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«БРЕСТСКИЙ ГОСУДАРСТВЕННЫЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ»

КАФЕДРА ЛИНГВИСТИЧЕСКИХ ДИСЦИПЛИН И МЕЖКУЛЬТУРНЫХ КОММУНИКАЦИЙ

Amelioration and Water Supply Engineering

методические рекомендации по английскому языку для студентов 1-го курса факультета инженерных систем и экологии дневной формы обучения специальности 6-05-0811-03 «Мелиорация и водное хозяйство»

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Целью данной методической рекомендации является изучение профессиональной лексики, развитие навыков чтения англоязычных текстов по специальности, формирование навыков перевода профессиональных текстов, а также подготовка студентов к иноязычному общению в сфере профессиональной деятельности.

Методические рекомендации составлены в соответствии с Учебной программой по дисциплине «Иностранный язык» для студентов 1-го курса факультета инженерных систем и экологии специальности 6-05-0811-03 Мелиорация и водное хозяйство.

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Учреждение образования

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UNIT 1. GEODESY
Topic 1.1 GEODESY AS A SCIENCE

Task 1. Pronounce the following words correctly and learn their meaningы.

1. accurately [ˈækjərətlɪ] - точно, правильно
2. shape [ʃeɪp] - форма, очертание
3. circumference [səˈkʌmf(ə)r(ə)ns] - окружность
4. shadows [ˈʃædəʊ] - тень
5. essential [ɪˈsenʃ(ə)l] - необходимый , существенный
6. application [æplɪˈkeɪʃ(ə)n] - применение
7. precise [prɪˈsaɪs] - точный, определённый
8. sobriquet [ˈsəʊbrɪkeɪ] - прозвище, кличка, прозвание
9. extraterrestrial [ˌekstrətəˈrestrɪəl] - внеземной
10. crustal [ˈkrʌstl] - земная кора
11. investigate [ɪnˈvestɪgeɪt] - исследовать; изучать
12. inherent [ɪnˈhɪər(ə)nt] - неотъемлемый
13. water vapor [ˈwɔːtə ˈveɪpə] - водяной пар
14. glacier [ˈglasɪə] - ледник
15. ice sheet [aɪs ʃiːt] - ледяной покров
16. rotation [rə(ʊ)ˈteɪʃ(ə)n] - вращение
17. shoreline [ˈʃɔːlaɪn] - береговая линия
18. determine [dɪˈtɜːmɪn] - определять, устанавливать
19. boundary [ˈbaʊndrɪ|] - граница, черта
20. surface [ˈsɜːfɪs] - поверхность
21. surveying tool [səˈveɪɪŋˈtuːl] - геодезические инструменты
22. measure [ˈmeʒə] - измерять, мерить
23. consistent [kənˈsɪst(ə)nt] - совместимый, последовательный
24. point [pɔɪnt] - точка, место
25. capture [ˈkæptʃə] - поймать, фиксировать
26. ellipsoid [ɪˈlɪpsɔɪd] - эллиптический, овальный
27. smooth [smuːð] - гладкий, ровный
28. valley [ˈvælɪ] - долина, впадина
29. additional [əˈdɪʃ(ə)n(ə)l] - дополнительный
30. exist [ɪgˈzɪst] - существовать

Task 2. Read the text.

GEODESY AS A SCIENCE

Geodesy is the science of accurately measuring and understanding the Earth's geometric shape, orientation in space, and gravity field. This field of study dates back to ancient Greece, when Eratosthenes measured the circumference of the earth using shadows. Today, geodesy is essential for modern navigation – GPS relies upon accurate geodetic measurements – as well as climate research and many other applications. Every day, without knowing it, people use technology that depends upon precise geodetic measurements [1].

Observations and measurements are at the heart of geodesy. Measurements of the static Earth aimed at understanding its size, shape, and motion have been made

for many centuries, earning geodesy the sobriquet of "oldest Earth science." In the last half-century, space techniques using extraterrestrial components and measurements have revolutionized the research and applications of geodesy, hence the term "space geodesy." Space geodetic observations are used today to measure global, regional, and local crustal deformation and gravity variability associated with a wide variety of geophysical processes; to investigate mass motions inherent in the global water cycle; to monitor atmospheric water vapor and temperature; to study the dynamics and kinematics of glaciers and ice sheets; and to study changes in the planet's moment of inertia and rotation. Due to the wide application of space geodetic observations, space geodesy has today become the most interdisciplinary branch in all of the geophysics [2].

Many organizations use geodesy to map the shoreline, determine land boundaries, and improve transportation and navigation safety. To measure points on the Earth's surface, geodesists assign coordinates (similar to a unique address) to points all over the Earth. In the past, geodesists determined the coordinates of points by using Earth-based surveying tools to measure the distances between points. Today, geodesists use space-based tools like the Global Positioning System (GPS) to measure points on the Earth's surface.

Geodesists must accurately define the coordinates of points on the surface of the Earth in a consistent manner. A set of accurately measured points is the basis for the National Spatial Reference System, which allows different kinds of maps to be consistent with one another.

To measure the Earth, geodesists build simple mathematical models of the Earth which capture the largest, most obvious features. Geodesists have adopted the ellipsoid as the most basic model of the Earth. Because the ellipsoid is based on a very simple mathematical model, it can be completely smooth and does not include any mountains or valleys. When additional detail of the Earth is needed, geodesists use the geoid. A geoid has a shape very similar to global mean sea level, but this exists over the whole globe, not just over the oceans [3].

Task 3. Find one synonym to the first word in each row.

1. investigate - own - find - explore
2. essential - minor - crucial - terrifying
3. boundary - scope - shadow - border
4. capture - apply - research - catch
5. measure - assign - use - evaluate
6. extraterrestrial - similar - ethereal - depend
7. point - glacier - rotation - place

Task 4. Find the suitable meaning to each of the words.

1. accurately – a) continental-scale masses of ice that rest on land
2. sobriquet – b) having an even and regular surface
3. surveying tools – c) closed surface of which all plane cross sections are either ellipses or circles
4. ice sheet – d) in a way that is correct, exact, and without any mistakes
5. surface – e) the exterior or upper boundary of an object or body

6. ellipsoid – f) instruments for calculating the angles and the distances between points
7. smooth – g) typically a familiar name used in place of a real name without the need of explanation

Task 5. Complete the following sentences.

1. Geodesy is the science of accurately measuring and understanding_____.
2. This field of study dates back to _____.
3. Today, geodesy is essential for _____.
4. Observations and measurements are at the heart of _____.
5. Measurements of the static Earth aimed at understanding its _____.
6. The ellipsoid can be completely smooth and does not include any mountains or _____.
7. When additional detail of the Earth is needed, geodesists use_____.

Possible answers: size, shape, and motion; geodesy; the Earth's geometric shape; valleys; the geoid; ancient Greece; modern navigation.

Task 6. Insert the missed parts of the sentences.

1. Eratosthenes measured _____of the earth using shadows.
2. People use technology that depends upon _____ geodetic measurements.
3. Geodesy earned the sobriquet of "_____ science."
4. Space techniques use _____ components and measurements.
5. Space geodetic observations are used today to measure global, regional, and local _____deformation.
6. Geodesists must accurately define the coordinates of points on the surface of the Earth in _____ manner.
7. A set of accurately measured _____ is the basis for the National Spatial Reference System.

Possible answers: precise; crustal; oldest Earth; a consistent; points; the circumference; extraterrestrial.

Task 7. Answer the following questions.

1. What is geodesy?
2. Where the field of geodesy dates back to?
3. What is essential for modern navigation?
4. Observations and measurements are at the heart of geodesy, aren't they?
5. What is the application of space geodetic observations today?
6. Which tools the geodesists of the past used to determine the coordinates of points?
7. What is the shape of the geoid?
8. Many organizations use geodesy to map the U.S. shoreline, determine land boundaries, don't they?

Task 8. Share your point of view on "What is the importance of geodesy in the modern world?". Imagine our live without geodesy as a science. How it would be?

Topic 1.2 MODERN DIRECTIONS OF GEODESY

Task 1. Pronounce the following words correctly and learn their meanings.

1. allow [ə'lau] - позволять, разрешать
2. represent [ˌreprɪ'zent] - изображать; представлять
3. precision [prɪ'sɪʒ(ə)n] - точность
4. division [dɪ'vɪʒ(ə)n] - деление, разделение
5. consider [kən'sɪdə] - рассматривать, обсуждать
6. survey ['sɜːveɪ] - обзор, опрос
7. distribute [dɪ'strɪbjuːt] - распределять
8. satellite ['sæt(ə)laɪt] - передавать по спутниковой связи
9. investigate [ɪn'vestɪgeɪt] - изучать, исследовать
10. temporal ['temp(ə)r(ə)l] - временной
11. fluctuation [ˌflʌkʧu'eɪʃ(ə)n] - качание, колыхание
12. ongoing ['ɔnˌgəuɪŋ] - непрерывный, постоянный
13. observable [əb'zɜːvəbl] - наблюдаемый
14. feature ['fiːʧə] - особенность, черта
15. dimension [daɪ'men(t)ʃ(ə)n] - размеры, величина

Task 2. Read the text.

MODERN DIRECTIONS OF GEODESY

In recent years there has been the development of a set of disciplines called geodetic sciences, which allow measuring, representing and analyzing geographic space with high precision. These sciences are Cartography (the oldest), Topography, Position Astronomy, Photogrammetry, Remote Sensing and Geodesy.

The term geodesy was first used in Ancient Greece, by Aristotle, and means geographical divisions of the earth, or the act of dividing the earth.

It is considered at the same time a branch of Engineering and Geosciences, which deals with the survey and representation of the shape and surface of the Earth. Mathematics and physics also study geodesy, as a way to determine the measurement of curved surfaces, using methods similar to those used on the curved surface of the Earth.

We can divide geodesy into two major branches:

- Superior Geodesy or Theoretical Geodesy

It's divided between physical and mathematical geodesy, tries to determine and represent the figure of the Earth in global terms [4].

The research of the working group of Theoretical Geodesy is mainly focused on the areas of analytical and numerical techniques as basis for Theoretical Geodesy applications. Particularly, the processing of globally distributed satellite data to determine Earth's gravity is a priority objective.

In addition, the working group is also investigating the temporal changes in Earth's gravity, which are caused by mass transport due to ocean tides, sea level changes, or groundwater fluctuations. The aim of the working group is the linking of scientific knowledge from highly accurate (satellite) data of gravity field missions with the ongoing research activities in other geosciences such as oceanography, hydrology, glaciology and geophysics. The observable and measurable mass variations of the gravity

field of the Earth System are of essential importance for various kinds of geophysical processes and can be directly linked to parameters of the Earth's climate [4].

- Lower Geodesy, Practice or Topography

Topography is the study and description of the physical features of an area, for example its hills, valleys, or rivers, or the representation of these features on maps.

Is the part that studies and represents smaller portions of the Earth where the surface can be considered “flat”.

If we are based on the study of the earth, according to a mathematical concept, geodesy studies both the shape and the dimensions of the earth, however, according to the definition of the concept of geodesy, the field of gravity and its temporal variations are also studied. These last two concepts are within the field of physics [5].

Task 3. Complete the following sentences.

1. The development of geodetic sciences allows measuring, representing and analyzing geographic space with high_____.
2. The term geodesy was first used in Ancient Greece, by_____.
3. We can divide geodesy into two major branches_____.
4. A priority objective to determining the Earth's gravity is_____.
5. They are caused by mass transport due to ocean tides, sea level changes, or groundwater _____.
6. Topography is the study and description of the physical_____.
7. Is the part that studies and represents smaller portions of the Earth where the surface can be considered _____.

Possible answers: “flat”; superior and topography geodesy; precision; the processing of globally distributed satellite data; Aristotle; fluctuations; features.

Task 4. Find the synonym to the first word in each row.

1. allow – prevent – enable – forget
2. represent – hide – devide – portray
3. survey – subject – feature – poll
4. distribute – allocate – halt – investigate
5. satellite – detain – spread – restore
6. ongoing – abandoned – temporal – current
7. fluctuation – precision – feature – instability

Task 5. Find the suitable meaning to each of the words.

1. precision – a) look closely at or examine someone/something
2. consider – b) a distinctive attribute or aspect of something
3. survey – c) adapted for extremely accurate measurement or operation
4. investigate – d) capable of being observed; noticeable; visible
5. observable – e) the action of separating something into parts or the process of being separated
6. feature – f) to observe or study by close examination and systematic inquiry
7. division – g) think carefully about something, typically before making a decision

Task 6. Insert the missed prepositions in each sentence.

1. In recent years there has been the development ___a set __disciplines called geodetic sciences.
2. Mathematics and physics also study geodesy, using methods similar ___those used on the curved surface ___ the Earth.
3. If we are based ___ the study ___ the earth, according ___a mathematical concept, geodesy studies both the shape and the dimensions ___ the earth.
4. It is considered at the same time a branch of Engineering and Geosciences, which deals ___ the survey and representation ___ the shape and surface __ the Earth.
5. The research __ the working group __Theoretical Geodesy is mainly focused __ the areas __ analytical and numerical techniques as basis __Theoretical Geodesy applications.
6. We can divide geodesy ___ two major branches
7. The observable and measurable mass variations __ the gravity field __ the Earth System are of essential importance __ various kinds __ geophysical processes and can be directly linked __ parameters __ the Earth's climate.
8. The working group is also investigating the temporal changes __ Earth's gravity, which are caused __ mass transport due __ocean tides, sea level changes, or groundwater fluctuations.

Variants of possible answers: of; in; by; with; for; into; to; on

Task 7. Answer the following questions.

1. What geodetic sciences allow us to do?
2. Which geodetic sciences do you know?
3. Mathematics and physics also study geodesy, don’t they?
4. Which branches of geodesy do you know?
5. The research of the working group of Theoretical Geodesy is mainly focused on the areas of analytical and numerical techniques, isn’t it?
6. What is the priority objective of theoretical geodesy?
7. What is the notion of topography?
8. Geodesy studies both the shape and the dimensions of the earth, doesn’t it?

Task 8. Make a plan “Modern Directions of Geodesy” and report to your groupmate.

UNIT 2. SOURCES OF WATER

Topic 2.1 WATER AS A NATURAL RESOURCE

Task 1. Pronounce the following words correctly and learn their meanings.

1. glacier /ˈglæs.i.ər/ – ледник
2. to absorb /əbˈsɔːb/ – поглощать
3. capillarity /ˌkæp·əˈlær·ət̬·i/ – капиллярная система
4. circulation /ˌsɜː.kjəˈleɪ.ʃən/ – циркуляция, распространение, круговорот
5. to evaporate /ɪˈvæp.ər.eɪt/ – испарять(ся)
6. evaporation – испарение

7. to fall – падать, выпадать
8. ground water – грунтовые воды
9. to penetrate /ˈpen.ɪ.treɪt/ – проникать, пробивать
penetration – проникновение, распространение, проницаемость
10. plant root – корень растения
11. pores /pɔːz/ – поры
12. rainfall /ˈreɪn.fɔːl/ – дождь, количество атмосферных осадков, ливень
13. to run off – стекать, сбегать
14. to sink – оседать, проходить, проникать, впитывать(ся)
15. soil – почва
16. stream /striːm/ – ручей, поток, струя, течение
17. to vary /ˈveə.ri/ – варьировать(ся), отличать(ся)

Task 2. Read and translate the text.

Water seems the most renewable of all the Earth's resources. It falls from the sky as rain it surrounds us in the oceans that cover nearly three-quarters of the planet's surface and in the polar ice caps and mountain glaciers. It is the source of life on Earth. The most significant use of water is to produce hydropower by harnessing its energy. Compared to other resources that are used to produce energy and power water is considered renewable as well as having the least solid waste during energy production [6].

About 97% of all water is salt (saline) water of the oceans, and the remaining 3% is fresh water. The majority of fresh water, about 69%, is locked up in polar glaciers and icecaps, mainly of Greenland and Antarctica; and the rest is ground water. No matter where on Earth we stand, chances are that, at some depth, the ground below is saturated with water. Of all the fresh water on Earth, only about 0.3% is contained in rivers and lakes, known as surface water. Considering that most of the water we use in everyday life comes from rivers, we make use of a tiny portion of the available water supplies (see **Fig.** 1).

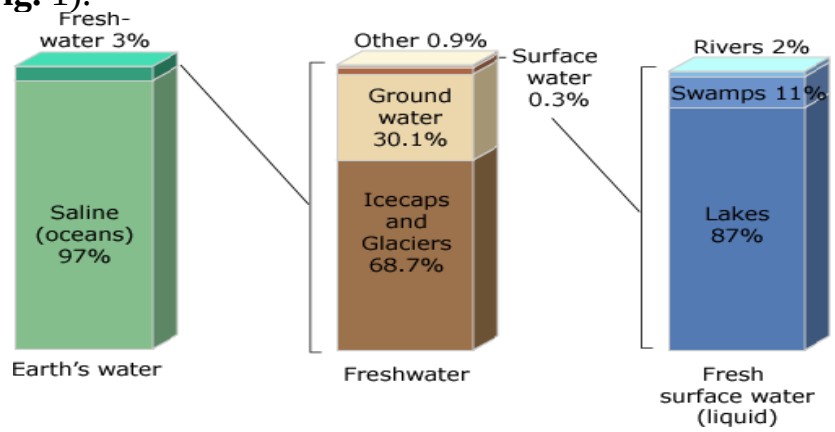


Fig. 1. Distribution of Earth's Water

As for ground water, this is the water contained underground in the pores of soil and rock. When rain falls on the earth some evaporates, some is absorbed by plants, some runs off in streams and the remainder sinks into the earth to become ground water. The amount that sinks into the ground depends on various factors.

It is much to the point to inquire how much of the rainfall soaks into the ground, how much evaporates, how much is used by plant life, and how much runs off into the

streams. It is certain that there is water in the ground in some places and there are good reasons to suppose that water may penetrate the rocks to a depth of a dozen miles.

The total amount of water varies greatly from place to place, and even from time to time in the same place.

Water which sinks into the earth moves not merely downward, but sideways and even back to the surface. Thus, there is a sort of circulation of underground water which is kept up fundamentally by gravity, and assisted by such agencies as capillarity and plant roots [7].

Task 3. Match the words from column A with their definitions from column B.

A	B
1. to absorb	a. water that flows naturally along a fixed route formed by a canal cut into rock or ground, usually at ground level;
2. stream	b. the movement of air or water in a space or system;
3. capillarity	c. the material on the surface of the ground in which plants grow;
4. soil	d. the process of a liquid changing to a gas, especially by heating;
5. circulation	e. to flow, especially in a steady stream;
6. to sink	f. underground water that is held in the soil and rocks;
7. evaporation	g. the ability of a liquid to move through a second liquid due to attraction;
8. to run off	h. to move into or through something;
9. ground water	i. to take in a liquid, gas, or chemical;
10. to penetrate	j. to go down below the surface or to the bottom of a liquid or soft substance.

Task 4. Decide if the following statements are true or false.

1. Water is a non-renewable resource on the Earth.
2. The most significant use of water is to produce hydropower by harnessing its energy.
3. Ground water is the water contained underground in the pores of soil and rock.
4. Water cannot penetrate the rocks to a depth of a dozen miles.
5. The total amount of water doesn't vary greatly from time to time.
6. There is a sort of circulation of underground water which is kept up fundamentally by gravity.

Task 5. Fill in the gaps using the words from task 3 (column A). Change the form if necessary.

1. These toxins can … food and cause health problems.
2. Water resources – surface and … water used or can be used in economic activities.
3. Physical properties such as density or texture cannot … infrared light either.
4. This technique stops the vertical … that forms in the soil during dry periods.
5. The thin water … that travels at high speed cuts the material quickly.
6. At lower temperatures, … is typically too slow to be noticed.
7. The stones were laid at a slight angle, lower on the outside than the inside to allow water to … … .
8. There is a natural water … which consists of natural movement and mixing of water.
9. Restoring … lost by erosion is slow.
10. The diver could inflate or deflate the balloon so that they could … or come to the surface easily.

Task 6. Answer the following questions according to the text.

1. What is ground water?
2. What happens to the rain water when it reaches the ground?
3. In what direction does water move when it sinks into the earth?
4. What agencies make the circulation of ground water possible?

Task 7. Make a summary of the text (see task 2).

Topic 2.2 THE WATER (HYDROLOGIC) CYCLE

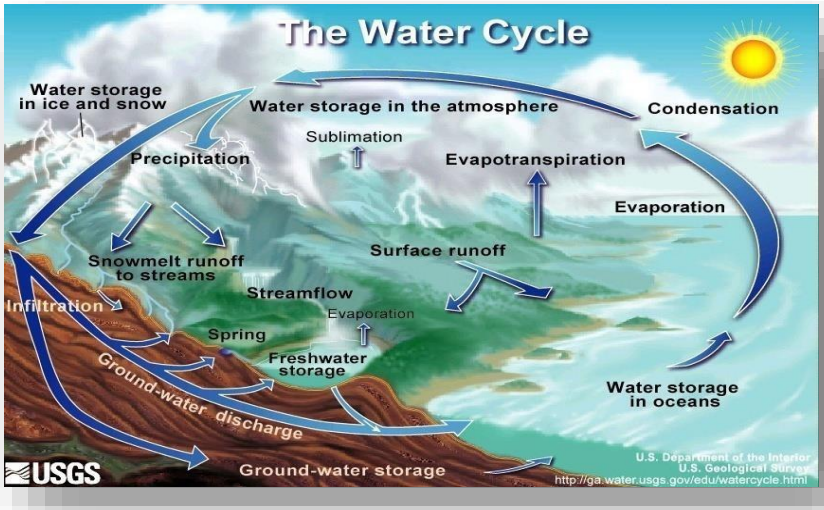
Task 1. Pronounce the following words correctly and learn their meanings.

1. hydrosphere /ˈhaɪ.drəʊ.sfɪə/ – гидросфера
2. hydrological cycle / water cycle /ˌhaɪ.drəˈlɒdʒ.ɪ.kəl ˈsaɪ.kəl/ – гидрологический цикл
3. to condense /kənˈdens/ – конденсировать(ся), сжимать
4. condensation – конденсация, конденсат
5. water vapor /ˈveɪ.pɚ/ – водяной пар
6. to infiltrate /ˈɪn.fɪl.treɪt/ – просочиться, проникнуть
7. infiltration – инфильтрация, просачивание
8. runoff /ˈrʌn.ɒf/ – сток
9. to seep – просачиваться, проникать
10. seepage /ˈsiː.pɪdʒ/ – просачивание, утечка, инфильтрация
11. to soak /səʊk/ – впитывать(ся)
12. soakage – просачивание
13. to solidify /səˈlɪd.ɪ.faɪ/ – затвердевать, застыть, укреплять
14. solidification – затвердевание, застывание, кристаллизация
15. solid – твердый, прочный
16. transpiration /ˌtræn.spɪˈreɪ.ʃən/ – транспирация, испарение
17. to transport /ˈtræn.spɔːt/ – транспортировать, переносить
18. transportation – транспортирование, перемещение
19. drinking water – питьевая вода
20. fresh water – пресная вода
21. to be composed of – состоять из
22. to include – включать в себя
23. moist /mɔɪst/ – влажный, сырой, мокрый
24. moisture /ˈmɔɪs.tʃə/ – влага, влажность, сырость
25. ongoing – постоянный, непрерывный

Task 2. Read the text and study the picture (see Pict. 1) below.

The hydrosphere is composed of all of the water on or near the earth. The total stock of it is approximately 1400 million km^3. This includes all forms of water in the oceans, rivers, lakes, and even the moisture in the air. Ninety-seven percent of the earth's water is in the oceans while the remaining three percent is fresh water for which three-quarters of the fresh water is solid and exists in ice sheets.

The water cycle, also known as the hydrological cycle, describes the continuous movement of water on, above and below the surface of the Earth. It includes the processes of evaporation, condensation, precipitation, infiltration, runoff, and subsurface flow.



Pict. 1. The Mechanism of Water (Hydrologic) Cycle

Solar radiation provides the necessary energy for evaporation of water from the surface of the ocean. As moist air is lifted, it cools and water vapor condenses to form clouds. Moisture is transported around the globe until it returns to the surface as precipitation. Once the water reaches the ground, some of the water returns rather rapidly to the atmosphere by evaporation or transpiration from plants. The remainder either flows over the land surface as runoff in streams, or soaks into the ground by infiltration to form groundwater. Groundwater either seeps its way to into the oceans, rivers, and streams, or is released back into the atmosphere through transpiration. Groundwater is the second largest reserve of fresh water (0.76%) after glacial ice (1.76%), and represents an important source of drinking water along with surface water from streams and lakes (0.14%). Finally, most water eventually reaches the ocean, where ongoing evaporation completes the cycle.

Water on the Earth is constantly on the move, recycling over and over again. This process proves the necessity of every person to take responsibility for saving the most precious resource - water - for the future generations [8].

Task 3. Label the diagram (Fig. 2) below.

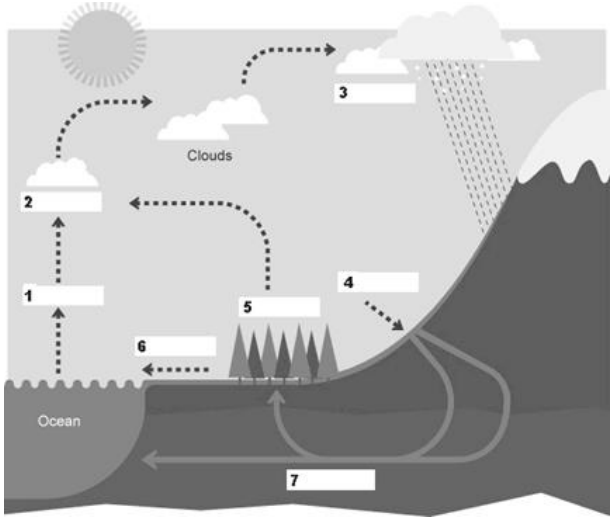


Fig. 2. The Water Cycle

Task 4. Match the terms with their definitions.

1. evaporation
2. condensation
3. precipitation
4. infiltration
5. runoff
6. transpiration

a) It's the process where water vapors change into very tiny particles of ice/water droplets.

b) It's the process of water movement through a plant and its evaporation from aerial parts, such as leaves, stems and flowers.

c) It's the process of a substance in a liquid state changing to a gaseous state due to an increase in temperature and/or pressure.

d) It's the process by which water soaks into subsurface soils and moves into rocks through cracks and pore spaces.

e) It's the process where water runs over the surface of earth.

f) It's the falling of water from the sky in different forms.

Task 5. State what part of speech the following words belong to and translate them into Russian.

vapor – evaporate – evaporation – evaporating – evaporated;
solid – solidify – solidification;
transport – transportation – transporting – transported;
condense – condenser – condensation – condensed;
infiltrate – infiltrated – infiltration;
form – formed – forming – formation;
deposit – deposition – deposited – depositional;
penetrate – penetration – penetrating;
seep - seepage – seeping;
soak – soakage – soaking.

Task 6. Translate the following sentences paying attention to the words ending in –ed. Define their role in the sentences.

1. In time, a layer of sediment *deposited* on the sea floor becomes buried under another layer. 2. Sediment is *deposited* when the transporting agent loses its carrying power. 3. The dark-colored country rock is shale *deposited* in a marine environment. 4. The igneous rock, being out of equilibrium, may then undergo weathering and erosion, and the debris *produced* is *transported* and *deposited* (usually on a sea floor) as sediment. 5. Weathering products *transported* to the sea by rivers as dissolved solids make seawater salty and serve as nutrients for many marine organisms. 6. *Transported* soils do not develop from locally *formed* rock. 7. Because of wetter climate in the past, large lakes *formed* in now arid regions of the United States. 8. Wind from the Gobi Desert carried the silt and clay that *formed* these deposits. 9. A striking but rare feature *formed* by long shore drift is a tombolo, a bar of sediment connecting a former island to the mainland. 10. Transportation is the movement of *eroded* particles by agents such as rivers, waves, glaciers, or wind. 11. Finally, the stream (the Colorado River) *eroded* its way through the rock, carving the Grand Canyon. 12. Rock debris *eroded* from above covers red beds (*красноцветные отложения)*.13. Fiords are evidence that valleys *eroded* by past glaciers were later partly submerged by rising sea level. 14. Sedimentary rocks are *formed* from *eroded* mineral grains, minerals *precipitated* from low-temperature solution, or consolidation of the organic remains of plants. 15. As the water evaporates beneath the land surface, salts are *precipitated* within the soil. 16. Tsunami *generated* by submarine earthquakes may cause tremendous damage to the coastal environment. 17. An earthquake is a trembling or shaking of the ground *caused* by the sudden release of energy *stored* in the rocks beneath Earth's surface.

Task 7. Answer the questions.

1. What is the hydrosphere?
2. What percentage of the earth's water is salt water and fresh water?
3. What are the main steps of the water cycle?
4. What is the role of plants in the water cycle?
5. *Which process is the most important component in the water cycle?
6. *Can we influence the water cycle for benefit of human being?

Task 8. Describe the water cycle using the picture (see Pict. 1).

UNIT 3. HYDRAULIC STRUCTURES

Task 1. Pronounce the following words correctly and learn their meanings.

1. to harness /ˈhɑː.nəs/ – использовать, задействовать, запрягать
2. dam /dæm/ – дамба, плотина
3. reservoir /ˈrez.ə.vwɑːr/ – резервуар
4. to evolve /ɪˈvɒlv/ – развивать, выделять
5. hydraulic mortar /haɪˈdrɒl.ɪk ˈmɔː.tər/ – гидравлический раствор (твердеющий в воде)
6. to percolate /ˈpɜː.kəl.eɪt/ – просачиваться, фильтровать, проникать сквозь
7. overflow /ˌəʊ.vəˈfləʊ/ – вытекание через край, разлив

8. spillway /ˈspɪl.weɪ/ – водослив
9. turbine /ˈtɜː.baɪn/ – турбина
10. to utilize /ˈjuː.təl.aɪz/ – использовать, утилизировать
11. durability /ˌdʒʊə.rəˈbɪl.ə.ti/ – прочность, стойкость, длительность

Task 2. Read and translate the text.

From the History of Dam Construction

Dams have a history just as long as such branches of civil engineering as bridge building, road construction and the laying down of canals. Not only do dams represent some of the most impressive achievements of engineers over the centuries but their vital role in supplying water to towns and cities, irrigating dry lands, providing a source of power and controlling floods is more than sufficient to rank dam building among the most essential aspects of man's attempts to harness, control and improve his environment.

In antiquity dams were built as an essential part of the need to practice irrigation on which the production of food was based. It was not until the Romans came on the scene that the size of dams was increased and new uses were found, such as the application of dams to problems of flood control and protection. The most important contribution, however, was the reservoir dam which, to a large extent, was a result of the Roman's concern with the water supply to cities and towns. That they were able to build so many big dams, many of which have lasted for a very long time and survived, despite eighteen centuries of use and neglect, was also a result of their evolving better methods of construction based on better materials, especially hydraulic mortar and concrete. Moreover, proper attention was paid to hydraulic problems to ensure that the water could not percolate through the dams and that when it overflowed them, spillways were provided.

The Industrial Revolution contributed to the further development of water resources not only for water supply purposes but also for water wheels, and, later, in the 19th century, for their logical successor-water turbines. In their mode of operation, particularly that of reaction turbines, it was a fundamentally new idea whose progress was closely linked with an improved understanding of hydrodynamics. The development of electric generators refers to the major scientific discoveries in the early part of the century, and one feature of electric power was of supreme significance, namely, that it is the only form of energy in a ready-to-use state which can be transmitted over long distances.

One of the greatest advantages of a water-power station is that it utilizes an energy carrier which renews itself constantly and does not exhaust energy resources. This makes its maintenance costs relatively low.

With the discovery of a generator three separate seemingly diverse branches of engineering, those concerning dams, water turbines and electric generators, came together to found a new branch of power generation utilizing hydropower resources. All the three elements have undergone changes in the height, volume and efficiency.

This progress places still greater responsibility on designers and engineers for ensuring durability and safety of the structures. The application of new devices-structural models and electronic computers-for stress analysis, research and calculations are of great help. The electronic computers handle the lengthy and time-consuming computations quickly and

accurately. Model analysis, a technique for simulating the complex behaviour of a structure, a dam, for instance, promotes a reliable forecast in designing new schemes and in the transformation and modernization of the old ones to increase their efficiencies [9].

Task 3. Match the following words with their translations.

1. близлежащий	a. water power engineer
2. водонепроницаемость	b. demand for
3. гидроэнергетик	c. to impound
4. спрос на	d. failure
5. шлюз	e. associated
6. водослив	f. executed
7. запруживать	g. stability
8. уровень	h. go down in history
9. устойчивость	i. steadily
10. неуклонно	j. to withstand
11. войти в историю	k. to occur
12. выполненный	l. to call for
13. разрушение	m. level
14. связанный	n. to comprise
15. происходить	o. water tightness
16. требовать	p. nearby
17. включать	q. spillway
18. выдерживать	r. to harness
19. использовать	s. lock

Task 4. Match the following words with their definitions.

1. dam	a. to make sth certain to happen
2. branch	b. a job or duty that you must do
3. flood	c. to bring a good result
4. application	d. very different from each other
5. ensure	e. a wall built across a river to hold back the water and form a lake behind it
6. contribution	f. smth that you give or do together with others
7. advantage	g. one of the main parts of sth
8. diverse	h. a large amount of water that covers an area which should be dry
9. responsibility	i. the practical use

Task 5. Fill in gaps with a suitable word below.

since; gorge; above; approaching;
constructed; reinforced concrete; reliable; buildings;
built; constructions; provide; called.

1. It is rather astonishing that the Romans only sparsely applied the arch in dam 1) …, a design otherwise so masterfully employed in their 2) … and bridges.

2. The Mongolians built the first arch dams 3) … the Romans.

3. The first true arch dam in Europe since the Roman times was 4) … from 1632 to 1640 near Elcho Spain.

4. The La Gage dam in France and the Tolls Dam in Corsica were both made exceedingly thin in order to 5) … a full-scale check on the validity of theoretical analyses when applied to dams 6) … the ultimate degree of slenderness.

5. Vaiont Dam in Italy, the second highest dam in the world, was built across a narrow 7) … on limestone foundations so that the crest 858 feet 8) … the valley bottom was only 623 feet in length.

6. The oldest dam still in use is the Almanza Dam in Spain, which was 9) … in the sixteenth century.

7. The first 10) … slab and buttress dam was built in the USA by Nils Ambursen in 1903 and this type of dam is often 11) … an Ambursen dam.

8. The first dam for which there are 12) … records was built on the Nile River sometime before 4000 B.C.

Task 6. Decide if the statements are true or false.

1. There is only one type of dam constructed of concrete.
2. There are five branches of civil engineering.
3. Dam building is one of man's attempts to harness, control and improve his environment.
4. The size of dams was decreased and new uses were found, such as the application of dams to problems of flood control and protection.
5. The Romans used better methods of construction based on better materials, especially stone and marble.
6. They invented a generator, three separate new branches of engineering: canals, water turbines, and computers.
7. Thanks to the Romans modern engineers and designers learn model analysis, a technique for simulating the complex behavior of a structure, a dam.

Task 7. Answer the following questions.

1. What kinds of branches of civil engineering are there? What are they?
2. Why were dams built in antiquity?
3. What was the important contribution in water supplying to cities and towns?
4. How did the water turbines operate?
5. What is one of the greatest advantages of a water-power station?
6. What are the three diverse branches of engineering? What changes did they undergo?
7. How did the new devices help the engineers and designers?

Task 8. Speak about types of dams and their constructions.

UNIT 4. DRAINAGE CANALS

Topic 4.1 LAND DRAINAGE

Task 1. Pronounce the following words correctly and learn their meanings.

1. drainage /ˈdreɪ.nɪdʒ/ – дренаж, осушение, водоотведение
2. ditch /dɪtʃ/ – ров, канава
3. drain /dreɪn/ – сток, слив, дренаж

4. dike /daɪk/ – дамба, плотина
5. to pump /pʌmp/ – откачать
6. embanked area /ɪmˈbæŋkt ˈeə.ri.ə/ – территория, огражденная дамбой
7. marsh /mɑːʃ/ – болото, топь
8. water storage basin /ˈstɔː.rɪdʒ ˈbeɪ.sən/ – водохранилище
9. feasibility /ˌfiː.zəˈbɪl.ə.ti/ – целесообразность, осуществимость
10. to take into account – учитывать, принимать во внимание
11. mitigation measures /ˌmɪt.ɪˈgeɪ.ʃən ˈmeʒ.əz/ – меры по смягчению/уменьшению последствий
12. ecological security /sɪˈkjʊə.rə.ti/ – экологическая безопасность
13. discharge rate /ˈdɪs.tʃɑːdʒ reɪt/ – норма разгрузки
14. water-conductive capacity /kənˈdʌk.tɪv kəˈpæs.ə.ti/ – водозаборная способность
15. plow layer /plaʊ ˈleɪ.ə/ – пахотный слой (земли)
16. drain ochering /ˈoʊ.kɚ .rɪŋ/ – обесцвечивание дренажа
17. trench /trentʃ/ – траншея, канавка
18. drain pipe /paɪp/ – дренажная труба
19. slope angle /sləʊp ˈæŋ.gəl/ – угол наклона
20. tillage operation /ˈtɪl.ɪdʒ/ – механическая обработка почвы
21. subsoiling /səbˈsɔɪ.lɪŋ/ – углубление пахотного слоя
22. slitting /ˈslɪ.tɪŋ/ – продольная резка
23. landforming /ˈfɔː.mɪŋ/– формирование рельефа
24. soil liming /ˈlaɪ.mɪŋ/ – известкование почвы
25. fertilization /ˌfɜː.tɪ.laɪˈzeɪ.ʃən/ – внесение удобрений

Task 2. Read and translate the text.

Land drainage – the removal of excess water via open ditches, subsurface tile drains, vertical drains, or through the creation of dikes and pumping the water out from embanked areas – is widely used not only in agriculture but also in the forestry industry, municipal and industrial construction, the mining industry, the construction of sport facilities, and the organization of recreation zones.

Land drainage allows humans to bring low-productive areas (marshes, the sea bottom, inundated and waterlogged territories around water storage basins, etc.) into agricultural use and to raise the efficiency of farming. Land drainage has a long history: the first drainage systems were created in Ancient Egypt, China, and India as early as in the third millennium BC. Since that time drainage technology has improved considerably, in parallel with the general scientific and technical progress of our civilization.

Simulation methods are widely used for the scientific substantiation of modern drainage projects. A feasibility analysis of a drainage project should take into account not only economic but also environmental aspects of the problem. Modern drainage technologies apply the findings of many sciences, including physics, chemistry, mathematics, biology, ecology, soil science, and earth sciences. Environmental protection should be studied thoroughly during the development of drainage projects. It is necessary to predict negative impacts of the future drainage system on the environment, including wildlife, and to suggest adequate mitigation measures. These measures should ensure the highest ecological security of drainage systems.

Land drainage is performed through the construction of open canals and subsurface plastic, ceramic, or tile drains. Land drainage projects are based on the results of topographic, soil, hydrologic, hydrogeologic, and other kinds of survey. The sizes of drainage canals and drainage parameters are calculated by special equations describing the hydraulic and filtration properties of soils.

The main criteria used in these calculations are the desired drainage depth (the projected depth of the groundwater table), the drainage discharge rate, and the water-conductive capacity of drains. Water budget equations are used to determine optimum drainage parameters.

Envelope filter materials (sand, copra) are used to protect drains from silting; simultaneously, these filters increase the water intake capacity of drains and provide the hydraulic connection of drains with the plow layer in heavy-textured soils with low natural infiltration capacity. The deposition of iron oxides on drain walls (drain ochering) is another danger that decreases the efficiency of drainage. A system of preventive measures is required to minimize drain ochering.

Open canals are constructed with the use of heavy excavators. The construction of subsurface drainage is performed in trenches or without them, using flexible drain pipes and drain loaders. A crucial point in the construction of drainage systems is the driving of canals and drain pipes in strict accordance with the necessary slope angle. This is achieved with the help of laser-based equipment.

Special tillage operations – subsoiling, slitting, landforming, and land planning – are used to increase the efficiency of drainage. The removal of shrubs and stones from the surface, soil liming, and fertilization are also performed during the construction of drainage systems [10].

Task 3. Match the words from column A with their definitions from column B.

A	B
1. ditch	a. a pipe or canal that is used to carry away waste matter and water from a building, or an opening in the road that rain water can flow down;
2. fertilization	b. a long wall that prevents water, esp. from the sea, from flooding a place;
3. drain	c. any pipe used to facilitate the transfer of water from one place to another;
4. tillage operation	d. a narrow hole that is dug into the ground;
5. dike	e. an area of low-lying land that is flooded in wet seasons or at high tide, and typically remains waterlogged at all times;
6. drain pipe	f. a systematically decomposed layer of soil;
7. to pump	g. the action of spreading a natural or chemical substance on land or plants, in order to make the plants grow well;
8. trench	h. to force liquid or gas to move somewhere;
9. marsh	i. a long, narrow open hole that is dug into the ground, usually at the side of a road or field, used especially for supplying or removing water or for dividing land;
10. plow layer	j. the operation which changes the soil condition with a tool for the benefit of man.

Task 4. Decide if the following statements are true or false.

1. Land drainage is widely used in the forestry industry, municipal and industrial construction, the mining industry, the construction of sport facilities, and the organization of recreation zones.

2. Land drainage cannot raise the efficiency of farming.
3. The first drainage systems were created in Ancient Greece.
4. Modern drainage technologies apply the findings of physics, chemistry, mathematics, biology, ecology, soil science, and earth sciences.
5. Land drainage projects are based on the results of topographic, soil, hydrologic, hydrogeologic, and other kinds of survey.
6. The main criteria used in these calculations are the desired drainage depth and the water-conductive capacity of drains.
7. Today the deposition of iron oxides on drain walls (drain ochering) is not a danger anymore.

Task 5. Fill in the gaps using the words from task 3 (column A). Change the form if necessary.

1. … … is usually white and is thinner than pipe used for water supply applications since it is not exposed to a pressurized liquid.
2. In order to prevent another disaster like this one, the … was built to hold in the waters of Lake Okeechobee.
3. Our latest machine can … a hundred gallons a minute.
4. The potential for soil erosion by water is affected by … … .
5. A shallow … must be dug for the pipe that will channel the laundry water to the plants.
6. She accidentally dropped her ring down a … in the road.
7. The people sinking in the … can't save each other.
8. The border here is marked by a stream, more like a roadside … .
9. A … … is created by repeated use of moldboard or disk plows at the same depth.
10. Proper … of land is of great importance for good quality food.

Task 6. Complete the following ideas according to the text (see task 2). Expand them if necessary.

1. Land drainage is … .
2. Land drainage allows … .
3. Land drainage has a long history: … .
4. Modern drainage technologies apply … .
5. Land drainage is performed through … .
6. The main criteria used in the calculations of the drainage canal sizes and drainage parameters are … .
7. Envelope filter materials (sand, copra) are used to … .
8. The construction of subsurface drainage is performed in … .

Task 7. Work in small groups. Prepare a five-minute presentation about the construction of:

1. open canals;
2. subsurface plastic drains;
3. subsurface ceramic drains;
4. subsurface tile drains.

Topic 4.2 INTERESTING FACTS ABOUT CANALS

Task 1. Read the text below. What fact(s) about drainage canals is/are the most interesting from your viewpoint? Why?

1. The best examples of canals for draining land are found in Holland, where much of the country is below sea-level. Dams are used to prevent flooding and since 1932 over 300,000 acres of land have been drained. In winter the Dutch people use the frozen canals for ice-skating.

2. In a hot dry country such as Egypt water is scarce, and to prevent the land from becoming dry long canals are built from dams. These canals must be continually kept open, for the Egyptian farms and cotton fields cannot exist without these life lines of water.

3. Many inland waterways are used for the transport of heavy goods by barges. This method of carrying materials is not so widely used now, for although it is cheaper, it has the disadvantage of being much slower. Speed is regulated by the number of bridges and locks which the barges encounter.

4. Two notable canals for ships in Europe are the Corinth Canal and the Kiel Canal. The former was built in 1893 across the solid rocks of the isthmus of Corinth. Bridges from the tops of the steep sides of the canal connect north and south Greece. The Kiel Canal, which also has no locks, was built two years later and it gives the countries of the Baltic Sea quicker access to the west.

5. Venice, at the Adriatic Sea, is one of the most beautiful cities in Europe, for it has many canals instead of streets. Long narrow boats with curved ends, called "gondolas", carry passengers and goods from one part of the city to another. The gondolas are supplied with lanterns, which at night make the canals very colourful and romantic. A peculiar custom of former days was that the Ruler of Venice used to throw a ring into the water each year to show that the city was wed to the sea.

6. One of the greatest arteries of world trade is the Suez Canal separating the two continents of Asia and Africa. As trade with India increased, the overland route across Suez became regular but very expensive. In 1859, the French engineer, Ferdinand de Lesseps, started to cut a passage through this flat desert country. Ten years later, the first sea-going ships passed through the canal, which is a hundred miles long and has no locks, thus completing a direct water route the North Atlantic to the Indian Ocean.

The journey along the canal takes about fifteen hours and shortens the distance from Britain to the East by about 4,000 miles. The canal belongs to Egypt and is a vital waterway serving the merchants fleets of many nations.

7. The Great Lakes which lie between Canada and the United States have become part of the world's ocean highways for it is now possible for big ship to sail up the Saint Lawrence Canal to the ports of Toronto, Cleveland and Chicago. A 218 mile canal joins the Atlantic with these Great Lakes which contain half of all the fresh water in the world. There are seven locks, five on the Canadian side and two on the United States side. Bridges needed to be raised fifty feet to allow big ship traffic to pass and, indeed, from Montreal, these ocean-going vessels are raised 246 feet above the sea-level to Lake Ontario. The Saint Lawrence Canal takes the ships 2,200 miles inland, half-way across the North American continent and deep into the heart of Canada [11].

Task 2. Find any other interesting facts about natural channels, man-made or drainage canals.

UNIT 5. BUILDING MATERIALS FOR AMELIORATION AND WATER SUPPLY CONSTRUCTION

Topic 5.1 CONCRETE

Task 1. Pronounce the following words correctly and learn their meanings.

1. concrete ['kɔŋkri:t] – бетон
2. property ['prɔpətɪ] – свойство
3. monolithic unit [ˌmɔnə'lɪθɪk 'ju:nɪt] – монолитный блок
4. aggregate ['ægrɪgət] – заполнитель
5. limestone ['laɪmstəun] – известняк
6. clay [kleɪ] – глина
7. powder ['paudə] – порошок
8. raw materials [rɔ: mə'tɪərɪəlz] – сырьё
9. obtain [əb'teɪn] – получать, добывать
10. blast furnace [blɑ:st ˈfɜ:nɪs] – доменная печь, домна
11. thoroughly ['θʌrəlɪ] – тщательно
12. artificial [ˌɑ:tɪ'fɪʃ(ə)l] – искусственный
13. curing ['kjuə(r)ɪŋ] – затвердевание
14. grading ['greɪdɪŋ] – сортировка
15. fire-resistant ['faɪərɪ'zɪst(ə)nt] – огнеупорный
16. reinforced concrete [ˌri:ɪn'fɔ:stˌkɔnkri:t] – железобетон
17. steel [sti:l] – сталь
18. dam [dæm] – дамба, плотина, насыпь
19. dock-wall [dɒk wɔ:l] – причальная стенка
20. girder ['gɜ:də] – балка, перекладина
21. beam [bi:m] – балка, бревно
22. alkali-slag concrete [ˈælkəlaɪ slæg ˌkɔnkri:t] – щелочной-шлакобетон
23. slag [slæg] –шлак
24. sandy loam [ˈsændɪ ləʊm] – песчаный суглинок
25. conventional [kən'ven(t)ʃ(ə)n(ə)l] – обычный, традиционный
26. pavement ['peɪvmənt] – тротуар
27. acid-proof ['æsɪdpru:f] – кислотостойкий

Task 2. Read the text and find the key sentences in all the passages of the text.

CONCRETE

It is difficult to imagine modern structure without concrete. Concrete is the very building material which led to great structural innovations. The most important quality of concrete is its property to be formed into large and strong monolithic units. The basic materials for making concrete are cement, aggregate and water. Cement is the most essential material and the most important one for making concrete of high quality.

Cement is made of limestone and clay. It is burnt (calcined) at high temperature and ground up into powder. Depending on the kind and composition of the raw materials different types of cement are obtained. Portland cement, blast furnace cement are suitable for putting up marine structures.

Concrete is made by mixing cement, water, sand and gravel in the right amount. As soon as it is thoroughly mixed it is poured into forms that hold it in place until it hardens. The crystals forming in the process of making concrete stick together in a very hard artificial stone. Cement starts hardening one hour after the water has been added and the process of hardening lasts for about twenty-eight days. This process is called concrete curing.

The characteristics of concrete depend upon the quality of the materials used, grading of the aggregates, proportioning and amount of water. The most important requirements for concrete are: it should be hard, strong, durable, fire-resistant and economical. Concrete can be divided into two classes: mass or plain concrete and reinforced concrete (ferro-concrete) where it is necessary to introduce steel. Plain or mass concrete can be used for almost all building purposes. Ferro-concrete is used in building bridges and arches, dams and dock-walls, for structures under water, for foundations, columns, girders, beams. The use of concrete and ferro-concrete is almost universal.

Builders now produce two types of new building materials: alkali-slag concrete and silica concrete. In alkali-slag concrete cement is replaced by a mixture of granulated blast-furnace slags and sodium and potassium compounds. The fillers can be sand or sandy loam containing various amounts of clay, which usually cannot be used with conventional cement. The new material has been tested successfully and is now being used for irrigation systems, roads, pavements and other structures. Silica concrete is light, fire-resistant and acid-proof. It contains no cement whatever. Silica concrete is widely used in aviation and in under water constructions [12].

Task 3. Complete the following sentences.

1. It is difficult to imagine modern structure without_____.
2. The most important quality of concrete is its property to be formed into large and strong_____.
3. Depending on the kind and composition of the raw materials different types of cement are _____.
4. The most important requirements for concrete are: it should be hard, strong, durable, economical and _____.
5. Concrete can be divided into two classes: mass concrete and _____.
6. Ferro-concrete is used in building bridges and arches, _____.
7. In alkali-slag concrete cement is replaced by a mixture of granulated_____.
8. Silica concrete is light, fire-resistant and _____.

Possible answers: acid-proof**;** obtained; fire-resistant; concrete; dams and dock-walls; reinforced concrete; blast-furnace slags; monolithic units

Task 4. Find the synonym to the first word in each row.

1. aggregate – booster – filler – magnifier
2. grading – assessment – level – sorting
3. conventional – ordinary – unusual – strange
4. thoroughly – quickly – elaborately – clearly
5. slag – scoria – chalk – stone
6. girder – sword – cord – beam
7. fire-resistant – fire-melting – impenetrable – liquid

Task 5. Find the suitable meaning to each of the words.

1. concrete – a) the process of becoming hard or solid by cooling or drying or crystallization
2. limestone – b) the main horizontal support of a structure which supports smaller beams
3. clay – c) to come into possession of something
4. grading – d) a building material made from a mixture of broken stone or gravel, sand, cement, and water
5. obtain – e) a stiff, sticky fine-grained earth that can be moulded
6. girder – f) a rock that is formed chiefly by accumulation of organic remains
7. curing – g) to classify or sort

Task 6. Give the comparative and superlative degrees of the following.

big, long, late, heavy, strong, dry, short, interesting, beautiful, pleasant, important, little, large, good, bad, well

Task 7. Answer the following questions.

1. Is it possible to put up modern structures using concrete?
2. Do you know what the most important quality of concrete is?
3. The basic materials for making concrete are cement, aggregate and water, aren't they?
4. What is the most essential material for making concrete?
5. Can we make cement if we take limestone and clay?
6. How is cement made?
7. What are Portland and blast furnace cement suitable for?
8. When does cement start hardening?
9. How long does the process of hardening last?
10. Can you tell us what process is called concrete hardening?
11. Are you able to say what the characteristics of concrete depend on?
12. Should concrete be hard, strong, durable, fire-resistant and economical?
13. What two classes can concrete be divided into?
14. Is the use of concrete and ferro-concrete most universal?
15. Do builders now produce two or three types of new building materials?
16. Where is silica concrete widely used?

Task 8. Make a plan of the text "Concrete" and report to your groupmates.

Topic 5.2 REINFORCED CONCRETE

Task 1. Pronounce the following words correctly and learn their meaning.

1. reinforced concrete [ˌriːɪn'fɔːstˌkɔnkriːt] – железобетон
2. bar [bɑː] – прутья
3. mesh [meʃ] – сетка
4. embedded [ɪmˈbedɪd] – встроенный
5. tamp [tæmp] – утрамбовать
6. gain [geɪn] – получать, приобретать
7. evident [ˈevɪdənt] – очевидный
8. rigid [ˈrɪʤɪd] – твёрдый, жесткий
9. compression [kəmˈpreʃn] – сжатие
10. expose [ɪkˈspəʊz] – выявить, раскрыть
11. shrinkage ['ʃrɪŋkɪʤ] – сжатие, уменьшение
12. restraining [rɪsˈtreɪnɪŋ] – повторное окрашивание
13. tensile [ˈtensaɪl] – растяжимый, эластичный
14. homogeneity [həʊməʤɪˈniːɪtɪ] – однородность

Task 2. Read the text and identify the main properties of reinforced concrete.

REINFORCED CONCRETE

Reinforced concrete is a combination of two of the strongest structural materials, concrete and steel. This term is applied to a construction in which steel bars or heavy steel mesh are properly embedded in concrete. The steel is put in position and concrete is poured around and over it, then tamped in place so that the steel is completely embedded. When the concrete hardens and sets, the resulting material gains great strength. This new structural concrete came into practical application at the turn of the 19th century. The first results of the tests of the reinforced concrete beams were published in 1887. Since that time the development of reinforced concrete work has made great progress. And the reasons of this progress are quite evident. Concrete has poor elastic and tensional properties, but it is rigid, strong in compression, durable under and above ground and in the presence or absence of air and water, it increases its strength with age, it is fireproof.

Steel has great tensional, compressive and elastic properties, but it is not durable being exposed to moisture, it loses its strength with age, or being subjected to high temperature. So, what is the effect of the addition of steel reinforcement to concrete?

Steel does not undergo shrinkage or drying but concrete does and therefore the steel acts as a restraining medium in a reinforced concrete member. Shrinkage causes tensile stresses in the concrete which are balanced by compressive stresses in the steel. For getting the best from reinforced concrete the following consideration should be kept in mind:

1. For general use the most suitable proportions of cement and aggregate are: 1 part cement, 2 parts sand and 4 parts of gravel.

2. Only fresh water free from organic matter should be used for reinforced work. Sea water is not allowed.

3. Homogeneity of the concrete is a very important requirement. Steel constructions with reinforced concrete have become the most important building materials invented in centuries and they have given modern architecture its peculiar features [12].

Task 3. What is the English for:

1. применять термин; 2. заливать бетон; 3. набирать прочность; 4. быть опубликованным; 5. увеличивать, уменьшать прочность; 6. подвергаться усадке; 7. вызывать растягивающие усилия; 8. использовать железобетон

Task 4. Complete the sentences using the English equivalents for the Russian words in brackets.

1. The resulting material gains great strength when (он затвердевает).
2. At the turn of the 19th century new structural concrete (стал применяться).
3. Steel has great tensional, compressive and elastic properties but (со временем она теряет прочность).
4. Steel does not undergo shrinkage and therefore it acts (как сдерживающая среда).
5. Shrinkage causes tensile stresses in concrete which are balanced (сжимающими усилиями в стали).

Task 5. Find the synonym to the first word in each row.

1. aggregate – booster – filler – magnifier
2. grading – assessment – level – sorting
3. conventional – ordinary – unusual – strange
4. thoroughly – quickly – elaborately – clearly
5. slag – scoria – chalk – stone
6. girder – sword – cord – beam
7. fire-resistant – fire-melting – impenetrable – liquid

Task 6. Make up sentences using the following words.

1. to combine – combination
2. strong – strength – to strengthen
3. hard – to harden – hardness
4. tension – tensional
5. compression – compressive
6. durable – durability
7. to apply – application
8. to shrink – shrinkage

Task 7. Answer the following questions.

1. Is reinforced concrete a combination of two of the strongest structural materials?
2. What is the process of making reinforced concrete?
3. When did this new structural concrete come into practical application?
4. Since when has the development of reinforced concrete work made good progress?
5. Can you name the properties of concrete?
6. Will you say a few words about the properties of steel?

7. Does concrete increase its strength with age?
8. What about steel?
9. Is it true that steel does not undergo shrinkage or drying but concrete does?
10. Shrinkage causes tensile stresses in the concrete, doesn't it?

Task 8. a) Write a summary of the text in English.
b) Write a review of the recent developments in your field or research.

Topic 5.3 PROPERTIES OF BUILDING MATERIALS

Task 1. Pronounce the following words correctly and learn their meanings.

1. durable ['djuərəbl] - надёжный, прочный
2. fasten ['fɑːs(ə)n] - затвердевать
3. wood [wʊd] - древесина
4. decay [dɪˈkeɪ] - распадаться
5. porosity [pɔː'rɔsətɪ] - пористость
6. insulation [ˌɪnsjə'leɪʃ(ə)n] - изоляционный материал
7. refer [rɪ'fɜː] - относиться
8. crushed [krʌʃt] - дроблёный
9. labour ['leɪbə] - труд
10. lime [laɪm] - известь
11. auxiliary [ɔːg'zɪlɪ(ə)rɪ] - вспомогательный
12. bearing structure [ˈbe(ə)rɪŋ ˈstrʌkʧə] - несущая конструкция

Task 2. Read the text and identify the main properties of reinforced concrete.

PROPERTIES OF BUILDING MATERIALS

Materials that are used for structural purposes should meet several requirements. In most cases it is important that they should be hard, durable, fire-resistant and easily fastened together.

The most commonly used materials are steel, concrete, stone, wood and brick. They differ in hardness, durability and fire-resistance.

Wood is the most ancient structural material. It is light, cheap and easy to work. But wood has certain disadvantages: it burns and decays.

Stone belongs to one of the oldest building materials used by man. It is characteristic of many properties. They are mechanical strength, compactness, porosity, sound and heat insulation and fire-resistance.

Bricks were known many thousands of years ago. They are the examples of artificial building materials.

Concrete is referred to as one of the most important building materials. Concrete is a mixture of cement, sand, crushed stone and water.

Steel has come into general use with the development of industry. Its manufacture requires special equipment and skilled labour.

Plastics combine all the fine characteristics of a building material with good insulating properties. It is no wonder that the architects and engineers have turned to them to add beauty to modern homes and offices.

All building materials are divided into three main groups: 1) Main building materials such as rocks and artificial stones, timber and metals. 2) Binding materials such as lime, gypsum and cement. 3) Secondary or auxiliary materials which are used for the interior parts of the buildings.

We use many building materials for bearing structures. Binding materials are used for making artificial stone and for joining different planes. For the interior finish of the building we use secondary materials [12].

Task 3. Insert the missed parts of the sentences.

1. In most cases it is important that they should be hard, durable, fire-resistant and easily _____ together.
2. Plastics combine all the fine characteristics of a building material with good _____ properties.
3. Main building materials such as rocks and _____ , timber and metals
4. Binding materials such as_____, gypsum and cement.
5. Secondary or _____materials which are used for the interior parts of the buildings.
6. Wood is the most ancient _____ material.
7. Such building materials as steel, concrete, stone, wood and brick differ in hardness, _____and fire-resistance.

Possible answers: structural; lime; auxiliary; insulating; fastened; durability; artificial stones

Task 4. Find the suitable meaning to each of the words.

1. fasten – a) a material that slows or prevents the flow of heat
2. labour – b) one that bears the weight of the floor or roof structure above it
3. decay – c) productive work, physical toil done for wages
4. auxiliary – d) strong and lasts a long time without breaking or becoming weaker
5. insulation – e) to make something stay firmly in place.
6. bearing structure – f) to undergo destructive dissolution
7. durable – g) providing supplementary or additional help and support

Task 5. Role play the dialogs in pairs.

Dialogue l

A.: Plastics have appeared comparatively recently, haven't they?

B.: It goes without saying that they have.

A.: Why is it that they've found a wide application in building?

B.: Not only in building. They've found a wide application in many industrial fields.

A.: How interesting! I'm sure its because of their inherent valuable and diverse properties. Don't you think so?

B.: You are quite right! Plastics possess valuable and diverse properties.

Dialogue 2

A.: How are plastics divided in respect to their properties?

B.: They are divided into rigid, semi-rigid, soft and plastic.

A.: And in respect to the number of constituents?

B.: You see, in respect to the number of constituents they may be classified as simple and complex.

Task 6. Answer the following questions.

1. What are the properties of the building materials?
2. What are the most commonly used building materials?
3. Do building materials differ from each other?
4. What can you say about the most ancient building materials?
5. What can you say about bricks?
6. Is concrete an artificial or natural building material?
7. Into what groups do we divide building materials?
8. Can you give an example of a binding material?
9. What artificial building materials do you know?
10. What natural building materials do you know?

Task 7. a) Prepare a report "Properties of building materials". Highlight at list 5 kinds of building materials, their advantages and disadvantages.

Topic 5.4 FROM THE HISTORY OF CONCRETE

Task 1. Pronounce the following words correctly and learn their meanings.

1. inert [ɪ'nɜːt] – неактивный, инертный
2. resist [rɪˈzɪstɪŋ] – сопротивляться, противостоять
3. tensile [ˈtensaɪl] - растяжимый
4. lack [læk] - отсутствие
5. reinforce [ˌriːɪn'fɔːs] – армировать
6. slab [slæb] - плита, панель
7. tensile ['ten(t)saɪl] - растяжимый; эластичный
8. aqueduct ['ækwɪdʌkt] – водопровод, труба
9. iron ['aɪən] - железо
10. rod [rɔd] - брус, рейка

Task 2. Read the text and identify the main properties of reinforced concrete.

FROM THE HISTORY OF CONCRETE

Concrete is an artificial stone. It is made by mixing a paste of cement and water with sand and crushed stone, gravel, or other inert material. After this plastic mixture is placed in forms, a chemical action takes place and the mass hardens. Concrete, although strong in compression, is relatively weak in resisting tensile and shearing stress which develop in structural members. To overcome this lack of resistance, steel bars are placed in the concrete at the proper positions, and the result is reinforced concrete.

In beams and slabs the principal function of the concrete is to resist compressive stresses, whereas the steel bars resist tensile stresses.

Mass or plain concrete dates from very early days. It was employed by the Egyptians, Romans and Greeks in the construction of aqueducts and bridges, in the construction of roads and town walls. Romans used it even in under-water structures some of which have survived till our time. A large part of the Great Chinese Wall (the 3rd century before our era) was also built of concrete.

The concrete remains of the foundations of buildings built several thousand years ago have been found in Mexico. As cement was not known in those times, concrete was made of clay and later of gypsum and lime Nowadays concrete is made in up-to-date machinery with very careful regulation of the proportion of the mix.

The idea of strengthening concrete by a network of small iron rods was developed in the 19th century, and ferro-concrete was introduced into engineering practice [12].

Task 3. Complete the sentences:

1. It is made by mixing a paste of cement and water with sand and crushed stone, gravel, or other _____.
2. The concrete remains of the _____.
3. To overcome this lack of resistance, steel bars are placed in the concrete at the proper positions, and the result is_____.
4. The idea of strengthening concrete by a network of small iron rods was developed_____.
5. It was employed by the Egyptians, Romans and Greeks in the construction of _____.
6. After this plastic mixture is placed in forms, a chemical action takes place and the mass _____.
7. A large part of the Great Chinese Wall (the 3rd century before our era) was also built of _____.

Possible answers: reinforced concrete; inert material; hardens; aqueducts and bridges; foundations of buildings; in the 19th century; concrete

Task 4. Find the suitable meaning to each of the words.

8. aqueduct – a) capable of being drawn out or stretched
1. rod – b) a large, thick, flat piece of stone or concrete, typically square or rectangular in shape
2. reinforce – c) a strong, hard magnetic silvery-grey metal
3. tensile – d) without the action or effect of something
4. slab – e) strengthen or support (an object or substance), especially with additional material
5. iron – f) a thin straight bar, especially of wood or metal
6. resist– g) an artificial canal for conveying water

Task 5. Role play the dialogs in pairs.

Dialogue 1

A.: There's something I want to ask you. May I?

B.: Sure, you may! Why not? Go ahead!
A.: What is the most important component of concrete?
B.: Do you mean to say that you don't know?
A.: Honestly, I don't! Tell me, please!
B.: OK, listen. The most important component of concrete is cement.

Dialogue 2
A.: May concrete be considered an artificial conglomerate stone?
B.: Certainly, it may! Why not? A.: You know how it's made, don't you?
B.: Sure, I do. It's made by uniting cement and water into a paste.
A.: What about sand? Isn't sand used?
B.: Of course, sand is used! How can you make concrete without sand?

Dialogue 3
A.: Concrete has great compressive strength, doesn't it?
B.: Quite true, it has enormous compressive strength!
A.: Does it have great ability to withstand tension?
B.: Tension, you say? It has very little ability to withstand tension.

Task 6. Answer the following questions.

1. What are the properties of concrete?
2. Concrete, although strong in compression, is relatively weak in resisting tensile, isn’t it?
3. How reinforced concrete is made?
4. What is the main function of concrete in beams and slabs?
5. What is the most ancient type of concrete?
6. Romans used concrete even in under-water structures some of which have survived till our time, didn’t they?
7. What material remains of the buildings foundations built several thousand years ago in Mexico?
8. The idea of strengthening concrete by a network of small iron rods was developed in the 20th century, wasn’t it?

Task 7. Make a plan “From the history of concrete” and report to your groupmates.

Topic 5.5 METALS AND CONCRETE

Task 1. Pronounce the following words correctly and learn their meanings.

1. ferrous metals [ˈferəs metlz] - чёрные металлы
2. nonferrous metals [nɒnˈferəs metlz] - цветные металлы
3. alloy ['ælɔɪ] - сплав
4. lustre ['lʌstə] - блеск
5. forge [fɔːʤ] - ковать
6. pull [pul] - вытягивать, растягивать
7. conductor [kənˈdʌktə] - проводник

8. cast iron [kɑːst ˈaɪən] - чугун
9. compress [ˈkɒmpres] - сжимать
10. load [ləʊd] - груз
11. impose [ɪm'pəuz] - облагать
12. partition [pɑːˈtɪʃn] - перегородка
13. reinforcement [riːɪnˈfɔːsmənt] - укрепление
14. corrosion-resistant [kəˈrəʊʒ(ə)nrɪˈzɪstənt] - антикоррозионный
15. stainless [ˈsteɪnlɪs] - нержавеющий
16. cutlery [ˈkʌtlərɪ] - столовые приборы
17. valve [vælv] - клапан, вентиль
18. ball-bearing [bɔːl ˈbe(ə)rɪŋ] - шариковый подшипник
19. conductivity [kɒndʌkˈtɪvɪtɪ] - проводимость

Task 2. Read the text and identify the main properties of reinforced concrete.

METALS AND CONCRETE

All metals are divided into ferrous metals and non-ferrous metals. Ferrous metals include iron, steel and its alloys. Non-ferrous metals are metals and alloys the main component of which is not iron but some other element. Metals, in general, and especially ferrous metals are of good importance in variations.

Metals possess the following properties:

1) All metals have specific metallic lustre. 2) They can be forged. 3) Metals can be pulled. 4) All metals, except mercury, are hard substances. 5) They can be melted. 6) In general, metals are good conductors of electricity.

These characteristics are possessed by all metals but the metals themselves differ from one another. Steel and cast iron are referred to the group of ferrous metals. Cast iron is the cheapest of the ferrous metals. It is chiefly used in building for compressed members of construction, as the supporting members.

When an engineer designs a steelwork he must carefully consider that the steel frame and every part of it should safely carry all the loads imposed upon it. The steel framework must be carefully hidden in walls, floors and partitions. It is steel and metal that is employed as reinforcement in modern ferroconcrete structures. In the curriculum of the Institute there is a special course on metal structures.

Steel. There are different kinds of steel. Alloyed steel (or special steel) is corrosion-resistant steel. This kind of steel is widely used in building. Stainless steel is also corrosion-resistant steel. It is used for cutlery, furnace parts, chemical plant equipment, valves and ball-bearings.

Non-Ferrous Metals. Non-ferrous metals have the following characteristics: high electric and heat conductivity, high corrosion resistance, non-magnetic qualities, light weight.

Aluminium. This is the oldest and best known light metal. It is used in aircraft, automobile, chemical and some other industries.

Copper. Copper is the best conductor of electricity. There are different alloys with copper. An alloy of copper and tin is called bronze. This metal is often used for making various ornaments [12].

Task 3. Find the suitable meaning to each of the words.

1. load – a) the ability of a material to withstand contact with ambient natural factors
2. forge – b) to reduce in size, quantity, or volume as if by squeezing
3. conductor – c) hard, brittle, nonmalleable (i.e. it cannot be bent, stretched or hammered into shape) and more fusible than steel
4. compress – d) make or shape (a metal object) by heating it in a fire or furnace and hammering it
5. corrosion-resistant – e) a metal made by combining two or more metallic elements
6. alloy – f) fill (a vehicle, ship, container) with a large amount of something
7. cast iron – g) a substance or material that allows electricity to flow through it

Task 4. Complete the sentences using the English equivalents for the Russian words in brackets.

1. All metals are divided into (черные и цветные).
2. Ferrous metals include (железо, сталь и их сплавы).
3. Copper, aluminium and some other metals are referred to as (цветные металлы).
4. Metals in general, and especially ferrous metals are of (большое значение в строительстве).
5. All metals have specific metallic (блеск).
6. All metals, except mercury, are (твердые вещества).
7. All metals are good conductors of (электричества).
8. (Сталь и чугун) are referred to the group of ferrous metals.
9. (Чугун) is the cheapest of the ferrous metals.

Task 5. Translate into English orally.

1. Медь и алюминий относятся к цветным металлам.
2. Все металлы, кроме ртути, твердые вещества.
3. Сталь широко используется в строительстве.
4. Сталь используется как арматура в железобетонных конструкциях.

Task 6. Answer the following questions.

1. What do ferrous metals include?
2. Is iron the main component of non-ferrous metals?
3. What properties do metals possess?
4. Do the metals themselves differ from one another?
5. Is cast iron the cheapest of the ferrous metals?
6. What must an engineer carefully consider when he designs a steelwork?
7. Where must the steel framework be carefully hidden?
8. Is alloyed steel corrosion-resistant steel?
9. What is it used for?
10. Is aluminium the oldest and best known light metal?
11. What is the best conductor of electricity?
12. An alloy of copper and tin is called bronze, isn't it?

Task 7. Speak about metals and concrete with your groupmates in the form of a dialogue.

UNIT 6. ENVIRONMENTAL PROBLEMS

Topic 6.1 ACID RAIN

Task 1. Pronounce the following words correctly and learn their meaning.

1. damage ['dæmɪʤ] - ущерб, урон
2. hazard ['hæzəd] - риск, опасность
3. precipitation [prɪsɪpɪˈteɪʃn] - выпадения осадка
4. dissolve [dɪˈzɒlv] - растворять
5. emissions [ɪˈmɪʃn] - излучение, выброс
6. fossil fuels [fɒsl ˈfjuːəlz] - ископаемые виды топлива
7. fumes [fjuːmz] - выхлопные газы
8. decay [dɪˈkeɪ] - распадаться, разлогаться
9. dissolve [dɪˈzɒlv] - растворять
10. droplets [ˈdrɒplɪtz] - капли, брызги
11. fraction [frækʃn] - крупица, частица
12. devastating [ˈdevəsteɪtɪŋ] - разрушительный
13. vulnerable [ˈvʌln(ə)rəb(ə)l] - уязвимый
14. loch [lɒk] - озеро
15. extinction [ɪksˈtɪŋkʃn] - вымирание
16. mortality [mɔːˈtælɪtɪ] - смертность
17. collapse [kəˈlæps] - разрушение, крушение
18. electric utilities [ɪˈlektrɪk juːˈtɪlɪtɪz] - электроснабжение

Task 2. Read the text.

ACID RAIN

Damage caused by acid rain has been well-documented leading to it being labelled as an environmental hazard. Acid rain can be defined as precipitation that is abnormally acidic due to it containing dissolved pollutants, which make it capable of causing great environmental harm. Typical rain will have a pH of around 5.5 whereas the pH of acid rain is much lower at around 4.0 due to it containing dissolved sulphur dioxide or nitrogen oxides, which are acidic pollutants.

How Does Acid Rain Affect the Atmosphere?

The majority of the emissions of sulphur dioxide and nitrogen oxides come from human activities such as burning of fossil fuels or vehicle exhaust fumes. However, a small fraction of emissions exist from natural processes such as decaying vegetation and volcanic activity.

These emissions of sulphur dioxide and nitrogen oxide diffuse into the atmosphere and dissolve in water droplets in clouds forming sulphuric acid and nitric acid respectfully. Clouds containing these acidic droplets can then be transported by winds before precipitation occurs, creating acid rain through a process known as wet deposition. Alternatively, some of the pollutant particles may not become dissolved in cloud water to form acid rain so instead return to Earth's surface through dry deposition.

How Does Acid Rain Affect the Water Cycle?

After being released from clouds as precipitation, acid rain reaches the Earth's surface and a large fraction of it is transported to rivers and lakes through surface runoff

or by groundwater flow. Here, it mixes with the existing water and increases the acidity of the water body with this drop in pH being particularly dramatic when large volumes of rainfall enter a relatively small water body.

In addition to rainfall, acid rain can also be deposited from the atmosphere as acid snow when temperatures are cold enough. This form of acid deposition can be particularly devastating to the natural environment as it will accumulate on the ground before suddenly melting to release a large volume of acidic water into the surrounding landscape.

How Does Acid Rain Affect Plant Growth and Ecosystems?

Living organisms suffer directly from acid rain falling in their habitat with species living in confined aquatic environments being particularly vulnerable as they cannot migrate to less acidic waters. Whilst some species have a high tolerance to acidic conditions, others cannot survive even very small changes in pH. For example, the increased acidity in several lochs in Galloway, Scotland in the 1900s led to the local extinction of several of the local fish populations.

The waxy outer layer of plant leaves can also become damaged by acid rain and the inability to photosynthesise efficiently makes the plant weak with an increased chance of mortality. The initial loss of key species in an ecosystem due to their high sensitivity to acid rain can result in the subsequent loss of further species who were dependent on the key species for their own survival, and this may result in the collapse of entire ecosystems.

How Does Acid Rain Affect Human Health?

Acid rain and the pollutant particles of sulphur dioxide and nitrogen oxide that it is formed from have been linked to human health problems including asthma, heart disease and eye irritation. In addition to forming acid rain, nitrogen oxides are also known to be involved in a reaction which creates tropospheric ozone which is known to cause respiratory problems in humans.

In answering the question on how does acid rain affect the environment, one will discover a whole host of environmental problems and impacts on humans. To prevent further damage from acid rain, it is important that we identify the main sources of sulphur dioxide and nitrogen oxide pollution and cut these emissions to meet higher air quality standards. Cutting emissions from these polluting sectors such as electric utilities and vehicles requires cleaner technologies to be used which can scrub out the pollutant gases and prevent them from causing environmental damage [13].

Task 3. Complete the following sentences.

1. Damage caused by acid rain has been well-documented leading to it being labelled as an environmental _____.
2. Acid rain can be defined as precipitation that is abnormally acidic due to it containing _____.
3. The majority of the emissions of sulphur dioxide and nitrogen oxides come from human activities such as burning of fossil fuels or vehicle exhaust_____.
4. This form of acid deposition can be particularly devastating to the natural environment as it will accumulate _____.
5. Inability to photosynthesise efficiently makes the plant weak with an increased chance of_____.
6. The initial loss of key species in an ecosystem due to their high sensitivity to acid rain can result in the subsequent loss of _____.

7. To prevent further damage from acid rain, it is important that we cut the emissions to meet higher air quality_____.

Possible answers: fumes; hazard; on the ground; further species; standards; dissolved pollutants; mortality

Task 4. Find the synonym to the first word in each row.

1. dissolve – evolve – distribute – solubilize
2. damage – benefit – detriment – feature
3. decay – smolder – recover – freeze
4. vulnerable – devastating – strange – unprotected
5. emissions – purity – radiation – ambiguity

Task 5. Find the antonym to the first word in each row.

1. droplets — splashes - drought – silence
2. fossil fuels – emissions – fumes – gas
3. mortality – lethality - death rate - birth rate
4. fraction – stone – grain - chunk
5. precipitation – sludge – aridity – vegetation

Task 6. Answer the following questions.

1. Can acid rain be defined as precipitation?
2. What is the pH acid rain?
3. How does acid rain affect the Atmosphere?
4. The majority of the emissions of sulphur dioxide and nitrogen oxides come from human activities, don't they?
5. How can clouds be transported by winds?
6. How does acid rain affect the water cycle?
7. Does large fraction of acid rain is transported to rivers and lakes through surface runoff?
8. Does acid rain can also be deposited from the atmosphere as acid snow?
9. How does acid rain affect plant growth and ecosystems?
10. The increased acidity in several lochs in Galloway, Scotland in the 1900s led to the local extinction of several of the local fish populations, didn't it?
11. How does acid rain affect human health?
12. What emissions should we cut to meet higher air quality standards?

Task 7. Find the connectors in the text "Acid Rain'' and divide them into columns or schemes depending on their type.

Task 8. Write an essay "Acid Rain and its impact'' using different types of connectors.

Topic 6.2 SAVE THE PLANET

Task 1. Pronounce the following words correctly and learn their meaning.

1. decisive [dɪˈsaɪsɪv] - решающий
2. clue up [kluː] - разгадка
3. long-haul [lɒŋ hɔːl] - долгий
4. biodiversity [baɪəʊdaɪˈvɜː(r)sɪti] - биоразнообразие
5. input [ˈɪnpʊt] - входные данные
6. grain [greɪn] - зерно
7. legume [ˈlegjuːm] - бобовые
8. struggle [strʌgl] - борьба
9. drastic [ˈdræstɪk] - радикальный
10. landfill [ˈlændfɪl] - свалка
11. drastic [ˈdræstɪk] - радикальный
12. marine [məˈriːn] - морской
13. upcycling [ʌpˈsaɪklɪŋ] - повторный цикл
14. estimate ['estɪmeɪt] - оценивать
15. leftover [ˈleftəʊvə] - остатки
16. consumer [kən'sjuːmə] - потребитель
17. decline [dɪ'klaɪn] - снижаться, уменьшаться
18. halte [hɔːlt] - останавливать
19. daunting [ˈdɔːntɪŋ] - пугающим
20. kickstart ['kɪkstɑːt] - толчок к действию
21. internship [ɪnˈtɜːnʃɪp] - стажировка

Task 2. Read the text

SAVE THE PLANET

We are the first generation to know we're destroying the world, and we could be the last that can do anything about it. Speaking up is one of the most powerful things you can do especially if it's to the right people. We've been promised a better world – but our leaders are not on track to deliver. We need decisive action now.

1. Keep yourself informed

One of the best things you can do is to keep yourself informed – the more you know the better. It leaves you better equipped to have those conversations with your friends and family and the people you want to influence. Get yourself clued up on the facts, stay up to date with recent news on the state of our natural world and work out what you can do.

We have the world at our fingertips, so learn from influential people, keep up with the news and research organisations that are working to make our planet a better place.

2. Travel responsibly

One of the most efficient ways of lowering your environmental impact is by travelling responsibly. This means, whenever you can, choosing a more sustainable way to get from A to B - walk or cycle when you can.

Transport is one of the most polluting sectors. But holidaying closer to home can make a big impact on your carbon footprint. One short haul return flight can account

for 10% of your yearly carbon emissions, and long-haul flights can completely determine your carbon impact.

3. Eat sustainably

Food production is a major driver of wildlife extinction. What we eat contributes around a quarter of global greenhouse gas emissions and is responsible for almost 60% of global biodiversity loss.

Farming animals for meat and dairy requires space and huge inputs of water and feed. Today, one of the biggest causes of forest loss is the expansion of agricultural land for animal feed production, such as soy. Producing meat creates vastly more carbon dioxide than plants such as vegetables, grains and legumes.

Moving away from a meat-dominated diet towards a more plant-based diet can lower your impact on the environment. Vegetarian and vegan foods are massively on the rise and becoming far more common in restaurants, cafes and supermarkets, so you'll rarely struggle.

Not only that, but cutting down on meat and dairy products can reduce your weekly food bills.

4. Reduce your waste

We need to make wasting our resources unacceptable in all aspects of our life. Every product we buy has an environmental footprint and could end up in landfill. The impact of plastic pollution on our oceans is becoming increasingly clear, having drastic impacts on marine life.

Recycling what we can reduces the amount of new materials we are making, and upcycling is a creative way to make old items into something more valuable. This could be reusing a jam jar as a candle holder, or using old tins as plant pots – the possibilities are endless!

It's not just the products we buy. It's estimated that a third of all food produced in the world is lost or wasted. Do your bit by eating up leftovers and use any ingredients you have spare to make interesting meals. Try to waste as little food as possible, and compost the organic waste you can't eat.

5. Watch what you buy

We can all do more to be more conscious about what we buy, and where we buy it from. Buying less will save you money, reduce waste and improve your environmental footprint. Living a less consumerist lifestyle can benefit you and our planet.

Use your purchasing power and make sure your money is going towards positive change. By supporting eco-friendly products which are less damaging to the environment, you're encouraging companies to source and produce their products in a sustainable way.

6. Find ways to donate

Our amazing supporters are helping us to restore nature and tackle the main causes of nature's decline, particularly the food system and climate change.

There are lots of ways to give. Become a member of WWF, adopt an animal, take on a challenge for Team Panda or encourage your family and friends to donate by setting up a Facebook birthday fundraiser.

7. Read the living planet report

WWF's most comprehensive study to date, the Living Planet Report 2022, shows global wildlife populations have plummeted by 69% on average since 1970. This means that nature loss is not being halted, let along reversed.

The solutions exist, but time is running out to act. We're now in a race to bring our world back to life - and we know it's a race we can win.

8. Volunteer for your world

Volunteering can be daunting, and expensive if you don't know where to look. But it doesn't need to be this hard to do good.

Often local nature reserves or parks are looking for regular volunteers, which can give you practical conservation experience as well as helping to restore nature your local area.

We want everyone to have the opportunity to help and kickstart a career in conservation. We have a network of youth internship schemes across the world where you can work on a placement with a WWF team or with one of our projects in the field. It's an exciting opportunity to be able to work in the front line of nature conservation [14].

Task 3. Insert the missed parts of the following sentences.

1. One of the most efficient ways of lowering your _____is by travelling responsibly.
2. Transport is one of the most _____sectors.
3. One short haul return flight can account for _____of your yearly carbon emissions.
4. What we eat contributes around a quarter of global _____gas emissions.
5. Producing meat creates vastly more _____than plants such as vegetables, grains and legumes.
6. WWF's most comprehensive study to date, the Living Planet Report 2022, shows global wildlife populations have plummeted by ____ on average since 1970.
7. Often local nature reserves or parks are looking for regular _____, which can give you practical _____as well as helping to restore nature your local area.

Possible answers: polluting; 10%; carbon dioxide; greenhouse; environmental impact; 69%; conservation experience; volunteers.

Task 4. Find the synonym to the first word in each row.

1. clue up – key – shackle – earrings
2. marine – sandy – sea – windy
3. leftover – food – staff – garbage
4. biodiversity - similarity - variety – peculiarity
5. consumer – user – customer - follower

Task 5. Find the meaning to each of the words.

1. drastic – a) roughly calculate or judge the value
2. upcycling – b) seeming difficult to deal with in prospect
3. estimate – c) be in something for the long haul
4. input – d) to try very hard to do, achieve, or deal with something that is difficult or that causes problems

5. daunting – e) likely to have a strong or far-reaching

6. biodiversity –to be involved in an activity or situation for a long time, rather than just a few days, weeks

7. long-haul – f) a system of trash and garbage disposal in which the waste is buried between layers of earth to build up low-lying land

8. struggle – g) the variety of plant and animal life in the world or in a particular habitat

9. landfill – h) to recycle (something) in such a way that the resulting product is of a higher value than the original item

Task 6. Answer the following questions.

1. What are the main steps to save the planet according to the text?
2. One of the most efficient ways of lowering your environmental impact is travelling responsibly, isn't it?
3. What is the main polluting sector?
4. What contributes around a quarter of global greenhouse gas emissions?
5. What leads to one of the biggest causes of forest loss?
6. The impact of plastic pollution on our oceans is becoming increasingly clear, having drastic impacts on marine life, isn't it?

Task 7. Look through the poster and add some points how we can save the planet. Brainstorm the ideas and share with your groupmate.

Pict. 2. Ways to save the Planet.

UNIT 7. MY SPECIALTY AND ITS MEANING

Topic 7.1 ENGINEERING

Task 1. Pronounce the following words correctly and learn their meanings.

1. ancient occupations /ˈeɪn.ʃənt ˌɒk.jəˈpeɪ.ʃənz/ – древние занятия
2. skill – умение, мастерство
3. broad field – широкий спектр
4. application – применение
5. to require /rɪˈkwaɪər/ – требовать, нуждаться
6. cast of mind /kɑːst/ – склад ума
7. imagination /ɪˌmædʒ.ɪˈneɪ.ʃən/ – воображение
8. testing – апробирование
9. to deal with /diːl/ – иметь дело с
10. automation process /ˌɔː.təˈmeɪ.ʃənˈprəʊ.ses/ – автоматизированный процесс
11. device – средство, устройство, механизм
12. prime mover /praɪm ˈmuː.vər/ – первичный двигатель
13. engine /ˈen.dʒɪn/ – мотор
14. turbine /ˈtɜː.baɪn/ – турбина
15. pumping machines /məˈʃiːnz/– насосные машины
16. hydraulic apparatus /haɪˈdrɒl.ɪk ˌæp.əˈreɪ.təs/ – гидравлические приборы
17. air conditioning /eə kənˈdɪʃ.ən.ɪŋ/ – кондиционирование воздуха
18. refrigerating equipment /rɪˈfrɪdʒ.ər.eɪt.ɪŋ ɪˈkwɪp.mənt/ – холодильное оборудование
19. to comprehend /ˌkɒm.prɪˈhend/ – воспринимать
20. competence – компетентность, знания
21. current issue /ˈkʌr.ənt ˈɪʃ.uː/ – современное понятие, проблема
22. to bridge a gap – ликвидировать разрыв
23. prolific solutions /prəˈlɪf.ɪk/ – плодотворные решения
24. to have at the command /kəˈmɑːnd/ – иметь в распоряжении
25. sources of power /ˈsɔːsiz/ – источники энергии
26. society /səˈsaɪ.ə.ti/ – общество

Task 2. Read the text. Figure out the main concept of engineering professions.

Engineering is one of the most ancient occupations in the history. The skills included into its broad field have led our civilization to the high level development at present days.

Engineering is often defined as making practical application of theoretical sciences such as physics and mathematics. Thus the work of engineer requires the analytical cast of mind and imagination. His main functions are designing, developing and testing products. At present the engineer may deal with the automation processes, so he can work in the designing office, in the lab and in the production field of engineering.

Mechanical engineering is one of its main divisions, which deals with the design, construction and operation of machines and devices of all kinds. Among these machines are prime movers such as engines and turbines, operating pumping machines and other hydraulic apparatus; air conditioning, refrigerating equipment and what not.

As for civil engineering its quality influences greatly industry, health, agriculture, commerce and communication. Civil engineers are people with vision, able to comprehend the forces and processes of nature and use them for the future well-being of mankind.

A rapidly changing world demands the design competence which should be situated within knowledge of current issues, such as urban problems, the new environment of computer aided design, the Internet and the application of new materials and technology. The work of the architectural technologist bridges this gap between design theory and construction practice. Modern day architects are well qualified professionals with practical and creative skills who can analyze construction problems and find attractive, prolific solutions.

In the 21th century the people of engineering professions have at the command new sources of power. They are to work hard for developing different industrial branches and thus making a great contribution to the progress of our society [15].

Task 3. Answer the following questions.

1. Why has the civilization achieved high level development?
2. What are the main functions of engineering?
3. What does the mechanical engineering deal with?
4. What kinds of prime movers do you know?
5. What is the purpose of civil engineering?
6. What does the up to date design competence require?
7. What are the necessary characteristics of the modern architects?
8. Why the work of engineer is highly demanded in the 21 century?
9. What for are engineers to work hard?

Task 4. Agree or disagree with the statements.

1. Engineering is the occupation, which has recently appeared.
2. Engineers can work only on the factories and plants.
3. Mechanical engineering deals only with repairing of machines.
4. Civil engineering has no influence on any side of peoples' lives.
5. Architects should possess knowledge concerning many aspects of life.
6. It's enough to sketch and draw well to become a skillful specialist in the field of architecture.
7. The work of engineer requires the analytical cast of mind and imagination.
8. In 21 century the people of engineering professions have to discover new sources of power.
9. Hard work of engineers is required in the society.

Task 5. Match tails and heads.

1. The skills included into its broad field	a. the design, construction and operation of machines and devices of all kinds.
2. Engineer's main functions are	b. able to comprehend the forces and processes of nature and use them for the future well- being of mankind.
3. As for civil engineering its quality	c. have at the command new sources of power.
	d. designing, developing and testing products.
4. Mechanical engineering is one of its main divisions which deals with	
5. The work of the architectural technologist	e. influences greatly industry, health, agriculture, commerce and communication.
6. In 21 century the people of engineering professions	f. have led our civilization to the high level development at present days.
7. Civil engineers are people with vision	g. bridges this gap between design theory and construction practice.

Task 6. Finish the sentences and write down the summary about your specialty.

1. I study at … Faculty.
2. My future specialty is … .
3. It is connected with … Engineering.
4. I can't do without studying … in order to become skilled specialist.
5. After graduating from the university I'll be able to find a job at … .
6. I'll have to deal with … .
7. I think that my future profession is useful for the society because … .
8. My specialty is interesting too as … .
9. Besides my profession is sure to contribute to my future successful career because ….
10. I do hope that when I become a skilled professional … .

Topic 7.2 AMELIORATION AND WATER SUPPLY ENGINEERING

Task 1. Read the text. Outline the main characteristics of water-supply engineering and sewage disposal.

Water-Supply Engineering and Sewage Disposal

Water-supply engineering is a branch of civil engineering. It is a complex of activities concerned with the supply of water to its various consumers – community, industrial enterprises, transport, etc.

This discipline based on various branches of technical sciences has a complex character. The complex character is determined by the necessity of solving a complex of complicated engineering tasks connected with design, construction and operation of water supply systems. These systems include various facilities providing acquisition, treatment and delivery of water in demanded quantities and of adequate quality to water consumers.

The study of the course in water-supply engineering is based on the knowledge of a number of general technical and specialized disciplines:

1. For solving the tasks of acquisition of water from natural water sources the knowledge of hydrology, hydrogeology (groundwater hydrology), hydrotechnics (hydraulic engineering) and drilling technology is needed.

2. The solution for problems of water treatment technology is possible with sufficient knowledge of water chemistry and hydrobiology.

3. Planning and designing of water-supply networks and water facilities based on the laws of hydraulics require profound knowledge of this discipline.

4. Design, construction and operation of water delivery structures require the knowledge of technical equipment: pumps, engines, electrical equipment, as well as control and measuring instruments.

5. For the work in design and construction of waterworks a water supply engineer must have good training in the sphere of building disciplines.

Sewage disposal [waste disposal] is a complex of sanitary activities as well as a complex of engineering structures and facilities intended for the collection of wastewater, its disposal outside the city limits or industrial enterprises, its delivery to wastewater treatment plants, as well as its treatment, sanitation and disinfection before recycling or discharge into a body of water [6].

Task 2. Complete the following sentences according to the text.

1. Water-supply engineering is … .
2. This discipline based on various branches of technical sciences has … .
3. A water-supply engineer solves a complex of complicated engineering tasks connected with … .
4. Water supply systems include various facilities providing … .
5. The study of the course in water-supply engineering is based on the knowledge of … .
6. Sewage disposal [waste disposal] is a complex of sanitary activities as well as a complex of engineering structures and facilities intended for … .

Task 3. Answer the following questions.

1. What is water-supply engineering?
2. Does this discipline have a complex character? What is it deter- mined by?
3. What facilities do water supply systems include?
4. What is a water supply system?
5. What does a water supply system include?
6. What general technical and specialized disciplines is the study of the course in water-supply engineering based on?
7. What is sewage disposal?

Task 4. Match the synonyms.

1. acquisition	a. building
2. branch	b. collection
3. complex	c. complicated / difficult
4. construction	d. deep

5. hydrogeology	e. delivery
6. hydrotechnics	f. designed
7. intended	g. groundwater hydrology
8. network	h. hydraulic engineering
9. problem	i. sewage disposal
10. profound	j. solving
11. sewage	k. sphere/field/area/subdivision
12. solution	l. system
13. supply	m. task
14. waste disposal water consumer	n. wastewater water user

Task 5. Match the antonyms.

1. adequate	a. impossible
2. complicated	b. inadequate
3. demand	c. inside
4. high-quality	d. insufficient
5. natural	e. low-quality
6. outside	f. simple
7. possible	g. supply
8. sufficient	h. to admit
9. to discharge	i. to exclude
10. to include	j. unnatural

Task 6. Fill in the correct prepositions.

1. a branch … civil engineering 2. a complex … activities concerned … the supply … water … its various consumers 3. to be based … various branches … technical sciences 4.to be determined … the necessity … solving a complex … complicated engineering tasks 5. to be connected … design, construction and operation … water supply systems 6. the course … water-supply engineering 7. acquisition … water … natural water sources 8. the solution … problems … water treatment technology 9. design, construction and operation … water delivery structures 10. … the sphere … building disciplines 11. a complex … engineering structures and facilities 12. to be intended … the collection … wastewater 13. … the city limits 14. … recycling or discharge … a body … water.

Task 7. Match the English and Russian equivalents.

1. water-supply engineering 2. sewage [wastewater / waste] disposal 3. water supply [delivery] 4. water supply system [network]; water distribution system 5. water consumer [user] 6. water acquisition [collection] 7. water treatment [purification] 8. water facilities 9. sewage / wastewater 10. sewage [wastewater] collection 11. sewage [wastewater] treatment 12. sewage treatment plant [works], wastewater treatment plant [works] 13. sewage [wastewater] sanitation 14. sewage [wastewater] disinfection	a. водоотведение, отведение сточных вод, отвод сточных вод, удаление сточных вод b. водоочистная станция, станция водоочистки, станция очистки сточных вод, сооружения по очистке сточных вод c. водопользователь, водопотребитель d. водоснабжение *(отрасль инженерии)* e. водоснабжение, снабжение водой, доставка воды, подача воды, водоподача, обеспечение водой f. водохозяйственные сооружения g. обезвреживание сточных вод h. обеззараживание сточных вод i. обработка воды, очистка воды j. очистка сточных вод k. сбор воды, водосбор, добывание воды l. сбор сточных вод, прием сточных вод m. система водоснабжения n. сточные воды

Task 8. Get ready to speak about water-supply engineering as a branch of civil engineering.

Task 9. Read the text below and pay attention to the peculiarities of water supply engineering profession.

Amelioration and Water Supply Engineering

An amelioration and water supply engineer is a specialist engaged in the design, development, implementation and support of water supply systems and amelioration projects. The main task of such engineers is to ensure effective and sustainable management of water resources, including their distribution, use, protection and restoration. This profession is important for maintaining the balance of water resources, preventing droughts and floods, ensuring access to clean water and maintaining ecological balance.

What does an amelioration and water supply engineer do? The amelioration and water supply engineer performs many tasks related to water resources management and amelioration. Their main functions include:

Design and development:

- Development of plans and projects for water supply and sanitation.
- Design of irrigation and drainage systems for agricultural land.

Analysis and research:

- Research and assessment of water resources to determine their quality and quantity.
- Analysis of the impact of hydraulic engineering and land reclamation works on the environment.

Management and supervision:

- Project management for the construction and reconstruction of hydraulic structures.
- Monitoring compliance with norms and standards in the field of water use and land reclamation.

Technical support:

- Maintenance and optimization of existing water management systems.
- Implementation of technical supervision over the condition and operation of hydraulic structures.

Consultations and training:

- Providing consultations on sustainable water resources management.
- Staff training and educational programs for the public on water use issues.

Cooperation and coordination:

- Interaction with government agencies, local communities and other stakeholders.
- Coordination of international and regional projects in the field of water management and land reclamation.

Amelioration and water supply engineers play a key role in ensuring sustainable development, rational use and protection of water resources, which is important for both the environment and the economy.

Amelioration and water supply engineers can specialize in various fields reflecting a wide range of tasks and goals related to water management. Some of the main specializations include:

- ✓ *Hydraulic engineering:* Specialization in the design and construction of dams, canals, reservoirs and other hydraulic structures.
- ✓ *Irrigation engineering:* Development and management of irrigation systems for agricultural needs, optimization of the use of water resources for irrigation.

✓ *Drainage and drainage of land:* Design and implementation of drainage and drainage systems to improve agricultural land and prevent flooding.

✓ *Water quality control:* Monitoring, analysis and management of water quality, development of measures to prevent pollution of reservoirs.

✓ *Ecological water management:* Specialization in the conservation of ecosystems, biodiversity of reservoirs and sustainable management of water resources.

✓ *Water risk management:* The work to prevent and minimize the consequences of floods, droughts and other water disasters.

✓ *Water supply and sanitation:* Design and operation of water supply and sanitation systems for urban and industrial needs.

✓ *Water resources management:* Development of strategies and plans for the effective allocation and use of water resources on a regional and national scale.

These specializations reflect the variety of tasks facing Amelioration and water supply engineers and emphasize their importance in modern society, where sustainable and efficient water resources management is a key factor in economic development and environmental security.

Amelioration and water supply engineers can find employment in various sectors where their knowledge and skills are used for the management, planning and operation of water resources. The main places of work include:

❖ *State and municipal institutions:* Work in ministries and departments dealing with water resources, agriculture, ecology and nature management.

❖ *Design and research institutes:* Employment in research institutes and design organizations developing new technologies and approaches in the field of water management and amelioration.

❖ *Municipal enterprises:* Work in organizations engaged in the operation of water supply and sanitation systems, management of sewer networks and sewage treatment plants.

❖ *Agricultural organizations:* Applying knowledge to the development and management of irrigation and drainage systems in the agricultural sector.

❖ *Construction companies:* Participation in the design and construction of hydraulic structures such as dams, canals, reservoirs.

❖ *Environmental organizations and non-profit organizations:* Work in the field of environmental protection, focus on sustainable management of water resources and conservation of aquatic ecosystems.

❖ *Private consulting firms:* Providing consulting services in the field of planning, management and operation of water resources.

❖ *International organizations:* Participation in international projects and programs on water management and amelioration, often within the framework of international assistance and development.

Water management and amelioration engineers play a key role in ensuring sustainable water management, which is especially important in the context of global climate change and growing water scarcity [16].

Task 2. Make your own presentation about your future career.

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