bound water in the wood will be lost, a condition known as oven-dry – so-called because a kiln or oven is typically required to completely drive out all moisture.

The amount of water in a given piece of wood is expressed as a percentage of the weight of the water as compared to its oven-dry weight. Some species of trees, when they are initially felled, may contain more water by weight than actual wood fiber, resulting in moisture content (MC) over 100%.

Exercise 9. Transform the sentences, use the appropriate infinitive constructions.

1. There are a lot of things that you must wash. 2. This is an interesting film that a child can see. 3. This is an interesting subject that one can study. 4. They had a lot of things that they could discuss. 5. Judy learnt about it last. 6. There are other facts that can prove this theory. 7. There is news that you must know. 8. Frank told his father the pleasant news first. 9. He has a friend that he can ask for advice. 10. There are some papers that must be typed. 11. I have some money that can be invested. 12. This is the material that should be revised. 13. He got to the finishing line right after the winner. 14. These are the things he must repair.

Exercise 10. Transform the sentences, use the appropriate infinitive constructions 'too + adjective + infinitive'.

1. The weather is so bad that we won't go to the country. 2. The article is so difficult that he can't translate it. 3. The day is so hot that it is impossible to stay in town. 4. The dress is so expensive that it can't be worn every day. 5. The mountain is so high that you won't be able to climb it.

Exercise 11. Transform the sentences, use the appropriate infinitive constructions 'adjective + enough + infinitive'.

1. The rule was difficult. The child could hardly understand it. 2. The car is expensive. I can't buy it. 3. The house was large. Such a big family to live in it. 4. The girl is fifteen. She's going to get married. 5. Your coat isn't warm. You can hardly wear it in winter.

UNIT 4

I. Natural Defects in Wood

Exercise 1. Make sure you know the following words and expressions.

Abnormality – аномалия, отклонение, неправильность; irregularity – отклонение от нормы, неправильность формы, несимметричность; deviation – отклонение (от нормы), отступление, отход; shrink (shrank, shrunk) – уменьшаться, сокращаться, давать усадку; expand – увеличиваться в объеме, расширяться; machining – механическая обработка; seasoning – высушивание древесины на воздухе, естественная сушка; pitch pocket – смоляной карман; damaged – поврежденный, испорченный; pin knot – сучок игольчатый; denote – обозначать, означать, указывать на; annual ring – годичное кольцо, годичный слой древесины; longitudinal shrinkage – продольная усадка; stiffness – жесткость, прочность; decay – гниение, разложение; attack – поражать, разрушать, воздействовать; lack – недостаток, нехватка, отсутствие; shock resistance – ударопрочность; resin – смола, канифоль, камедь; conversion – переработка, преобразование; bark pocket – карман с корой в древесине; cross grain – поперечный косослой; imperfection – дефект, изъян, недостаток; protrude – торчать, выступать, выдаваться; longitudinal axis – продольная ось; reaction wood – древесина кренёвая; compression wood – крень, древесина кренёвая; shake – морозобоина, трещина; wind stress – напряжение от ветровой нагрузки; disintegration – разложение, разрушение; dissolution – распад, разложение, гниение; wood tissue – древесная ткань; stain – синева (порок древесины), пятно, красящее вещество, морилка; sound – здоровый, прочный, крепкий; unsound – нездоровый, ненадежный, дефектный; firm – твердый, прочный, крепкий; fungus (fungi) – гриб, плесень; pine – сосна, spruce – ель, fir – пихта; larch – лиственница; nesting place – гнездовье; larva (larvae) – личинка, гусеница.

Exercise 2. Read and translate the following text.

No tree is perfect. During its lifetime a tree is subjected to many natural forces that cause defects in wood. A defect is simply

an abnormality or irregularity found in wood. There are many different types of defects arising from many different causes.

There are innate defects caused by the natural characteristic of wood to shrink or expand in response to moisture in the air. And there are artificial and mechanical defects caused by incorrect sawing or machining (conversion), improper drying (seasoning), or improper handling and storage.

Defects may be responsible for reducing wood's economic value, lowering its strength, durability and usefulness, spoiling its appearance, and in some cases, causing its decay.

The most common defects are the following: knots, bark pockets, pitch pockets, cross grain, reaction wood, defects caused by insects, shake, decay and stains.

Knots are the most common defects caused due to natural forces. During the growth of a tree, branches close to the ground or lower branches die. Bases of those branches remain in the tree as the trees grow. These bases may create imperfection known as knots. There are two types of knots: dead and live. Dead knots are remains of damaged branches, after drying out they become loose and fall out. Live knots are sound and firm. Live knots are usually not a problem as they remain firmly attached to the timber. If small, they are not great of a defect. Knots decrease the strength of wood and thus lower its value for structural uses.

Knots vary in size. Pin knots are less than 6.5 mm in diameter. Small knots are from 6.5 to 20 mm in diameter. Medium knots are from 20 to 40 mm in diameter. Large knots are above 40 mm in diameter.

Bark pockets are formed when a small piece of the bark protrudes into the lumber. This area is generally considered unsound.

Pitch pocket or resin pocket is a cavity formed between the annual rings, it contains free resin. This defect is confined to softwoods such as pines, spruces, firs and larches.

Cross grain is the term which denotes the deviation of wood fibers from a direction parallel to the longitudinal axis of a piece of wood. Subtypes include diagonal, spiral and irregular grain.

Reaction or compression wood is wood that forms in place of normal wood as a response to gravity. This abnormal growth frequently occurs on the underside of leaning trees and limbs of softwoods. It is denser and harder than other wood, is

characterized by wide eccentric annual rings, and is more or less dark reddish to brown in color. Generally compression wood has high longitudinal shrinkage and low stiffness.

Defects caused by insects. There are a number of insects that eat wood. Many other insects use wood as a nesting place for their larvae which results in holes and tunnels in the wood. The damage they cause ranges from minor to catastrophic because they weaken the strength of the wood and can turn wood into powder.

Shake is separation of wood along the grain primarily between or within annual rings. This separation makes the wood undesirable when appearance is important. Usually this defect is caused by frost or wind stress, but it can also occur on impact at the time of felling or because of shrinkage in the log before conversion.

Decay in wood is the process of decaying, disintegration, dissolution of wood tissues. Wood does not decay simply because it is wet, but because it has been attacked by fungi under rather special conditions of moisture and temperature. In order to prevent decay it is necessary to know the nature of the fungi that attack wood and the conditions necessary for their growth. Wood with moisture content less than approximately 20% will not decay owing to lack of sufficient moisture for fungi development. Wood under water will not decay because the air supply is lacking. Decay affects shock resistance at a very early stage.

Stains are discoloration that penetrates the wood fiber. They are caused by a variety of conditions and can be any color other than the natural color of the wood. A number of wood destroying fungi can cause stains or discoloration. Some stains may indicate that decay or bacteria are present.

Exercise 3. Choose the best continuation for each of the following sentences.

1. Knots decrease ... and thus lower its value for structural uses.

a) the tree attractiveness...

b) the beauty of lumber...

c) the strength of wood...

2. Cross grain is the term which denotes the deviation of wood fibers from a direction parallel to ... .

a) the longitudinal axis of a piece of wood...

b) the transverse axis of a piece of wood...

c) both longitudinal and transverse axes of a piece of wood...

3. Shake is ... primarily between or within annual rings.

a) the process of disintegration...

b) the process of discoloration...

c) separation of wood along the grain...

4. There are ... caused by the natural characteristics of wood.

a) acquired imperfections...

b) innate defects...

c) artificial errors...

5. Many insects use wood as ... which results in holes and tunnels in the wood.

a) a nesting place for their larvae...

b) food...

c) a hiding place...

6. Reaction wood frequently occurs ... of leaning trees and limbs of softwoods.

a) on the underside...

b) on the upper side...

c) on the lateral side...

7. Compression wood is characterized by wide eccentric annual rings, and is more or less ... .

a) dark reddish to black in color...

b) dark reddish to brown in color...

c) light reddish to brown in color...

8. Pitch pocket or resin pocket is a cavity formed between the annual rings, ...

a) it contains compression wood...

b) it contains a piece of bark...

c) it contains free resin...

Exercise 4. Match the words to their definitions.

1. shrink	a) a round hard place in a piece of wood where a branch grew;
2. expand	b) the process of changing into a different, less attractive color;
3. decay	c) to become larger in size and fill more space;
4. lumber	d) fibre obtained from wood and used especially in the manufacture of paper;
5. knot	e) the gradual destruction of something as a result of a natural process of change;

6. annual ring	f) to become smaller in amount, value or range;
7. resin	g) forest timber cut and prepared for transportation and sale;
8. wood fibre	h) the hard substance that covers a tree;
9. discoloration	i) a ring in the cross section of the woody plant stem produced by one year's growth;
10. bark	j) a transparent sticky substance produced by some plants and trees.

Exercise 5. Complete each sentence using a word derivationally related to the word given in brackets.

1. It is (importance) to note that decay organisms require moisture to live and grow. 2. The (present) of active decay implies access to a source of moisture. 3. (Moisture) wood will always decay, unless the wood is preservative-treated or is of a very durable species. 4. (Discolor) of wood may be caused by decay. 5. Wide eccentric annual rings are one of the (character) of compression wood. 6. Usually reaction wood has high longitudinal (shrink) and low (stiff). 7. Defects in wood may (occurrence) as a result of the drying process. 8. Slope of grain may be a (naturally) phenomenon wherein the grain is at some angle to the tree axis. 9. Slope of grain has a negative (effective) upon wood (strong) properties. 10. The strength-reducing effects of fungal attack are quite (signify) even before (visibility) evidence.

Exercise 6. Complete the sentences with the correct preposition.

1. Shake is lengthwise separation ... the wood, which usually occurs ... or through the annual growth rings. 2. Shakes are limited ... grading since they present a plane ... greatly reduced shear strength. 3. Shake may occur as a result ... severe wind that bends a tree to produce an internal shear failure, or as a result ... subsequent rough handling ... the tree or its products. 4. Splits and cracks are separations ... the wood cells ... the grain, most often the result ... drying stresses as the wood shrinks. 5. Cracks are small, whereas splits extend completely ... the thickness ... a piece. 6. Insect attack may range ... small blemishes that do not affect strength ... large voids or extensive damage ... the wood as the result ... termite or other insect infestation. 7. Insect attack is usually treated as equivalent ... the effect ... similarly sized

knotholes. 8. Knots are the result ... cutting across a branch ... lumber manufacture. 9. If the branch is cut perpendicular ... its axis, the knot is round. 10. If the saw is oriented so as to cut ... the length ... a branch, the knot is greatly elongated.

Exercise 7. Read the text again and mark the sentences T (true), F (false), or DS (doesn't say).

1. Defects may be responsible for spoiling appearance of wood. 2. There are many different types of defects arising from only one cause. 3. There are no artificial defects caused by improper storage. 4. Slope of grain has a negative effect upon wood strength properties. 5. Spiral grain is a subtype of cross grain. 6. Small knots are from 8.5 to 30 mm in diameter. 7. Wood under water will not decay because the air supply is lacking. 8. Pitch pocket is a defect confined to softwoods such as birches and oaks. 9. Fibers of sound knots are intergrown with the surrounding wood. 10. Stains are caused by a variety of conditions and can be any color other than the natural color of the wood.

Exercise 8. Read and translate the following text in written form. Think about the appropriate title for the text.

Reaction wood in a woody plant is wood that forms in place of normal wood as a response to gravity, where the cambial cells are oriented other than vertically. It is typically found on branches and leaning stems. It is an example of self-optimization.

Progressive bending and cracking would occur in parts of the tree undergoing predominantly tensile or compressive stresses were it not for the localized production of reaction wood, which differs from ordinary wood in its mechanical properties. Reaction wood may be laid down in wider than normal annual increments, so that the cross section is often asymmetric or elliptical. The structure of cells and vessels is also different, resulting in additional strength. The effect of reaction wood is to help maintain the angle of the bent or leaning part by resisting further downward bending or failure.

There are two different types of reaction wood, which represent two different approaches to the same problem by woody plants:

1) In angiosperms reaction wood is called tension wood. Tension wood forms on the side of the part of the plant that is under tension, pulling it towards the affecting force (upwards, in

the case of a branch). It has a higher proportion of cellulose than normal wood. Tension wood may have as high as 60% cellulose.

2) In gymnosperms it is called compression wood. Compression wood forms on the side of the plant that is under compression, thereby lengthening/straightening the bend. Compression wood has a higher proportion of lignin than normal wood. Compression wood has only about 30% cellulose compared to 42% in normal softwood. Its lignin content can be as high as 40%.

As a rule, reaction wood is undesirable in any structural application, primarily as its mechanical properties are different from normal wood. It alters the uniform structural properties of timber. Reaction wood also responds to moisture differently from normal wood.

Exercise 9. Read and translate the following text. Express the main idea of the text in 1 or 2 short sentences.

Seasoned, properly used wood is a dependable building material. In properly designed houses that are well built and well maintained, decay causes little damage. Most damage can be avoided. Prevention is cheap; cure is sometimes costly.

Wood decay is caused by minute plants called fungi. These plants consist of microscopic threads that are visible to the naked eye only when many of them occur together. Some fungi merely discolor wood, but decay fungi destroy the fiber. Decayed wood is often dry in the final stages, but not while the decay is taking place, because fungi cannot work in dry wood. That is why there is no such thing as «dry rot», and why decay is a minor problem in the dry countries.

Exercise 10. Use Participle I Active.

Example: – She was sitting and watching the sunset.
– *She sat* ***watching*** *the sunset.*

1. The man who is sitting at the window is waiting for you. 2. As he was a rich man he could buy the car. 3. As she was ill she had to stay home. 4. As she was proud of her son she often spoke about him. 5. What is the name of the man who is talking to Jack? 6. As he was late he took a taxi. 7. The child who was crying looked unhappy. 8. At last I found the page which was missing. 9. As he was interested in the subject he read a lot of books about it.

Exercise 11. Use Participle II.

Example: – He took some photos of a church which was built in the 15th century.
– He took some photos of a church **built** in the 15th century.

1. He took the camera which was broken and threw it away. 2. He was looking at the pictures which had been drawn by the child. 3. The thing which she had forgotten was again fresh in her memory. 4. They are looking for some treasure which is hidden here. 5. The lanterns which were lit showed them the way. 6. The bird which had been shot fell down. 7. He likes to wear the clothes which have worn out. 8. He saw a note which had been written in a hurry. 9. He looked through the composition the child had written.

II. Wood Protection and Finishes

Exercise 1. Make sure you know the following words and expressions.

Finish – отделка, полировка, покрытие; sanding – шлифовка, очистка; lacquer – лак, политура, глазурь; varnish – лак, глянец; enamel – эмаль, финифть, глазурь; drying oil – олифа; pigment – краситель, пигмент; colorant – краситель, красящее вещество, пигмент; coating – покрытие, оболочка, нанесение покрытия; undercoat – грунтовка, грунтовочное покрытие; thinner – растворитель, разбавитель; solvent – растворитель; setting – затвердевание, застывание; cure – отверждать, схватываться; spraying – распыление, напыление, пульверизация; durability – долговечность, прочность, износоустойчивость; wood stain – протрава для древесины; volatile – летучий, быстро испаряющийся; water-repellent – водоотталкивающий, водонепроницаемый; brush-applied – нанесенный кистью; preserve – сохранять, сберегать; damage – вред, повреждение, ущерб; prerequisite – необходимое условие, предпосылка; dipping in – макание, погружение в (жидкость); wood protection agent – средство (химическое вещество) для защиты древесины; pressure impregnation – пропитка под давлением; vacuum impregnation – вакуумная пропитка; wetting – смачивание, замачивание; saline solution – солевой раствор; charring – обжиг, обжигание; cabinet maker – краснодеревщик, столяр; beeswax – пчелиный воск; shellac – шеллак (естественная

смола, природный лак); linseed oil – льняное масло, льняная олифа; melting point – точка плавления, температура плавления; rubbing – натирание, полировка; dull luster – матовый блеск, тусклый глянец; glossy finish – глянцевая поверхность, блестящая полировка; shine – глянец, блеск, лоск; nitrocellulose – нитроцеллюлоза; plasticizer – пластификатор, смягчитель; low maintenance – низкие эксплуатационные расходы; dissolved – растворенный; suspended – взвешенный, суспендзионный; grain pattern – структура волокна (древесины); wear – изнашивание, истирание; pest – вредитель, паразит; sandpaper – наждачная бумага, шкурка; sander – шлифовальный станок, пескоструйный аппарат.

Exercise 2. Read and translate the following text.

The purpose of protecting wood is to preserve the good properties of wood and wood products and, at the same time, to prevent damage by decay, fungi, pests, etc. A prerequisite for the long-term durability of wood is, among other things, to keep its moisture content constantly below 20%. If wood must be kept in conditions such that its protection is not possible merely by structural means, chemical protection can also be used. Such methods include spraying, coating with or dipping in a wood protection agent, or pressure and vacuum impregnation. Before chemical methods started to be used, wetting the wood in a saline solution or charring its surface were used as means of protecting it, among other methods.

Sprayed and brush-applied wood protection agents usually only penetrate the surface of the wood to a depth of 1–2 mm, so their wood-protecting effect is minor, unless the agent is reapplied often enough. With the dipping method, the chemical agents can reach a depth of about 5 mm under the surface of the wood. New wood protection agents and coatings are being constantly developed, and their range is quite large. Most wood protection agents contain pentachlorophenol, lacquers and water-repellent substances. Wood impregnation aims to protect the wood against biological destruction and pests.

Finishing is the final step of the manufacturing process that gives wood surfaces desirable characteristics, including enhanced appearance and increased resistance to moisture and other environmental agents. Finishing can also make wood easier to clean.

In addition, finishing provides a way of giving low-value woods the appearance of ones that are expensive and difficult to obtain.

Sanding is carried out before finishing to remove defects from the wood surface that will affect the appearance and performance of finishes that are subsequently applied to the wood. Sanding is the process of smoothing or polishing a surface with sandpaper or sander. It should not begin until the wood has been cut to the final size.

Once the wood surface is prepared and stained, the finish is applied. It usually consists of several coats of wax, shellac, drying oil, lacquer, varnish, or paint, and each coat is typically followed by sanding.

Finally, the surface is polished. Often, a final coat of wax is applied over the finish to add a degree of protection.

Wax has been used as a finish for centuries. The early cabinet makers used such natural waxes as beeswax, shellac and linseed oil. Wax comes in different forms but the paste form of wax is preferred. There is also a wide range of colors to choose from. Wax is rather soft and will never dry to a hard finish, it has a low melting point and it doesn't provide adequate protection against mechanical damage or heat. It takes much rubbing to bring out the characteristic dull luster.

Nowadays there are many plastic finishes (synthetic finishing materials) produced by the chemical industry which, when properly applied, make unusually durable surface coatings. Before using any of them it is important to study the manufacturer's instructions, because some of the finishes require a catalyst for setting, others are self-curing. They can be sprayed or applied with a brush.

Varnish is a clear solution that is principally applied to wood to give it a glossy finish while forming a protective film around it. Varnish consists of a resin, a drying oil, and a thinner or solvent. Since varnishes have very little color, they can also be applied over a wood stain to enhance the shine of the wood.

Lacquer is a type of solvent-based product that is made by dissolving nitrocellulose together with plasticizers and pigments in a mixture of volatile solvents. Lacquer also contains a solution of shellac in alcohol that creates a synthetic coating, causing it to form a high gloss surface.

Both varnish and lacquer provide shiny and glossy finishes. While lacquers can come in clear or a colored coating, varnishes tend to be completely transparent and are rarely produced in any other color.

Enamel finish is a general term applied to paints that dry to a hard, durable finish. They are an excellent choice for painting pieces that will be used outdoors or in places that are likely to be subjected to lots of wear, such as garden furniture or stairs. Enamel is durable, attractive and low maintenance. It should be applied on smooth surfaces with undercoats. It is not advisable to use enamel over wax surfaces.

A wood stain consists of colorants dissolved or suspended in a solvent (water, alcohol, shellac, lacquer, varnish, etc.). Application of the wood stain changes only the color of the wood not the grain pattern.

A finish benefits wood in two basic ways: protection and decoration.

Protection means protection from moisture, either in a liquid or vapor form (humidity), or protection from scratches, dirt and wear. The thicker the finish, the more moisture-resistant it is.

Whatever the finishing material used, a good finishing job improves any project, while a poor one spoils even the best project.

Exercise 3. Choose the best continuation for each of the following sentences.

1. Plastic finishes ... make unusually durable surface coatings.

a) when properly applied...

b) when approximately used...

c) when easily evaporated...

2. A good ... improves any project, while a poor one spoils even the best project.

a) surface coating...

b) layer of paint...

c) finishing job...

3. Application of the wood stain changes only the color of the wood not the ... .

a) appearance of wood...

b) properties of wood...

c) grain pattern...

4. Before using plastic finishes it is important to study ... .

a) a lot of subjects at the University...

b) the manufacturer's instructions...
c) the composition of these plastic finishes...

5. Varnishes tend to be ... and are rarely produced in any other color.
a) completely transparent...
b) very dark...
c) unusually glossy...

6. Wax comes in different forms but ... is preferred.
a) the liquid form of wax...
b) the paste form of wax...
c) the solid form of wax...

7. Sanding is carried out before finishing ... that will affect the appearance and performance of finishes that are subsequently applied to the wood.
a) to remove paint from the wood surface...
b) to smooth the wood surface...
c) to remove defects from the wood surface...

8. Enamels are an excellent choice for painting pieces that are likely to be ... .
a) subjected to lots of wear...
b) used in public places...
c) sent to the international exhibitions...

Exercise 4. Match the words to their definitions.

1. varnish	a) the first layer of paint that you put on a surface;
2. wax	b) a liquid used for dissolving a solid substance so that it becomes a part of the liquid;
3. undercoat	c) easily evaporated at normal temperatures;
4. pigment	d) a clear sticky liquid used for covering wood or other surfaces (It forms a shiny transparent surface that gives protection);
5. solvent	e) able to stay in good condition for a long time and after being used a lot;
6. melting point	f) an oil that thickens or hardens on exposure to air;
7. volatile	g) a soft natural or artificial substance, used for making wooden furniture shine and for protecting objects from water;

8. coating	h) a thin layer of substance that covers something;
9. durable	i) the temperature at which a given solid will melt;
10. drying oil	j) a natural substance that gives color to something.

Exercise 5. Complete each sentence using a word derivationally related to the word given in brackets.

1. A (freshly) coat of paint gives wood furniture a brand new look. 2. Proper (prepare) is important in getting an (attract) and durable finish. 3. Woodworkers and (profession) painters often recommend an oil-based paint for heavily used furniture because of its long-lasting (durable). 4. Oil-based paint sticks well to (previous) painted surfaces. 5. (Chemistry) solvents are necessary to (cleaner) brushes, tools and surfaces. 6. Varnish dries slowly in (humidity) or (coldness) conditions. 7. Wood is sanded to remove any surface (perfect). 8. Shellac has excellent (insulate) properties. 9. Spray varnish is (wonder) if you have large areas to cover, and is (ridiculous) easy to apply. 10. Acrylic varnishes offer very high (transparent) levels and don't go yellow.

Exercise 6. Complete the sentences with the correct preposition.

1. Acrylic varnishes are easy to clean ... and don't give ... fumes. 2. They are often used ... artists to seal and protect paintings, sometimes ... special ultraviolet light resistors to protect the paint ... light. 3. Marine varnish is simply a super-durable product brilliant ... boats. 4. There is ... fact a wide range ... pigmented versions ... floor varnish. 5. Floor varnish comes ... several attractive natural wood shades. 6. There are water-based varnishes ... interior doors and furniture, ... floors and staircases. 7. Polyurethane varnish is a plastic ... liquid form. 8. It is safe to use polyurethane varnish ... wooden children's toys. 9. Shellac is actually a natural resin secreted ... an insect called a lac beetle, which lives ... Indian and Thai forests. 10. Varnishes are made ... chemically combining a modifying resin ... a vegetable oil.

Exercise 7. Read the text again and mark the sentences T (true), F (false), or DS (doesn't say).

1. Finishing is the first step of the manufacturing process. 2. Water-based latex paint creates an easy-to-clean surface that

holds up well. 3. A finish benefits wood in three basic ways: protection, promotion and decoration. 4. A wood stain consists of colorants dissolved or suspended in a solvent. 5. Unfinished or bare wood is prepared for paint by sanding with 60- or 80-grit sandpaper, following the direction of the wood grain. 6. Enamel should be applied on smooth surfaces without undercoats. 7. Lacquer contains a solution of shellac in alcohol that creates a synthetic coating, causing it to form a high gloss surface. 8. Brush-applied wood protection agents penetrate the surface of the wood to a depth of 6 mm. 9. Pressure and vacuum impregnation are among the methods of chemical protection of wood. 10. Oil-based paint takes a lot longer to dry and cure than water-based paint.

Exercise 8. Read and translate the following text in written form. What grammar phenomena can you point out in the text?

Seven Tips for Varnishing Wood

1. Vacuum the area to remove dust and dirt, before starting work. A slightly damp mop also works well for removing sanding dust from the surface of the floor.

2. Choose a day when the weather isn't too humid. Varnish will dry slower in humid or cold conditions, and there's more chance of dust and dirt settling on your project before it's fully dry, which means you'll have an imperfect finish. If working indoors, use the heating to get the room temperature somewhere between 20 and 25°C. If the room is too hot, the varnish will dry too fast and messy bubbles might form.

3. Remove any existing varnish or finish with a suitable paint and varnish remover. Sand the wood to remove any surface imperfections, and then use a damp cloth to remove any debris and let the wood dry.

4. The first coat can be thinned if required but this isn't necessary with many of the modern water-based varnishes. Leave it to dry for 24 hours, then sand it with fine sandpaper and wipe down with a damp cloth or vacuum to remove the dust.

5. Apply your first coat of pure varnish, working with the grain, then let it dry completely.

6. Sand gently the surface with very fine sandpaper.

7. Apply as many coats as you need, generally 2–3 coats is the norm, but additional coats can be applied for greater depth of

finish, gently sanding in between each coat. Don't sand your last-but-one or final coat, and go with the grain for the final coat for a super-smooth finish.

Exercise 9. Read and translate the following text in written form. Think about the appropriate title for the text.

Furniture, made from engineered pressed wood such as plywood and medium density fiberboard, known as MDF, is covered by thin wood veneers, plastic or paper laminates designed to look like wood. It is necessary to sand laminate surfaces carefully to avoid exposing the material beneath. Veneers are very thin, sometimes as much as 1/16 of an inch or smaller.

The key to painting laminate furniture is to use an oil-based primer first. This type of primer bonds well to glossy surfaces and provides a foundation for the paint. Let the primer dry thoroughly according to the manufacturer's instructions, usually several hours or overnight. Sand the primed surface lightly before painting. Latex paint can be used over an oil-based primer.

Exercise 10. Read the text and choose the most suitable title from the given variants. Explain your choice.

1. Applying the paint.
2. Techniques of paint application.
3. Paintbrushes.
4. Tips for paint application.

Use high-quality paintbrushes when painting furniture to avoid brushstrokes or shedding. When working with latex paint, use a nylon or polyester angled bristle brush. Use a natural bristle brush with oil paint. A foam roller with rounded ends works best to cover large areas.

Always brush or roll with the wood grain to get the best results. Start with thin layers of paint. It's better to do several thin layers than just a few thick layers. The painted surfaces come out smooth and professional-looking.

Exercise 11. Read and translate the following text. Express the main idea of the text in 1 or 2 short sentences.

Varnishes have always been considered a mysterious blend of black art and science. In trying to understand how a varnish works, it is useful to review the various components necessary to create a typical varnish. Varnishes are generally made up of five specific

ingredients: oil, resin, solvent, driers and ultra-violet additives. Although these are the five main categories, there are many choices within each category. The right combination of all five ingredients results in a varnish's optimal performance.

The main purpose of oil in a varnish is to improve penetration into the wood. The more oil in a varnish, the better it penetrates. When discussing oil, the terminology «long», «medium» and «short» oil is commonly used. This refers to the ratio of oil to resin in a particular varnish or coating. The «long» oils tend to result in longer dry times but greater durability in terms of gloss and color retention. Premium varnishes exhibit these qualities. «Medium» oils allow for faster drying times. They are, generally, restricted to low grade varnishes. «Short» oils are used almost exclusively on primers.

Exercise 12. Use Participle I Perfect Active.

Example: – As I hadn't phoned him back I had to apologize.
– ***Not having phoned*** *him back I had to apologize.*

1. I left the luggage at the airport and went to the restaurant. 2. As he hadn't found the necessary papers he felt angry. 3. As he hadn't read the book he couldn't discuss it. 4. As they hadn't taken a decision they turned to him for help. 5. She made dinner and decided to have a rest. 6. As he hadn't bought tickets he couldn't join them. 7. As he had broken his car he had to go by bus. 8. He finished the article and went to bed. 9. As he had given up smoking he felt better.

Exercise 13. Use Participle I Passive.

Example: – He was being followed and felt uneasy.
– ***Being followed*** *he felt uneasy.*

1. As he hadn't been introduced to the other guests he felt a stranger. 2. As she was being looked at she felt confused. 3. He had been taught good manners and that was why he was admired by everybody. 4. The clothes which are being sold here are expensive. 5. As the cup was broken it was of no use. 6. He hadn't been asked to come in and felt hurt. 7. As the flowers had been kept without water for a long time they faded. 8. As the house was being reconstructed it was empty. 9. As he had not been told the truth he didn't know how to act.

UNIT 5

I. Engine. Engine Creation History

Exercise 1. Make sure you know the following words and expressions.

Internal combustion engine – двигатель внутреннего сгорания; external combustion engine – двигатель внешнего сгорания; motor – (электро)двигатель, мотор; motor vehicle – автомобиль, транспортное средство; fuel – топливо, горючее; burn – жечь, сжигать, использовать в качестве топлива, работать на; heat exchanger – теплообменник; piston – поршень, плунжер; spark plug – свеча зажигания, запальная свеча; valve – клапан, вентиль, затвор; piston ring – поршневое кольцо; connecting rod – соединительная тяга, шатун; crankshaft – коленвал, коленчатый вал; friction – трение, сила трения; rubbing parts – трущиеся детали, трущиеся части; lubricate – смазывать, наносить смазку; working fluid – рабочая жидкость; homogenous – однородный, гомогенный; overcome – преодолевать, превозмочь; core – сердцевина, ядро, центр; combustion chamber – камера сгорания; straightforward – простой, ясный, непосредственный; convert – превращать, преобразовывать; explosive power – сила взрыва, взрывная сила; expel – выбрасывать, выталкивать, удалять; ejected – вытолкнутый, выброшенный; carburetor – карбюратор; metered-out charge – отмеренная порция (топлива); injected – впрыснутый; withdraw – отводить, изымать, удалять; scuffing – износ, истирание, заедание; premature wear – преждевременный износ; contribute – вносить вклад, способствовать, содействовать; four-cycle engine – четырёхтактный двигатель; two-stroke engine – двухтактный двигатель; transcend – выходить за пределы, превышать.

Exercise 2. Read and translate the following text.

An engine or motor is a machine for converting energy into motion or mechanical work. Heat engines burn a fuel to create heat which is then used to do work. Electric motors convert electrical energy into mechanical motion; pneumatic motors use compressed air.

Heat engines can be classified as internal combustion (IC) engines and external combustion (EC) engines.

An external combustion engine uses a working fluid, either a liquid or a gas or both, that is heated by a fuel burned outside the engine. The external combustion chamber is filled with a fuel and air mixture that is ignited to produce a large amount of heat. This heat is then used to heat the internal working fluid either through the engine wall or a heat exchanger. The fluid expands when heated, acting on the mechanism of the engine, thus producing motion and usable work.

The difference between external and internal combustion engines is quite straightforward and is made obvious by the difference in their names. In an external combustion engine, the fuel isn't burned inside the engine. With an internal combustion engine, the combustion chamber lies right in the middle of the engine.

External combustion engines have a working fluid that is heated by the fuel. Internal combustion engines rely on the explosive power of the fuel within the engine to produce work. In internal combustion engines, the explosion forcefully pushes pistons or expels hot high-pressure gas out of the engine at great speeds. Both moving pistons and ejected high-speed gas have the ability to do work. In external combustion engines, combustion heats a fluid which, in turn, does all the work.

The core of the engine is the cylinder (usually cars have 2, 4, 8 or more), with the piston moving up and down inside the cylinder. Other important parts of the engine are spark plugs, valves, piston rings, connecting rods, crankshafts. For an engine to operate normally, its cylinders must be supplied with a homogenous mixture of fuel and air in definite proportions (in carburetor engines) or with metered-out charges of fuel injected under a high pressure at strictly defined moments (in diesel engines). To reduce the amount of work done in overcoming friction, to withdraw heat, and to prevent scuffing and premature wear, all the rubbing parts of the engine are lubricated with oil. The engine must be cooled in order to create normal temperature conditions in the cylinders.

Engine Creation History. Various scientists and engineers contributed to the development of internal combustion engines. In 1791, John Barber developed the gas turbine. In 1794 Thomas Mead patented a gas engine. Also in 1794, Robert Street patented

an internal combustion engine, which was also the first to use liquid fuel, and built an engine around that time. In 1798, John Stevens built the first American internal combustion engine. Then there were several decades of hard work, researches and inventions. And at last in 1860, Belgian Jean Joseph Etienne Lenoir produced a gas-fired, single-cylinder internal combustion engine mounted to a three-wheeled carriage, which was further improved. In 1863 he built a three-wheeled carriage that ran on petrol. It was the first internal combustion engine to be produced commercially. The engines actually met with relatively good success, with about 500 built in total, but they clearly left room for a lot of improvement.

Many talented engineers and scientists continued the development of different types of engines. In 1876 Nikolaus Otto patented the compressed charge, four-cycle engine. In 1879, Karl Benz patented a reliable two-stroke gasoline engine. Later, in 1886, he began the first commercial production of motor vehicles with the internal combustion engine. In 1892, Rudolf Diesel developed the first compression ignition engine. So, these were the first steps of the automobile industry.

Today, it is hard to imagine our world without cars. They have become such a widespread form of transportation that almost everybody owns one. Cars have transcended their original purpose as a form of transportation. They have become an art form and a collector's item, they have become more than a piece of machinery. But the true art lies beneath the hood. The engine is the heart and soul of the car and its development continues.

Exercise 3. Choose the best continuation for each of the following sentences.

1. In 1860, Belgian Jean Joseph Etienne Lenoir produced ... mounted to a three-wheeled carriage.

a) a petrol-fired, single-cylinder external combustion engine...

b) a gas-fired, single-cylinder internal combustion engine...

c) a gas-fired, four-cylinder internal combustion engine...

2. The engine is the heart and soul of the car and ... .

a) it is alive...

b) there is no future for its development...

c) its development continues...

3. Internal combustion engines rely on ... to produce work.

a) the explosive power of the fuel outside the engine...

b) the explosive power of the fuel within the engine...
c) the heat power of the fuel within the engine...
4. All the rubbing parts of the engine are lubricated ...
a) with oil...
b) with water...
c) with gasoline.
5. External engines have a working fluid that ... .
a) is heated by the sun...
b) circulates in the system...
c) is heated by the fuel...
6. The difference between external and internal combustion engines is quite straightforward and is made obvious ... .
a) by the difference in their names...
b) by the difference in their functions...
c) by the difference of their inventors...
7. An engine or motor is a machine for converting ... or mechanical work.
a) motion into energy...
b) energy into motion...
c) energy into efficiency...
8. The engine ... in order to create normal temperature conditions in the cylinders.
a) must be heated...
b) must be cleaned...
c) must be cooled...

Exercise 4. Match the words to their definitions.

1. combustion	a) a device for transferring heat from one medium to another;
2. fuel	b) a device for firing the explosive mixture in an internal combustion engine;
3. piston	c) the process of burning something;
4. friction	d) the part of an engine that moves up and down to create power;
5. spark plug	e) a machine with moving parts that converts power into motion.
6. heat exchanger	f) the resistance that one surface or object encounters when moving over another;
7. carburetor	g) to put oil on the parts of a machine to minimize friction and allow smooth movement;

8. homogenous	h) the part of an engine that mixes air and petrol in order to provide power;
9. lubricate	i) a substance such as coal, gas or oil that is burned to produce heat or power;
10. engine	j) consisting of things that are very similar or all of the same type.

Exercise 5. Complete each sentence using a word derivationally related to the word given in brackets.

1. Steam engine and (steamer) turbines are the common example of external (combust) engines. 2. The spark plug (supplier) the spark that (ignition) the air/fuel mixture so that combustion can occur. 3. The spark must happen at just the (rightful) moment for things to (worker) properly. 4. The intake and (exhaustion) valves open at the (properly) time to let in air and fuel and to let out exhaust. 5. Both valves are closed during (compress) and combustion so that the combustion chamber is sealed. 6. A piston is a (cylinder) piece of metal that (movement) up and down inside the cylinder. 7. The crankshaft turns the piston's up and down motion into (circle) motion. 8. In an engine the (line) motion of the pistons is converted into the (rotate) motion by the crankshaft. 9. If you put a tiny amount of high-energy fuel in a small, enclosed space and ignite it, an (credible) amount of energy is released in the form of (expansion) gas. 10. Liquid fuels must be (atom) to create a fuel-air (mixing).

Exercise 6. Complete the sentences with the correct preposition.

1. The ignition system ... an internal combustion engines depends ... the type ... engine and the fuel used. 2. Petrol engines are typically ignited ... a precisely timed spark and diesel engines ... compression heating. 3. Ignition occurs due ... heat generated ... the compression ... the air ... the compression stroke. 4. Typically an internal combustion engine is fed ... fossil fuels like natural gas or petroleum products. 5. There is a growing usage ... renewable fuels like biodiesel ... compression ignition engines. 6. Such fuel as hydrogen can be obtained ... either fossil fuels or renewable energy. 7. The base ... a reciprocating internal combustion engine is the engine block, which is typically made ... cast iron or aluminium. 8. Single cylinder engines are common ... motorcycles and ... small

engines ... machinery. 9. The cylinder head is attached ... the engine block ... numerous bolts. 10. Internal combustion engines are advantageous ... steam engines due ... mechanical simplicity and higher thermal efficiency.

Exercise 7. Read the text again and mark the sentences T (true), F (false), or DS (doesn't say).

1. The engine with one cylinder is typical of most lawn mowers. 2. Cars have transcended their original purpose as a form of transportation. 3. In 1795 Robert Street patented an internal combustion engine, which was also the first to use liquid fuel, and built an engine around that time. 4. The fluid expands when cooled, acting on the mechanism of the engine, thus producing motion and usable work. 5. With an internal combustion engine, the combustion chamber lies right in the middle of the engine. 6. Piston rings prevent the fuel/air mixture and exhaust in the combustion chamber from leaking during compression and combustion. 7. To prevent scuffing and premature wear all the rubbing parts of the engine are lubricated with oil. 8. In 1879 Nikolaus Otto began the first commercial production of motor vehicles with the internal combustion engine. 9. The connecting rod connects the piston to the crankshaft; it can rotate at both ends so that its angle can change as the piston moves and the crankshaft rotates. 10. In 1892 Rudolf Diesel developed the first steam engine.

Exercise 8. Read and translate the following text in written form. Think about the appropriate title for the text.

Born in Greenock, James Watt (1736–1819) was a Scottish inventor and mechanical engineer who was renowned for the improvements he made to the steam engine. While working for the University of Glasgow in 1765, Watt was assigned the task of repairing a Newcomen engine that was deemed inefficient but the best steam engine of its time. That started the inventor working on several improvements to Newcomen's design.

The most notable improvement was Watt's 1769 patent for a separate condenser connected to a cylinder by a valve. Unlike Newcomen's engine, Watt's design had a condenser that could be cool while the cylinder was hot. Eventually Watt's engine would become the dominant design for all modern steam engines and helped bring about the industrial revolution.

Exercise 9. Read and translate the following text. Express the main idea of the text in 1 or 2 short sentences.

Internal combustion engines can contain any number of combustion chambers (cylinders), with numbers between one and twelve being common, though as many as 36 have been used. Having more cylinders in an engine yields two potential benefits: first, the engine can have a larger displacement with smaller individual reciprocating masses, that is, the mass of each piston can be less thus making a smoother-running engine since the engine tends to vibrate as a result of the pistons moving up and down. Doubling the number of the same size cylinders will double the torque and power. The downside to having more pistons is that the engine will tend to weigh more and generate more internal friction as the greater number of pistons rub against the inside of their cylinders. This tends to decrease fuel efficiency and robs the engine of some of its power. For high-performance gasoline engines using current materials and technology, such as the engines found in modern automobiles, there seems to be a point around 10 or 12 cylinders after which the addition of cylinders becomes an overall detriment to performance and efficiency.

Exercise 10. Read the text and choose the most suitable title from the given variants. Explain your choice.

1. Types of lubrication systems.
2. Development history of lubrication systems.
3. Comparative analysis of lubrication systems.
4. Principle of operation of lubrication system.

Internal combustions engines require lubrication in operation that moving parts slide smoothly over each other. Insufficient lubrication subjects the parts of the engine to metal-to-metal contact, friction, heat build-up and rapid wear.

Several different types of lubrication systems are used. Simple two-stroke engines are lubricated by oil mixed into the fuel or injected into the induction stream as a spray. Early slow-speed stationary and marine engines were lubricated by gravity from small chambers similar to those used on steam engines at the time – with an engine tender refilling these as needed. As engines were adapted for automotive and aircraft use, the need for a high power-to-weight ratio led to increased speeds, higher temperatures, and greater pressure on bearings which in turn required pressure-lubrication for crank bearings and connecting-rod

journals. This was provided either by a direct lubrication from a pump, or indirectly by a jet of oil directed at pickup cups on the connecting rod ends which had the advantage of providing higher pressures as the engine speed increased.

Exercise 11. Read and translate the following text in written form. Think about the appropriate title for the text.

The internal combustion engine is a heat engine in which the burning of a fuel occurs in a confined space called a combustion chamber. This exothermic reaction of a fuel with an oxidizer creates gases of high temperature and pressure, which are permitted to expand. The defining feature of an internal combustion engine is that useful work is performed by the expanding hot gases acting directly to cause movement, for example by acting on pistons, rotors, or even by pressing on and moving the entire engine itself.

The internal combustion engine was invented by Jean Joseph Etienne Lenoir. Lenoir made the first internal combustion engine that provides a reliable and continuous source of power, which was the gas engine using coal gas, in 1860, in France.

The first practical internal combustion engine was based heavily on experience from the production of steam engines. The engine had a horizontal cylinder; slide valves were used to draw in the fuel-air mixture; and it was double acting, the mixture being fed into the cylinder alternately at either end of the piston. Once it is in the cylinder the mixture was ignited by electric sparks generated at spark plugs by a coil and a battery. This ignition system, a primitive ancestor of modern electric ignition, was unreliable.

Because the first internal combustion engine was unreliable, many later pioneers made improvements of the first internal combustion engine. As a result many new engines were made. Such engines were the two and four stroke engine and the petrol engine. Siegfried Marcus in Austria in 1864 was able to create an engine that uses petrol as a fuel. The first internal combustion engine is the basic form for modern car engines.

Exercise 12. Change the sentence structure using the given verbs and phrases.

Example: – Don't drive in rainy weather. (to avoid).
– ***Avoid driving*** *in rainy weather.*

1. I think it's great to swim in cold water. (to be fond of). 2. It's useless to speak to him. (it's no use). 3. He always interrupts

people. (to have a habit). 4. He says he didn't see Jack on Friday. (to deny). 5. I can't live without music. (to imagine). 6. He is still talking. (to keep). 7. Just suppose that you live in a big house. (to imagine). 8. The man says he didn't steal anything. (to deny). 9. She repeats the same thing all the time. (to keep). 10. It's useless to phone him. (it's no use). 11. I always play tennis on Sunday with pleasure. (to enjoy). 12. I try not to meet him. (to avoid). 13. You can learn a foreign language in different ways. (there are many ways). 14. He always listens to loud music. (to have a habit).

II. Classification of Engines. Petrol and Diesel Engines

Exercise 1. Make sure you know the following words and expressions.

Gasoline – бензин, газолин; reciprocating engine – поршневой двигатель; rotary – роторный, ротационный; in-line engine – рядный двигатель; spark ignition – искровое зажигание; compression ignition – воспламенение от сжатия; radial engine – звездообразный двигатель, двигатель с радиально расположенными цилиндрами; naturally aspirated – безнаддувный; turbocharged – с турбонаддувом; supercharged – с наддувом; capacity – мощность, производительность; run on petrol – работать на бензине; fuel injection – впрыскивание топлива; rotation speed – скорость вращения; approximately – приблизительно, примерно; thermal efficiency – тепловой (термический) КПД; atomized – распыленный, мелкокапельный; spontaneously – самопроизвольно, спонтанно; emit – испускать, выделять, выбрасывать, излучать; waste products – отходы (производства); consume – потреблять, расходовать; exchange – обмен, замена; alternative fuel – альтернативное топливо, синтетическое топливо; jet fuel – топливо для реактивных двигателей; breathing – вентиляция двигателя; reciprocating – возвратно-поступательный, качающийся, поршневой; elevated – повышенный, выше нормы.

Exercise 2. Read and translate the following text.

Engines are generally classified as:

1. steam, compressed air, gasoline (according to the form of energy they utilize);

2. internal combustion and external combustion (according to the place where the exchange from chemical to heat energy takes place);

3. petrol, diesel, gas, bio/alternative fuels (according to the type of fuel they utilize);

4. reciprocating and rotary (according to the type of their pistons motion);

5. two-stroke and four-stroke (according to the number of the piston strokes for a complete cycle);

6. spark ignition and compression ignition (according to the type of ignition);

7. from 1 up to 18 cylinders (according to the number of cylinders);

8. in-line (In this engine construction, the cylinders are in a single straight line. An in-line engine is used with 2, 3, 4, 5, 6 or up to 8 cylinders.), V (This is a newer generation engine design. In this engine construction, the cylinders are at an angle. The angle between the cylinders forms a "V" shape.), W (In this engine construction, the engine has three rows of cylinders placed at an angle. The angle between the cylinder rows forms a "W" shape. Typically, it is used in high-speed racing cars.), horizontal, radial (according to the arrangement of cylinders);

9. air-cooled, water-cooled, oil-cooled (oil is cooled separately) (according to the engine cooling method);

10. naturally aspirated, turbocharged, supercharged (according to the breathing);

11. according to the size/capacity.

Petrol Engine. A petrol engine is an internal combustion engine with spark-ignition, designed to run on petrol (gasoline) and similar volatile fuels.

In most petrol engines, the fuel and air are usually mixed after compression. The pre-mixing was formerly done in a carburetor, but now it is done by electronically controlled fuel injection. The process differs from a diesel engine in the method of mixing the fuel and air, and in using spark plugs to initiate the combustion process.

Petrol engines run at higher rotation speeds than diesels, partially due to their lighter pistons, connecting rods and crankshafts and due to petrol burning more quickly than diesel.

Typically, most petrol engines have approximately 20% thermal efficiency, which is nearly half of diesel engines. However

some newer engines are reported to be much more efficient (thermal efficiency up to 38%) than previous spark-ignition engines.

Diesel Engine. The diesel engine, named after Rudolf Diesel, is an internal combustion engine in which ignition of the fuel which is injected into the combustion chamber is caused by the elevated temperature of the air in the cylinder due to mechanical compression. Diesel engines work by compressing only the air. This increases the air temperature inside the cylinder to such a high degree that atomized diesel fuel that is injected into the combustion chamber ignites spontaneously. Diesel engines burn diesel fuel, a petroleum product similar to kerosene, and jet fuel. Diesel engines are more efficient and less expensive to operate, they consume less fuel and emit less waste products. Most modern buses, trucks, tractors, trains and ships are powered by diesels.

Exercise 3. Choose the best continuation for each of the following sentences.

1. In most petrol engines, the fuel and air are usually mixed ... .

a) after compression...

b) before compression...

c) during compression...

2. The pre-mixing was formerly done ... , but now it is done by electronically controlled fuel injection.

a) in a compression chamber...

b) in a carburetor...

c) in a cylinder...

3. Diesel engines are more efficient and less expensive ... .

a) to buy...

b) to operate...

c) to clean...

4. Diesel engines burn ... , a petroleum product similar to kerosene and jet fuel.

a) oil...

b) gasoline...

c) diesel fuel...

5. Typically, most petrol engines have approximately ... , which is nearly half of diesel engines.

a) 20 % thermal efficiency...

b) 30 % thermal efficiency...

c) 40 % thermal efficiency...

6. A petrol engine is ... with spark-ignition, designed to run on petrol and similar volatile fuels.

a) a steam engine...
b) an external combustion engine...
c) an internal combustion engine...

7. Diesel engines work by compressing ... .

a) both the air and the fuel...
b) only the air...
c) only the fuel...

8. In the in-line engine construction the cylinders are ... .

a) in a single straight line...
b) in a single vertical line...
c) in a single curved line...

Exercise 4. Match the words to their definitions.

1. gasoline	a) to use a supply of something such as time, energy or fuel;
2. in-line engine	b) cooled by means of a current of air;
3. atomize	c) to convert a substance into very fine particles or droplets;
4. energy	d) the North American term for 'petrol';
5. consume	e) to catch fire or cause to catch fire;
6. cylinder	f) the power derived from the utilization of physical or chemical resources;
7. fuel injection	g) the reduction in volume of the fuel mixture in an internal combustion engine before ignition;
8. ignite	h) a piston chamber in a steam or internal combustion engine;
9. air-cooled	i) the direct introduction of fuel under pressure into the combustion units of an internal combustion engine;
10. compression	j) a motor having cylinders arranged in a line.

Exercise 5. Complete each sentence using a word derivationally related to the word given in brackets.

1. Fuels burn faster and more (efficiency) when they present a large surface area to the (oxygenate) in air. 2. Liquid fuels must

be atomized to (creation) a fuel-air mixture. 3. (Tradition) this was done with a carburetor in petrol engines and with fuel (inject) in diesel engines. 4. Most (modernize) petrol engines now use fuel injection too – though the technology is quite (differ). 5. While diesel must be injected at an (exactly) point in that engine cycle, no such (precise) is needed in a petrol engine. 6. However, the lack of lubricity in petrol means that the (injection) themselves must be more sophisticated. 7. Simpler (reciprocate) engines (continuation) to use a carburetor to supply fuel into the cylinder. 8. Most internal combustion engines now require a fuel (pumpable). 9. Diesel engines use an all-mechanical precision pump (systematic) that (delivery) a timed injection directly into the combustion chamber. 10. Gas turbines and rocket engines use (electricity) systems.

Exercise 6. Complete the sentences with the correct preposition.

1. The first marine installation ... a diesel engine was completed ... 1910. 2. Diesel engine became the primary power plant ... World War II. 3. The first diesel engine ... automobiles was built ... 1922 ... Germany, and it opened ... numerous fields ... application. 4. Diesel engines are similar ... appearance ... spark-ignition engines and have many ... the same components. 5. Pistons ... the cylinders are connected ... rods ... a crankshaft. 6. As the pistons move ... and ... ... their cylinders, they cause crankshaft to rotate. 7. ... the end ... a piston's compression stroke, a fuel injector sprays fuel ... the combustion chamber. 8. The air must be compressed ... a pressure ... at least 3,450 kilopascals, which produces a temperature inside the chamber ... approximately 540°C. 9. The amount ... compression ... an engine cylinder is a ratio ... the original volume and the final volume. 10. Relatively unrefined fuels can be burned ... a diesel engine because ... the nature ... its fuel-injection system and combustion process.

Exercise 7. Read the text again and mark the sentences T (true), F (false), or DS (doesn't say).

1. According to the place where the exchange from chemical to heat energy takes place the engines are classified as steam, compressed air or gasoline engines. 2. Most modern buses, trucks, tractors, trains and ships are powered by diesels. 3. Almost all cars currently use what is called a four-stroke combustion cycle

to convert gasoline into motion. 4. Diesels run at higher rotation speeds than petrol engines partially due to their lighter pistons, connecting rods and crankshafts. 5. It takes less time for a piston in a petrol engine to complete its stroke than a piston in a diesel engine. 6. According to the type of their pistons motion the engines are classified as reciprocating and rotary engines. 7. According to the size/capacity the engines are classified as air-cooled, water-cooled, oil-cooled engines. 8. A V4 engine was used from 1922 to 1960 by Lancia. 9. According to the number of the piston strokes for a complete cycle the engines are classified as two-stroke and four-stroke engines. 10. According to the type of ignition the engines are classified as petrol, diesel, gas, bio/alternative fuels engines.

Exercise 8. Read and translate the following text in written form. Think about the appropriate title for the text.

Most car engines have 4 to 8 cylinders, with some high-performance cars having 10, 12 – or even 16, and some very small cars and trucks having 2 or 3. In previous years, some quite large cars had two-cylinder or two-stroke engines.

Radial aircraft engines had from 3 to 28 cylinders. Larger examples were built as multiple rows. As each row contains an odd number of cylinders, to give an even firing sequence for a four-stroke engine, an even number indicates a two- or four-row engine. The largest of these was with 36 cylinders (four rows of nine cylinders), but it did not enter production.

Motorcycles commonly have from one to four cylinders, with a few high-performance models having six; although, some 'novelties' exist with 8, 10, or 12.

Snowmobiles usually have one to four cylinders and can be both 2-stroke and 4-stroke, normally in the in-line configuration; however, there are again some novelties that exist with V4 engines.

Small portable appliances such as chainsaws, generators, and domestic lawn mowers most commonly have one cylinder, but two-cylinder chainsaws exist.

Large reversible two-cycle marine diesels have a minimum of three to over ten cylinders. Freight diesel locomotives usually have around 12 to 20 cylinders due to space limitations, as larger cylinders take more space (volume) per kWh.

Exercise 9. Read and translate the following text in written form. Think about the appropriate title for the text. Express the main idea of the text in 1 or 2 short sentences.

A V engine is a common configuration for an internal combustion engine. The pistons are aligned so that they appear to be in a V when viewed along the line of the crankshaft. The V configuration reduces the overall engine length and weight compared to an equivalent straight engine. The first V-engine was invented by Gottlieb Daimler and Wilhelm Maybach in 1888.

A V4 engine is a V form engine with four cylinders. It was first used by Lancia starting 1922 through 1960. It was a narrow-angle aluminum design.

A V6 is an internal combustion piston engine with six cylinders in a V configuration. It is the second most common engine configuration in modern cars after the in-line-4; it shares with that engine compactness very suited to the popular front wheel drive layout, and is becoming more popular as car weights increase. The first V6 was introduced by Lancia in 1924. The design was reintroduced by the company in 1950. Though the model was not a spectacular success, it was the first mass-produced V6 engine.

A V8 engine is a V engine with eight cylinders. The V8 is a very common configuration for large automobile engines. The first engine was a British one, developed by Rolls Royce. But Cadillac was the first automobile maker to mass produce a V8 engine. The company has produced eight generations of V8s since 1914.

A V10 engine is a V engine with 10 cylinders in two banks of five. The V10 configuration is not an inherently balanced design. It can be balanced with crankshaft counterweights, with a balance shaft, or with a split crankshaft journal 90 degree V angle. Until recently V10s had rarely been a popular configuration for road cars.

A V12 engine is a V engine with 12 cylinders. Like a straight-6, this configuration has perfect primary and secondary balance no matter which V angle is used and therefore needs no balance shafts. The first V12 engine was used in 1912. Before the World War II the engine was used in a lot of luxury cars: Cadillac, Packard, Lincoln, and Rolls-Royce.

Exercise 10. Read the text and choose the most suitable title from the given variants. Explain your choice.

1. Life and work of Rudolf Diesel.
2. History of creation and development of the famous Diesel engine.

3. Rudolf Diesel's happiness and tragedy.

4. Severe conditions of market competitions for the famous inventor.

Rudolf Diesel, who is best known for the invention of the engine that bears his name, was born in Paris, France in 1858. His invention came while the steam engine was the predominant power source for large industries.

In 1885, Diesel set up his first shop in Paris to begin development of a compression ignition engine. The process would last 13 years. In the 1890s, he received a number of patents for his invention of an efficient, slow burning, compression ignition, internal combustion engine. From 1893 to 1897, Diesel further developed his ideas. "Sulzer Brothers" of Switzerland took an early interest in Diesel's work, buying certain rights to Diesel's invention in 1893.

Development of Diesel's invention needed more time and work to become a commercial success. Many engineers and developers joined in the work to improve the market viability of the idea created by Rudolf Diesel. He, on the other hand, became somewhat threatened by this process and was not always able to find common language with other engine designers developing his invention. Diesel's attempts of market promotion of the not-yet-ready engine eventually led into a nervous breakdown. In 1913, deeply troubled by criticisms of his role in developing the engine, he mysteriously vanished from a ship on a voyage to England, presumably committing suicide. After Diesel's patents started to expire, a number of other companies took his invention and developed it further.

Exercise 11. Change the sentence structure using Gerund with preposition.

Example: – He read the letter and hid it. (on).

– ***On reading*** the letter he hid it.

1. She said it and turned red. (on). 2. First read the instruction and then open the box. (before). 3. When I came to London I decided to call all my friends at once. (on). 4. He took a decision and felt better. (after). 5. He entered the room and greeted everybody. (on). 6. First read the book then see the film. (before). 7. He left the house and took a taxi. (on). 8. He did his morning exercises and then took a shower. (after). 9. He arrived at the airport and registered. (on). 10. He took a ticket and got on the train. (on).

UNIT 6

I. Classification of Saws

Exercise 1. Make sure you know the following words and expressions.

Hand saw – ручная пила, ножовка; band saw – ленточная пила; frame saw – рамная пила, лесопильная рама; circular saw – дисковая пила, циркулярная пила, круглопильный станок; chain saw – цепная пила, бензопила; power saw – механическая пила, отрезной станок; blade – лезвие, полотнище (пилы), лопасть (винта); workpiece – обрабатываемая деталь, заготовка, изделие; cutting action – резание, обработка резанием, режущая способность; kerf – пропил, разрез, прорезь; tooth load – нагрузка на зуб (пилы); ripping – распиловка вдоль волокна; bedplate – опорная плита, станина; feeding mechanism – механизм подачи (на станках); guard – предохранительное устройство, ограждение, защита; crank mechanism – кривошипно-шатунный механизм; upkeep – обслуживание, ремонт, содержание в исправности; edger – кромкострогальный станок; resaw – делительная пила, ребровая пила; interchangeable – сменный, съёмный, заменяемый; tough – прочный, жесткий, упругий; sturdy – прочный, крепкий, жесткий; wire – провод, проволока; toothed edge – сторона с зубьями (ленточной пилы); forcefully – с усилием, сильно; power source – источник питания; evenly distributed – равномерно распёрделенный; irregular shape – сложная конфигурация (форма); curved shape – криволинейная форма; curve – кривая линия, дуга, изгиб; tooth pitch – шаг зубчатого зацепления; versatile – многофункциональный, разносторонний, универсальный; accommodate – вмещать, размещать; gang – набор, комплект; controls – рычаги управления; lubricating attachment – смазывающее устройство; sawdust – опилки; output – производительность, выработка; revolving – вращающийся, поворотный; periphery – внешняя граница; rate – оценивать, считать; beam – балка, брус; handheld – ручной, переносной, портативный; plywood – фанера; concrete – бетон; cutting chain – режущая цепь; tip – верхушка, остриё, конец; guide bar – направляющий стержень, шток; kick back –

отскакивать назад; manual – инструкция, руководство; safety features – характеристики защитных устройств; safe operating technique – методика безопасной эксплуатации; thicknesser – станок для строгания по толщине.

Exercise 2. Read and translate the following text.

Saws have been in use for thousands of years. A saw is a tool consisting of a tough blade, wire or chain with a hard toothed edge. It is used to cut through material, very often wood though sometimes metal or stone. The cut is made by placing the toothed edge against the material and moving it forcefully forth and less forcefully back or continuously forward. This force may be applied by hand, or powered by steam, water, electricity or other power source.

Hand saws have been around for over 5.000 years and will still be around for a very long time to come. No woodworker's shop is complete without a traditional hand saw, with its large blade and sturdy handle. Though the hand saw is 100 percent muscle-powered, it steps in when a power saw just won't do.

Mechanically powered saws constitute the other major category of saws after hand saws. These saws can be powered via a direct wired electrical connection, batteries, or some other source, such as an internal combustion engine. The most well-known and wide-spread saws are band saws, frame saws, circular saws and chain saws.

A band saw is a stationary saw with a blade consisting of a continuous band of metal riding on wheels that rotate on the same plane. Band saws may be either vertical or horizontal. With a band saw, the workpiece is held stationary while the saw blade moves. Such type of saws is used for cutting timber, metal and other materials. Advantages include uniform cutting action as a result of an evenly distributed tooth load, and the ability to cut irregular or curved shapes. The minimum radius of a curve is determined by the width of the band and its kerf. Most band saws have two wheels rotating in the same plane, one of which is powered, although some may have three or four to distribute the load. The blade itself can come in a variety of sizes and tooth pitches (teeth per inch, or TPI), which enables the machine to be highly versatile and able to cut a wide variety of materials. Timber mills use very large band saws for ripping lumber; they are preferred

over circular saws for ripping because they can accommodate large-diameter timber and because of their smaller kerf, resulting in less waste.

Frame saws or log frames are machines with the help of which logs are cut into boards by means of a gang of reciprocating saws. A frame saw consists of a bedplate, a cutting mechanism, a feeding mechanism, controls, lubricating attachments and guards. In frame saws the blades perform reciprocating motion transmitted to them by a crank mechanism. Frame saws require medium initial cost and upkeep. They are adapted to the rapid sawing of small, knotty, and low-grade logs into lumber of uniform thickness with a minimum of sawdust. They require a considerable power and must be accompanied by edgers or resaws. Sorting logs by size increases output.

There are many varieties of frame saws, for example: vertical and horizontal, stationary and portable, high-power and low-power, high-speed and low-speed, ordinary and special frame saws.

The comparative output of various frame saws working under different conditions depends upon the technical characteristics of the saw and the nature, diameter and length of the logs being processed.

Circular saws are revolving steel discs with teeth cut along the periphery. The disc is typically between 7.25 and 9 inches in diameter but you can find saws with discs as small as 4 inches for light woodworking projects or as large as 12 inches for cutting heavy timbers. They are the most common type of powered saws and accept blades that cut all types of wood, metal, plastic, etc. Many saw blades are rated by teeth per inch. These numbers range from 2 to 32. Blades with lower TPI numbers will cut quickly but produce rougher cuts. The higher TPI ratings will produce fine, smooth cuts in wood and similar materials.

The circular saw was first used in sawmills for the sawing of logs and beams. This type of saw is now most commonly used as a handheld saw, and can be used with a variety of blade styles and sizes. Designed to cut straight lines in dimensional lumber, plywood, and even concrete, the circular saw is one of the most popular saws.

As the name implies, a chain saw uses a linked chain with numerous specially designed teeth, or, in other words, its blade consists of a cutting chain with sharp teeth on each segment of

the chain. Chain saws are typically powered by an internal combustion engine, although some electric chainsaws are also available. The chain saw is designed to cut tree limbs or fell entire trees with its sharp teeth that rotate around the guide bar. Guide bars range from 14 up to 36 inches long and can be interchangeable on some models of chain saws. Chain saws are among the most powerful saws, but they're also dangerous because the tip of the guide bar can kick back during operation.

Before operating any saw, it is necessary to read the manual carefully and familiarize yourself with the saw's safety features and safe operating techniques.

Exercise 3. Choose the best continuation for each of the following sentences.

1. The ... was first used in sawmills for the sawing of logs and beams.

a) band saw...

b) frame saw...

c) circular saw...

2. Designed to cut straight lines in dimensional lumber, plywood, and even concrete, the circular saw is ... ...

a) one of the most popular saws...

b) one of the most expensive saws...

c) one of the most popular methods...

3. Before operating any saw, it is necessary ... and familiarize yourself with the saw's safety features and safe operating techniques.

a) to have a lot of practice...

b) to read the manual carefully...

c) to buy this saw...

4. In frame saws the blades perform reciprocating motion transmitted to them by ... ...

a) a crank mechanism...

b) a cylinder...

c) rotating wheels...

5. No woodworker's shop is complete without ... , with its large blade and sturdy handle.

a) a modern circular saw...

b) a traditional hand saw...

c) a powerful band saw...

6. A band saw is a stationary saw with a blade consisting of ... riding on wheels that rotate on the same plane.

a) a gang of reciprocating saws...

b) a revolving steel disc...

c) a continuous band of metal...

7. With a band saw, the workpiece is held ... while the saw blade moves.

a) moving...

b) frozen...

c) stationary...

8. Frame saws require a considerable power and must be accompanied by ... ...

a) band saws...

b) edgers or resaws...

c) chain saws...

Exercise 4. Match the words to their definitions.

1. saw	a) the thin sharp part of knife, tool or weapon that cuts things;
2. blade	b) switches or other devices by which a machine or vehicle is regulated;
3. workpiece	c) a tool for cutting wood or other hard materials;
4. kerf	d) powdery particles of wood produced by sawing;
5. guard	e) a slit made by cutting with a saw;
6. upkeep	f) the process of keeping something in good condition;
7. controls	g) a device mounted to prevent injury or damage;
8. sawdust	h) a type of board made from thin layers of wood that are fixed together using glue;
9. plywood	i) the amount of something produced by a person, machine or industry;
10. output	j) an object being worked on with a tool or machine;
11) tip	k) a metal plate forming the base of a machine;
12) bedplate	l) a narrow or pointed end, especially of something long or thin.

Exercise 5. Complete each sentence using a word derivationally related to the word given in brackets.

1. A band saw can be used to cut (curvature), even in (thickness) lumber, to rip lumber and to crosscut (shortage) pieces. 2. The most common use for the band saw, however, is in cutting (regular) shapes. 3. The second most common use is in resawing or (rip) (lumberer) into thinner slabs. 4. A band saw also makes the smoothest cuts and, with the (appropriately) blade, can be used to cut materials other than (wooden), including metal. 5. (Circle) saws were (invention) in the late 18th century and were in common use in sawmills in the United States by the middle of the 19th century. 6. In woodworking the term 'circular saw' refers (specific) to the hand-held type. 7. Circular saw blades are (special) designed for each particular (materialize) they are intended to cut. 8. Circular saws are (common) powered by (electric). 9. There are many specialized (cut) tools but they are not commonly used outside of trades they were (development) for. 10. Additionally, you may be surprised to (finding) that many saws are (region) called by the name of other saws.

Exercise 6. Complete the sentences with the correct preposition.

1. Band saws are perfect ... intricate cutting ... curves into wood but are limited ... a depth ... only a few inches. 2. Resawing is possible ... a band saw ... standing the board ... its edge and carefully ripping it using a fence. 3. A portable band saw can be an invaluable tool especially ... metalworkers. 4. These types ... saws can cut nearly any type ... wood using blades ... a TPI between 8 and 10. 5. While blades come ... a variety of lengths, width depends ... the curve. 6. Circular saw blades are labeled ... the type ... material they are designed to cut. 7. The most common and the best known saws are ... working ... wood. 8. A table saw, unlike a circular saw, has a fixed circular blade that rises ... a slot ... a table. 9. ... this type ... saw, the material to be cut is moved ... a blade that remains ... a fixed location. 10. It is especially useful ... cutting long pieces ... stock.

Exercise 7. Read the text again and mark the sentences T (true), F (false), or DS (doesn't say).

1. The disc of a circular saw is typically between 7 and 8 inches in diameter. 2. An abrasive saw, also known as a metal chop saw,

uses an abrasive friction disc for cutting instead of a toothed blade. 3. The chain saw is designed to cut tree limbs or fell entire trees. 4. Heavy-duty saws often have a coolant system to increase the life of the blade, since a large amount of heat is generated. 5. The blade of a chain saw consists of a cutting chain with sharp teeth on each segment of the chain. 6. Chain saws are among the most powerful saws, but they're also safe because the tip of the guide bar can kick back during operation. 7. Blades with lower TPI numbers will cut quickly and produce fine, smooth cuts in wood and similar materials. 8. High-power and low-power, high-speed and low-speed saws are the varieties of frame saws. 9. Hand saws have been around for over 500 years and will not be around soon. 10. Rather than simply duplicating various handheld saws, powered saws have evolved to fill niches of their own.

Exercise 8. Read and translate the following text in written form. Express the main idea of the text in 1 or 2 short sentences.

A circular saw is a power saw using a toothed or abrasive disc or blade to cut different materials using a rotary motion. A circular saw is a tool for cutting many materials such as wood, masonry, plastic, or metal and may be hand-held or mounted to a machine. In woodworking the term «circular saw» refers specifically to the hand-held type. Circular saw blades are specially designed for each particular material they are intended to cut and in cutting wood are specifically designed for making rip-cuts, cross-cuts, or a combination of both. Circular saws are commonly powered by electricity, but may be powered by a gasoline engine or a hydraulic motor which allows it to be fastened to heavy equipment, eliminating the need for a separate energy source.

Exercise 9. Read and translate the following text in written form. Think about the appropriate title for the text.

Saws are generally thought of as a cutting tool that will have either a blade, in some cases a wire or even a chain with an edge with teeth on it. Their main purpose is of course to act as a tool that can cut through a material. These can either be operated manually or powered by a battery, an engine, or some type of power source.

As the name would suggest hand saws are saws that carpenters and joiners would use when working with wood.

There are, however, a few types of these hand saws available, and each has a specific purpose. All of them have a few parts in common.

Saws for cutting trees are known as pruning saws and are clearly the popular choice of gardeners. As the name pruning would suggest these are saws that can handle smaller branches. At the other end of the scale there is of course the ever popular chainsaw. These can make their way through the biggest of trees.

Sitting in between the humble pruning saw and the heavy duty chainsaw, sit another range of saws, designed for use on trees. These include various types of hand and woodworking saws. A very popular choice is of course the chainsaw.

Exercise 10. Use Gerund as the subject.

Example: – It's very convenient to go there by car.
– ***Going*** *there by car is very convenient.*

1. It's so uncomfortable to sleep on the floor. 2. It's great to meet old friends. 3. It's impolite to speak in a loud voice. 4. It's always useful to think. 5. It's boring to clean the flat. 6. It's interesting to teach. 7. It's exciting to travel to other countries. 8. It's simple to give advice. 9. It's not always clever to take other people's advice. 10. It's inconvenient to have much luggage. 11. It wasn't easy to follow the man. 12. It made him nervous to speak before a large audience.

II. Planing. Types of Planing Machines. Cutters

Exercise 1. Make sure you know the following words and expressions.

Planing – строгание, обработка на строгальном станке; plane – рубанок; planer = surface planing machine – продольно-строгальный станок; jointer – фуговальный станок; smooth – шлифовать, делать ровным, гладким; sculpted surface – поверхность с глубокими выемками, объемная поверхность (детали); shaping – фрезеровка, строгание (на поперечно-строгальном станке), придание формы; reciprocate – совершать возвратно-поступательные движения; surface planer – станок для строгания поверхностей; thickness planing machines = thickness

planer – рейсмусовый пропускной станок (для строгания по толщине); position – помещать, располагать, ставить; support – служить опорой, поддерживать; adjustable – регулируемый, настраиваемый; cutterblock – режущая головка; compulsory – обязательный; removable – съёмный, сменный, заменяемый; working width – рабочая ширина, ширина захвата; feed rate – скорость подачи; stationary – закрепленный, неподвижный; machine – подвергаться механической обработке, обрабатывать резанием; cutting tool – режущий инструмент, резец; carbide tipped – с твердосплавной режущей пластиной; power tool – механический инструмент, инструмент с механическим приводом; predetermined – заранее установленный, предопределенный; in one pass – за один проход; wood dust – пыль древесная; chips – стружки, опилки; health hazard – опасность (угроза) для здоровья; cutting edge – режущая кромка, остриё; multicutter – многорезцовый, ногоинструментный; rpm (revolutions per minute) – число оборотов в минуту; surface quality – качество обработанной поверхности.

Exercise 2. Read and translate the following text.

Planing is using a plane to smooth a flat surface of a piece of wood when it is done by hand. Also planing is a manufacturing process of material removal in which the cutting tool reciprocates against a stationary workpiece producing a plane or sculpted surface. Planing is analogous to shaping.

The mechanism used for this process is known as a planer. The size of the planer is determined by the largest workpiece that can be machined on it. The cutting tools are usually carbide tipped or made of high speed steel.

A woodworking machine is a mechanism intended to process wood. These machines are usually powered by electric motors and are used extensively in woodworking. Woodworking machines are used both in small-scale commercial production of timber products and by amateurs. Most of these machines may be used on solid timber and on composite products. Machines can be divided into the bigger stationary machines where the machine remains stationary while the material is moved over the machine, and hand-held power tools, where the tool is moved over the material. A surface planer serves to straighten a piece of wood to be processed while a thickness planer serves to bring a piece of wood to the required size.

The development of stationary planing machines can be traced back to the beginning of the 19th century. In 1850 a planing machine was built in Germany on which the workpiece was fed over a cutterblock located between two tables used to position and to support the workpiece. Apart from technical improvements this basic design has been maintained to this day. Such a machine is called a surface planing machine or a jointer.

More recently, machines were designed to plane the upper surface of a workpiece to a predetermined thickness by means of a horizontally rotating cutterblock. The distance between the cutting circle diameter and the surface of the table supporting the workpiece is adjustable. Such machines are called one-side-thickness planing machines.

These two basic machine types were eventually combined into a machine which could be used for both surface and thickness planing. This development ended in planing machines for two-, three- and four-sided working in one pass.

From the point of view of occupational safety and health, it is strongly recommended that measures be taken for the extraction of wood dust and chips from the planing machine. Dust originating from hardwood (oak, beech) and tropical wood is considered a particular health hazard and must be extracted. Measures to reduce the noise level of planing machines should also be taken. An automatic brake for the cutterblock is compulsory in many countries.

In planing the wood is processed by means of cutters. In this operation either the wood being processed is stationary, while the cutters perform reciprocating rectilinear motion, or the cutters are fixed and the wood moves past them. Cutters material must be harder than the material which is to be cut, and the tool must be able to withstand the heat generated in the cutting process.

Removable flat cutters are mainly used for planing flat surfaces, and in this instance they have a rectilinear cutting edge. Multicutter blocks are used for planing both shaped and narrow flat surfaces. The number of cutters in blocks of both types can be 2, 4, 6 or 8, while in machines with a high feeding speed the number of cutters can exceed 8.

Cutterblocks usually have a circular cross-section; the blades should be properly secured. The cutterblock rotates generally at speeds between 4,500 and 6,000 rpm (revolutions per minute).

The diameters of conventional cutterblocks vary from 56 to 160 mm and their lengths (working widths) from 200 to 900 mm. The surface quality therefore depends on the speed and diameter of the cutterblock, the number of cutting blades and the feed rate of the workpiece.

Exercise 3. Choose the best continuation for each of the following sentences.

1. Multicutter blocks are used for planing ... surfaces.

a) both shaped and narrow flat...

b) only narrow flat...

c) both shaped and narrow curved...

2. Dust originating from ... is considered a particular health hazard and must be extracted.

a) hardwood and softwood...

b) softwood and tropical wood

c) hardwood and tropical wood...

3. The cutterblock rotates generally at speeds between ... revolutions per minute.

a) 4,200 and 6,000...

b) 4,500 and 6,000...

c) 4,500 and 5,000...

4. The number of cutters in machines ... can exceed 8.

a) with a low feeding speed...

b) with a medium feeding speed

c) with a high feeding speed...

5. The distance between the cutting circle diameter and the surface of the table supporting the workpiece ... ...

a) is adjustable...

b) is removable...

c) is compulsory...

6. The development of stationary planing machines can be traced back to the ... ...

a) beginning of the 18^{th} century...

b) middle of the 19^{th} century...

c) beginning of the 19^{th} century...

7. Woodworking machines are usually powered ... and are used extensively in woodworking.

a) by steam engines...

b) by electric motors...

c) by stationary power sources...

8. The size of the planer is determined by ... that can be machined on it.

a) the largest workpiece...

b) the heaviest workpiece...

c) the most beautiful workpiece...

Exercise 4. Match the words to their definitions.

1. plane	a) able to be adjusted;
2. reciprocate	b) to bear all or part of the weight of something;
3. compulsory	c) obligatory, required by law or a rule;
4. adjustable	d) to move backwards and forwards in a straight line;
5. stationary	e) moving in a straight line;
6. position	f) a tool used to smooth wooden or other surfaces;
7. support	g) not moving or not intended to be moved;
8. automatic	h) a tool for cutting something;
9. rectilinear	i) to put or arrange in a particular place or way;
10. cutter	j) working by itself with little or no direct human control.

Exercise 5. Complete each sentence using a word derivationally related to the word given in brackets.

1. The most common (apply) of planers are generating (accurately) flat surfaces and cutting slots. 2. Cutting blades not (proper) secured may be ejected by (centrifuge) force and may cause severe (injure) and material damage. 3. A planer guard was introduced in 1938 which (efficient) met all practical (require). 4. Over the years this guard has proved (usefulness) not only as a guarding system but also as an aid for most (operate). 5. Almost all (industry) surface planing (machinery) in Europe are equipped with a planer guard nowadays. 6. The design and operation of combined machines are (similarity) to those of the (individualize) machines. 7. (Surfacer) planers are ideal for the (plane) operations involving raw wood. 8. The feed direction can be (horizon) and (vertically). 9. Curved and (regular) surfaces can be (production) by using special attachments. 10. The cutterblock axis of (rotate) is parallel to the table surfaces and (perpendicularly) to the feed direction.

Exercise 6. Complete the sentences with the correct preposition.

1. Planers are designed ... processing mainly flat surfaces ... a cutter. 2. Planing machines are used ... single and small batch production. 3. Low productivity ... planers can be compensated to a certain extent ... multi-tool processing. 4. Early planing ideas are known to have been underway ... France ... the 1750s. 5. As the cutterblock rotates opposite ... the direction ... which the workpiece is fed, the hazard ... kickback exists. 6. If the workpiece is ejected, the operator's hand or fingers may come ... contact ... the rotating cutterblock unless adequate guarding has been provided. 7. The design features ... the planer guard are introduced ... the European standard ... surface planing machines. 8. Combined machines are mainly used ... small workshops ... few workers or where space is limited. 9. There are planers and shaping machines capable ... processing anything ... metal pieces ... plastic objects. 10. A hand plane is a tool ... shaping wood using muscle power to force the cutting blade ... the wood surface.

Exercise 7. Read the text again and mark the sentences T (true), F (false), or DS (doesn't say).

1. Woodworking machines can be divided into the bigger stationary machines and hand-held power tools. 2. Although the basic tool path of a planer is linear, helical cutting can be accomplished by coupling the table's linear motion to simultaneous rotation. 3. Cutters material must be as hard as the material which is to be cut. 4. Planing is a manufacturing process of material removal in which the cutting tool reciprocates against a stationary workpiece producing a plane or sculpted surface. 5. The diameters of conventional cutterblocks vary from 50 to 60 mm and their lengths from 100 to 500 mm. 6. In 1830 a planing machine was built in England on which the workpiece was fed over a cutterblock located between two tables used to position and to support the workpiece. 7. Woodworking machines are used both in small-scale commercial production of timber products and by amateurs. 8. The main frame of a one-side thickness planing machine houses the cutterblock, thickness planing table and feed elements. 9. To minimize the danger of kickback, one-side thickness planing machines should be fitted with an anti-kickback device covering the full working width of

the machine. 10. A thickness planer serves to straighten a piece of wood to be processed.

Exercise 8. Read and translate the following text in written form. Think about the appropriate title for the text. Express the main idea of the text in 1 or 2 short sentences.

A surface planing machine has rigid main frame that supports the infeed and the outfeed table. The cutterblock is located between the two tables and mounted on ball bearings. The main frame should be ergonomically designed, that means it should enable the operator to work comfortably.

Hand-operated control devices should be installed in such a way that the operator is not placed in a hazardous situation when operating them and the possibility of inadvertent operation should be minimized.

The side of the main frame facing the operator's position must be free of projecting parts such as handwheels, levers and so on. The table to the left of the cutterblock (outfeed table) is normally set at the same height as the cutting circle of the cutterblock. The table to the right of the cutterblock (infeed table) is set lower than the outfeed table to obtain the desired depth of cut. Contact between the table lips and the cutterblock should not be possible over the full setting range of the tables. However, the clearance between the table lips and the cutting circle of the cutterblock shall be as small as possible to provide for good support of the workpiece to be planed.

The major operations on a surface planing machine are flatting and edging. The position of the hands on the workpiece is important from an operational and safety viewpoint. When flatting, the workpiece should be fed with one hand, with the other hand holding it down initially on the infeed table. As soon as there is a sufficient portion of timber on the outfeed table, the latter hand can pass safely over the bridge-guard to apply pressure on the outfeed table and will be followed by the feeding hand to complete the feeding operation. When edging, the hands should not pass over the cutterblock while in contact with the timber. Their prime function is to exert horizontal pressure on the workpiece to maintain it square to the fence.

The noise produced by the rotating cutterblock often may exceed the level considered harmful to the ear. Measures to reduce the noise level are therefore necessary.

Exercise 9. Read the text and choose the most suitable title from the given variants. Explain your choice.

1. Hand planes. 2. Principle of operation of hand planes.
3. Types of planes. 4. Planing with the help of planes.

Generally all planes are used to flatten, reduce the thickness of, and impart a smooth surface to a rough piece of lumber or timber. Planing is also used to produce horizontal, vertical, or inclined flat surfaces on workpieces usually too large for shaping.

Hand planes are generally the combination of a cutting edge, such as a sharpened metal plate, attached to a firm body, that when moved over a wood surface, take up relatively uniform shavings, by nature of the body riding on the 'high spots' in the wood, and also by providing a relatively constant angle to the cutting edge, render the planed surface very smooth. A cutter which extends below the bottom surface, or sole, of the plane slices off shavings of wood. A large, flat sole on a plane guides the cutter to remove only the highest parts of an imperfect surface, until, after several passes, the surface is flat and smooth.

Though most planes are pushed across a piece of wood, holding it with one or both hands, Japanese planes are pulled toward the body, not pushed away.

Exercise 10. Read and translate the following text in written form. Think about the appropriate title for the text. Express the main idea of the text in 1 or 2 short sentences.

Once the workpiece has been flattened and edged on a surface planing machine, it is planed to the desired thickness on the thickness planing machine. Unlike that of a surface planing machine, the cutterblock of a thickness planing machine is located above the planing table and the workpiece is no longer fed by hand but mechanically by feed rollers. The feed rollers are driven either by a separate motor or via a speed-reduction gearbox receiving its power from the cutterblock motor. With a separate drive the feed rate remains constant, but if the power is transmitted from the cutterblock motor the feed rate varies according to the cutterblock speed. Feed rates between 4 and 35 m/min are common.

Two spring-mounted feed rollers rest on the upper surface of the workpiece. The feed roller in front of the cutterblock is grooved for better grip on the workpiece; the feed roller at the outfeed end of the cutterblock is smooth. An infeed and an outfeed pressure bar located next to the cutterblock press the workpiece down onto the table, thereby ensuring a clean and even cut. The design and arrangement of the feed rollers and pressure bars should be such that contact with the rotating cutterblock is impossible.

Sectional feed rollers and pressure bars allow for the simultaneous working of two or more workpieces of slightly different thickness. From the point of view of accident prevention, sectional feed rollers and pressure bars are essential. The width of the individual feed roller or pressure bar section should not exceed 50 mm.

Two idle rollers are arranged in the table. They are designed to facilitate the passage of the workpiece over the table.

Exercise 11. Use Gerund in the Passive Voice.

Example: – I like visiting other people.
– *I like* ***being visited*** *by other people.*

1. He always prefers telling the truth. 2. I don't mind sending him there. 3. I avoid visiting strangers. 4. I remember asking him for help. 5. I'm tired of asking questions. 6. I'm looking forward to showing them the place. 7. I object to doing this work now. 8. They insist on letting him in. 9. I avoid asking for help. 10. Do you mind telling us how to do it? 11. Why are you afraid of asking him questions? 12. Why do you object to showing them the letter? 13. I don't mind leaving him alone. 14. I object to forcing me to do it.

Glossary

A

abnormality – аномалия, отклонение, неправильность
accommodate – вмещать, размещать
adhesive – клей, склеивающее вещество
adjustable – регулируемый, настраиваемый
adverse – неблагоприятный, вредный
air-drying – воздушная сушка
alternative fuel – альтернативное топливо, синтетическое топливо
although – хотя
anisotropic material – анизотропный, неравномерный материал
annual ring – годичное кольцо, годичный слой древесины
approximately – приблизительно, примерно
atomized – распыленный, мелкокапельный
attack – поражать, разрушать, воздействовать
attain – достигать, приобретать
attendant – сопутствующий, сопровождающий

B

band saw – ленточная пила
bark pocket – карман с корой в древесине
batch process – периодический технологический процесс, обработка порциями
beam – балка, брус
bedplate – опорная плита, станина
beeswax – пчелиный воск
be liable to checking and splitting – склонный к растрескиванию и раскалыванию
bending properties – свойства изгибания, склонности к деформации
biodiversity – биоразнообразие
blade – лезвие, полотнище (пилы), лопасть (винта)
boom – бон (заграждение в виде бревен), запань (заграждение на реке для собирания сплавляемого леса)
boreal – арктический, северный, бореальный
brancher – сучкорезная машина
branching – обрубка сучьев

break down – разлагать, распадаться
breathing – вентиляция двигателя
brush-applied – нанесенный кистью
bucking – раскряжевка
burn – жечь, сжигать, использовать в качестве топлива, работать на
busy sort – ценный сорт

C

cabinet maker – краснодеревщик, столяр
canopy – древесный полог
capacity – мощность, производительность
carbide tipped – с твердосплавной режущей пластиной
carburetor – карбюратор
categorize – распределять по категориям, классифицировать
cell cavity – клеточное углубление, полость
chain saw – цепная пила, бензопила
charring – обжиг, обжигание
chips – стружки, опилки
circular saw – дисковая пила, циркулярная пила, кругло-пильный станок
clear – очищать, вырубать
clear-cutting – сплошная рубка
cloud forests – влажный тропический лес, моховой лес, туманный лес
coating – покрытие, оболочка, нанесение покрытия
colorant – краситель, красящее вещество, пигмент
coloring – окраска, расцветка
combustion chamber – камера сгорания
compartment kiln – сушилка периодического действия
complicate – усложнять
compression ignition – воспламенение от сжатия
compression wood – крень, древесина кренёвая
compulsory – обязательный
concrete – бетон
coniferous – хвойные
connecting rod – соединительная тяга, шатун
consume – потреблять, расходовать
continuous – продолжительный, непрерывный
contribute – вносить вклад, способствовать, содействовать
controls – рычаги управления

conversion – переработка, преобразование
convert – превращать, преобразовывать
core – сердцевина, ядро, центр
cover – покрывать
count on – рассчитывать
crank mechanism – кривошипно-шатунный механизм
crankshaft – коленвал, коленчатый вал
crawler tractor – гусеничный трактор
cross grain – поперечный косослой
cure – отверждать, схватываться
curve – кривая линия, дуга, изгиб
curved shape – криволинейная форма
cutterblock – режущая головка
cutting action – резание, обработка резанием, режущая способность
cutting chain – режущая цепь
cutting edge – режущая кромка, остриё
cutting tool – режущий инструмент, резец
cut-to-length logging operation – операция по разрезанию бревен на мерные длины

D

dam – дамба, плотина
damage – вред, повреждение, ущерб
damaged – поврежденный, испорченный
decay – гниение, разложение
deciduous – лиственные
denote – обозначать, означать, указывать на
derivative – производное
determine – определять
development – развитие
deviation – отклонение (от нормы), отступление, отход
dipping in – макание, погружение в (жидкость)
disintegration – разложение, разрушение
dissolution – распад, разложение, гниение
dissolved – растворенный
driving – молевой лесосплав
drought – засуха
drying oil – олифа
dull luster – матовый блеск, тусклый глянец
durability – долговечность, прочность, износоустойчивость

E

edger – кромкострогальный станок
ejected – вытолкнутый, выброшенный
elevated – повышенный, выше нормы
embed – вставлять, встраивать, внедрять
emit – испускать, выделять, выбрасывать, излучать
enamel – эмаль, финифть, глазурь
enrich – обогащать
environment – окружающая среда
environmental value – ценность для окружающей среды
evenly distributed – равномерно распределенный
expand – увеличиваться в объеме, расширяться
expel – выбрасывать, выталкивать, удалять
explosive power – сила взрыва, взрывная сила
exposure – выставление наружу, подвергание
external combustion engine – двигатель внешнего сгорания

F

feeding mechanism – механизм подачи (на станках)
feed rate – скорость подачи
feller-buncher – машина для валки леса и формирования пачек хлыстов
felling – рубка, валка леса
fiber-saturation point – предел насыщения клеточных стенок, точка насыщения волокна
finish – отделка, полировка, покрытие
fir – пихта
firm – твердый, прочный, крепкий
floatable – плавучий, пригодный для сплава
floating – плотовой лесосплав
forcefully – с усилием, сильно
forestland – лесной массив
forest management – лесоуправление
forwarder – форвардер, самозагружающийся трактор для трелевки лесоматериалов
foundation – основание
four-cycle engine – четырёхтактный двигатель
frame saw – рамная пила, лесопильная рама
friction – трение, сила трения
fuel – топливо, горючее

fuel injection – впрыскивание топлива
fungus (fungi) – гриб, плесень

G

gang – набор, комплект
gasoline – бензин, газолин
glossy finish – глянцевая поверхность, блестящая полировка
grain pattern – структура волокна, зернистая структура
guard – предохранительное устройство, ограждение, защита
guide bar – направляющий стержень, шток
gum – смола, живица

H

handheld – ручной, переносной, портативный
hand saw – ручная пила, ножовка
hardness – твердость, прочность, жесткость
hardwood – древесина, лесоматериалы твердолиственных пород
harvester – харвестер, лесозаготовительная машина для валки и обработки деревьев
hauling – транспортировка, буксировка, перевозка
health hazard – опасность (угроза) для здоровья
heat exchanger – теплообменник
heterogeneous – гетерогенный, неоднородный
homogenous – однородный, гомогенный
hygroscopic – гигроскопичный

I

imbibed water – связанная вода
imperfection – дефект, изъян, недостаток
impregnate – пропитывать, насыщать
injected – впрыснутый
inland – территория, удаленная от моря, внутренний, вглубь страны
in-line engine – рядный двигатель
in one pass – за один проход
insect – насекомое
interchangeable – сменный, съёмный, заменяемый
internal combustion engine – двигатель внутреннего сгорания
in turn – в свою очередь

irregularity – отклонение от нормы, неправильность формы, несимметричность
irregular shape – сложная конфигурация (форма)

J

jet fuel – топливо для реактивных двигателей
jointer – фуговальный станок

K

kerf – пропил, разрез, прорезь
kick back – отскакивать назад
kiln drying – камерная сушка

L

lack – недостаток, нехватка, отсутствие
lacquer – лак, политура, глазурь
landing – место погрузки/выгрузки (бревен)
larch – лиственница
larva (larvae) – личинка, гусеница
leach – выщелачивать, вымывать питательные элементы (о почве)
linseed oil – льняное масло, льняная олифа
load – грузить, нагружать
loading – погрузка
lodge – зависать (о дереве при валке), упираться в препятствие (о трелюемом грузе)
logging operation – лесозаготовительные работы
longitudinal axis – продольная ось
longitudinal shrinkage – продольная усадка
low maintenance – низкие эксплуатационные расходы
lubricate – смазывать, наносить смазку
lubricating attachment – смазывающее устройство
lumber – бревно, пиленый лес, пиломатериалы
lumber company – лесозаготовительная компания
lush – сочный, обильный, пышный (о растительности)

M

machine – подвергаться механической обработке, обрабатывать резанием
machining – механическая обработка
make up – составлять

manual – инструкция, руководство
mellow gloss – мягкий блеск
melting point – точка плавления, температура плавления
metered-out charge – отмеренная порция (топлива)
mitigate – смягчить, уменьшить,
moisture – влажность, влага, сырость
moss – мох
motor – (электро)двигатель, мотор
motor vehicle – автомобиль, транспортное средство
multicutter – многорезцовый, многоинструментный
multipurpose – многоцелевой, универсальный

N

naturally aspirated – безнаддувный
nitrocellulose – нитроцеллюлоза

O

occur – случаться, происходить, встречаться
oleoresin – канифоль
output – производительность, выработка
overall manufacturing quality – общее качество производства
overcome – преодолевать, превозмочь

P

periphery – внешняя граница
pest – вредитель, паразит
pigment – краситель, пигмент
pine – сосна
pin knot – сучок игольчатый
piston – поршень, плунжер
piston ring – поршневое кольцо
pitch pocket – смоляной карман
plane – рубанок
planer = surface planing machine – продольно-строгальный станок
planing – строгание, обработка на строгальном станке
plasticizer – пластификатор, смягчитель
platen – пластина, плита
plywood – фанера
position – помещать, располагать, ставить
power loader – погрузочная машина

power saw – механическая пила, отрезной станок
power source – источник питания
power tool – механический инструмент, инструмент с механическим приводом
precipitation – осадки
predetermined – заранее установленный, предопределенный
pre-drying – предварительная сушка, подсушка
premature wear – преждевременный износ
prerequisite – необходимое условие, предпосылка
preserve – сохранять, сберегать
pressure gradient – градиент давления
pressure impregnation – пропитка под давлением
processing – обработка, переработка
protrude – торчать, выступать, выдаваться

R

radial engine – звездообразный двигатель, двигатель с радиально расположенными цилиндрами
railway car – железнодорожный вагон
rate – оценивать, считать
ratio – соотношение
reaction wood – древесина кренёвая
reciprocate – совершать возвратно-поступательные движения
reciprocating – возвратно-поступательный, качающийся, поршневой
reciprocating engine – поршневой двигатель
relationships – отношения
remains – остатки, останки
removable – съёмный, сменный, заменяемый
renewable – возобновляемый
resaw – делительная пила, ребровая пила
resin – смола, канифоль, камедь
revolving – вращающийся, поворотный
ripping – распиловка вдоль волокна
rotary – роторный, ротационный
rotation speed – скорость вращения
rpm (revolutions per minute) – число оборотов в минуту
rubbing – натирание, полировка
rubbing parts – трущиеся детали, трущиеся части
run on petrol – работать на бензине

S

safe operating technique – методика безопасной эксплуатации
safety features – характеристики защитных устройств
saline solution – солевой раствор
sander – шлифовальный станок, пескоструйный аппарат
sanding – шлифовка, очистка
sandpaper – наждачная бумага, шкурка
sawdust – опилки
sawmill – лесопилка, пилорама
scattered stand of timber – разряженный древостой
science of forestry – наука о лесном хозяйстве
scuffing – износ, истирание, заедание
sculpted surface – поверхность с глубокими выемками, объемная поверхность (детали)
seasoning – высушивание древесины на воздухе, естественная сушка
seasoning conditions – условия сушки (на открытом воздухе)
setting – затвердевание, застывание
shake – морозобоина, трещина
shaping – фрезеровка, строгание (на поперечно-строгальном станке), придание формы
shed leaves – сбрасывать листья
shellac – шеллак (естественная смола, природный лак)
shine – глянец, блеск, лоск
shock resistance – ударопрочность
shrink (shrank, shrunk) – уменьшаться, сокращаться, давать усадку
shrinkage – усадка, коробление
shrub – кустарник
skidder – трелевочная машина, лесотаска с механической лебедкой, скиддер
skidding – трелевка леса, перемещение деревьев, хлыстов или сортиментов от места валки до лесопогрузочного пункта
smooth – шлифовать, делать ровным, гладким
soak up – впитывать
softwood – хвойный лес, древесина мягких пород
soil – почва
soluble nutrients – растворимые питательные вещества
solvent – растворитель
sound – здоровый, прочный, крепкий
source – источник

spark ignition – искровое зажигание
spark plug – свеча зажигания, запальная свеча
species – вид(ы)
specific gravity – удельная плотность
spontaneously – самопроизвольно, спонтанно
spraying – распыление, напыление, пульверизация
spruce – ель
stain – синева (порок древесины), пятно, красящее вещество, морилка
stationary – неподвижный, закрепленный, стационарный
storehouse – хранилище, кладовая, склад
steady – постоянный, устойчивый, стабильный
stickers – рейки в качестве прокладок при сушке материалов
stiffness – жесткость, прочность
straightforward – простой, ясный, непосредственный
stream – ручей, небольшая речка
strength – сила, крепость, прочность
strength property – прочностная характеристика
stretch – участок, пространство, протяженность
strip-mining – открытая добыча угля
stump – пень
sturdy – прочный, крепкий, жесткий
supercharged – с наддувом
support – служить опорой, поддерживать
surface planer – станок для строгания поверхностей
surface quality – качество обработанной поверхности
suspended – взвешенный, суспендзионный
sustainable – устойчивый
swampy road – болотистая, топкая дорога
swelling – набухание, утолщение

T

tanning materials – дубильные вещества
thermal efficiency – тепловой (термический) КПД
thicknesser – станок для строгания по толщине
thickness planing machines = thickness planer – рейсмусовый пропускной станок (для строгания по толщине)
thinner – растворитель, разбавитель
thrive – пышно расти, разрастаться, процветать
timber – древесина, бревна, лесоматериал

tip – верхушка, остриё, конец
toothed edge – сторона с зубьями (ленточной пилы)
tooth load – нагрузка на зуб (пилы)
tooth pitch – шаг зубчатого зацепления
tough – прочный, жесткий, упругий
tractor-drawn wagon – буксир на тракторной тяге
transcend – выходить за пределы, превышать
tree-length log – древесный хлыст
tropical rainforest – тропические дождевые леса
trunk – ствол
turbocharged – с турбонаддувом
two-stroke engine – двухтактный двигатель

U

undercoat – грунтовка, грунтовочное покрытие
undercut – подпил, подруб, недорез
underestimate – недооценивать
undergrowth – подлесок, подрост
unsound – нездоровый, ненадежный, дефектный
upkeep – обслуживание, ремонт, содержание в исправности

V

vacuum impregnation – вакуумная пропитка
valve – клапан, вентиль, затвор
varnish – лак, глянец
vehicle – транспортное средство, машина
vent – вентиляционное отверстие, отдушина
versatile – многофункциональный, разносторонний, универсальный
vital – жизненно важный, насущный
volatile – летучий, быстро испаряющийся

W

warp – деформация, коробление
waste products – отходы (производства)
water-repellent – водоотталкивающий, водонепроницаемый
wear – изнашивание, истирание
wedge – клин, зубец
wedge-shaped section – клиновидная, заостренная часть, срез
wetting – смачивание, замачивание

wildlife – дикая природа
wind stress – напряжение от ветровой нагрузки
wire – провод, проволока
withdraw – отводить, изымать, удалять
wood – лес, древесина
wood dust – пыль древесная
wood protection agent – средство (химическое вещество) для защиты древесины
wood stain – протрава для древесины
wood tissue – древесная ткань
working fluid – рабочая жидкость
working width – рабочая ширина, ширина захвата
workpiece – обрабатываемая деталь, заготовка, изделие

Y

yield – размер выработки, количество добытого или произведенного продукта

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