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МЕТОДИЧНІ ВКАЗІВКИ ДО ВИКОНАННЯ ПРАКТИЧНИХ РОБІТ З ДИСЦИПЛІНИ «АНГЛІЙСЬКА МОВА» (ДЛЯ СТУДЕНТІВ 2 – ГО КУРСУ НАПРЯМУ ПІДГОТОВКИ 6.060101 «БУДІВНИЦТВО» ДЕННОЇ ТА ЗАОЧНОЇ ФОРМИ НАВЧАННЯ)

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Методичні вказівки містять систематизоване викладання навчальної дисципліни «Англійська мова», що складається з навчальних текстів, системи дотекстових та післятекстових завдань, лексичних вправ.

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UNIT 1 CIVIL ENGINEERING

Active Vocabulary

excavation	–	виймання ґрунту
embankment	–	насип
dam	–	дамба
aqueduct	–	акведук
stake	–	стійка
covering	–	настил
to pave	–	мостити
span	–	проліт, прогін (моста,арки)
pier	–	стовп
semicircular arch	–	напівкругла арка
pointed arch	–	готична арка

CIVIL ENGINEERING

1. The term «civil engineering» was first used to distinguish the work of the engineer with a non – military purpose from military engineering. But increasing specialization has led to subdivision of engineering into civil, mechanical, electrical and other forms, and the term «civil engineering» is usually applied to such as excavation and embankment, the construction of railways, bridges, docks and harbours, the control of water by dams and reservoirs, canals, aqueducts and pipelines, and the reclamation of land.

2. Civil engineering did not develop until the rise of Rome. The Romans, although they did not invent paved roads, advanced road building to a new height. The total length of the roads built by the Romans in Britain is estimated at over 47,000 miles. They were constructed to last forever and many are in use today; some have simply been resurfaced.'

In the construction of their road network the Romans aimed at the shortest route, regardless of obstacles. Rocks were cleared away, tunnels were dug through hills, and swamps were drained. At first the Romans built timber roads, then somewhat later, a timber road mounted on stakes, many having a covering of pavement.

3. Roman bridges, at first made of wood, were later built of stone. Typical Roman style was a semicircular arch and short span. The bridge builders' chief problem was to provide solid foundations.

London Bridge, finished in 1209, took thirty – three years to build. It consisted of nineteen irregular pointed arches, its piers resting on broad foundations de-

signed to withstand the Thames' current.

The use of pointed arches was another advance upon Roman methods yet the medieval bridge was not as great an engineering achievement as was the cathedral. Providing for only one – way traffic, the typical bridge was narrow. It was not adapted to heavy vehicles.

Exercises

Exercise 1 **Form nouns of the given verbs by means of these suffixes: ion, – tion, – ation, – ment:**

to excavate, to estimate, to construct, to invent, to apply, to reclaim, to found; to develop, to pave, to advance, to achieve.

Exercise 2 **Find antonyms of the given words among those in brackets:**

1. civil; 2. new; 3. simple; 4. short; 5. irregular; 6. broad; 7. great; 8. heavy; 9. late; 10. to finish,

(1. long; 2. narrow; 3. military; 4. easy; 5. complex; 6. old; 7. regular. little; 9. to begin; 10. early.)

Exercise 3 **Translate into English:**

- відрізняти роботу інженера;
- виймання ґрунту та насипу;
- осушування ґрунту;
- до появи Риму;
- винаходити бруковані дороги;
- покривати наново ;
- зроблені з дерева;
- головна проблема будівників мосту;
- використання стрілчатих арок;
- передбачати однобічний рух;
- пристосувати до важких транспортних засобів.

Exercise 4 **Cheese English equivalents to the following Russian words:**

1. насип	a) purpose; b) embankment; c) railway; d) bridge
2. покриття	a) road; b) length; c) reservoir; d) pavement
3. сітка	a) land; b) term; c) network; d) dam
4.основа	a) foundation; b) pipeline; c) building; d) water
5. осушувати	a) construction; b) excavation; c) reclamation; d) obstacle
6. гавань	a) harbour; b) tunnel; c) hill; d) timber

7. виймання ґрунту	a) paved road; b) excavation; c) timber road; d) medieval bridge
8. насип	a) covering; b) swamp; c) stone; d) span
9. рух	a) achievement; b) traffic; c) arch; d) vehicle
10. візок	a) pier; b) wood; c) vehicle; d) stake
11. брукувати	a) to build; b) to pave; c) to dig; d) to aim
12. рити	a) to adapt; b) to dig; c) to advance; d) to construct
13. проектувати	a) to design; b) to make; c) to last; d) to drain
14. витримувати	a) to mount; b) to withstand; c) to provide; d) to consist
15. покривати наново	a) to finish; b) to last forever; c) to resurface; d) to distinguish

Exercise 5 **Answer the following questions:**

I. When was the term «civil engineering» first used?
2. What was led to subdivision of engineering?
3. What is the term «civil engineering» usually applied to?
4. When did civil engineering begin to develop?
5. Did the Romans invent paved roads?
6. What is the total length of the roads built by the Romans in Britain?
7. How did the Romans build their roads?
8. What material were Roman bridges built of?
9. What was a typical Roman style?
10. How many years has London bridge taken to build?

Exercise 6 **Complete the sentences:**

1. The term «civil engineering» was first used… .
2. Now this term is usually applied to such as… .
3. Civil engineering did not develop until… .
4. The Romans advanced road building… .
5. They built in Britain… .
6. Many of them are… .
7. In the construction of their road network the Romans aimed at… .
8. Many timber roads mounted on stakes had… .
9. The Romans built their bridges first of… .
10. The construction of London bridge took… .

Exercise 7 **Correct statements if it is necessary:**

1. Civil engineering developed in the 18 – th century.

2. The term «civil engineering» was first used to distinguish the work of the engineer with a non – military purpose from military engineering

3. First Roman bridges were made of stone.

4. Typical Roman style was a circular arch and long span.

5. London bridge, finished in 1209, took thirty – three years to build.

6. London bridge consisted of nineteen irregular pointed arches.

7. The use of pointed arches was a disadvantage.

Exercise 8 **Translate into English:**

l. Термін "цивільне будівництво" був використаний з метою відрізнення воєнного будівництва від цивільного.

2. Сьогодні термін "цивільне будівництво" вживається на позначення виймання ґрунту, насипу, будівництва залізничних доріг, мостів, доків, гаваней, тощо.

3. Цивільне будівництво завдячує своїм розвитком римлянам.

4. Спільна довжина доріг, які були побудовані римлянами у Британії, складає більш 47 тисяч миль.

5. Деякі дороги, що були побудовані римлянами багато років тому, використовуються і зараз.

6. Римляни спочатку робили мости з лісу, пізніше – з каменя.

7. На будівництво мосту, що був закінчений у 1209 році, знадобилося 33 роки..

Exercise 9 **Read and translate the text without a dictionary:**

l. Civil engineering is claimed to be «the art of directing the great sources of power in nature for the use and convenience of man». The part played by civil engineers in pioneering work and in developing wide areas of the world has been and continues to be enormous.

Civil engineers must make use of many different branches of knowledge, including mathematics, theory of structures, hydraulics, soil mechanics, surveying, hydrology, geology and economics.

2. Civil engineering was not distinguished from other branches of engineering until 200 years ago. Most early engineers were engaged in the construction of fortifications and were responsible for building the roads and bridges required for the movement of troops and supplies. The Roman armies in occupation of Europe were served by brilliant engineers but after the collapse of the Roman Empire there was little progress in communications until the beginning of the Industrial Revolution, the invention of the steam engine and the realization of the potentialities in the use of iron. Roads, canals, railways, ports, harbours and bridges were then built by the engineers who adopted the prefix «civil» to distinguish them from the military engineers and to emphasize the value of their work to the community.

Exercise 10 **Speak on the following topics:**

1. The term «civil engineering».
2. Roman roads and bridges.
3. The work of the civil engineer.

UNIT 2 THE PROFESSION OF A BUILDER

Active Vocabulary

honourable	– благородний, шляхетний
canal	– канал (штучний)
attitude	– ставлення, позиція
to treat	– обробляти
to purity	– очищувати
domestic	– внутрішній
ultimate objective	– кінцева мета
to reveal	– відкрити, показати
to reduce	– скоротити, зменшити
occupant	– володар, мешканець
to sacrifice	– жертвувати

AN HONOURABLE PROFESSION

The building profession attracts many numbers of young men and women nowadays. It is an honourable profession.

Builders construct and reconstruct residential and industrial buildings, bridges, schools, palaces of culture, museums, theatres, kindergartens and hospitals. They build tunnels, canals, power stations, dams and reservoirs. They also construct aqueducts to store and transport water for populated areas and to irrigate desert lands. The distribution of water in irrigated areas is based on annual plans. Very many irrigation systems have been built and are being built and modernized. Hundreds of dams, reservoirs, locks, pumping stations have been erected on the rivers of our country by our hydrotechnicians.

The person entering this honourable profession must have a scientific attitude, imagination, initiative and good judgment, obtained by experience and serious work.

Civil engineers and architects have a common aim – to provide people with all modem conveniences, such as running water, gas, electricity, central heating. While a sanitary engineer protects the quality of water by treating and purifying this water when it is used for domestic purposes, an architect is a person who designs buildings. An architect must receive a great deal of scientific training connected with his profession. He must know mathematics, as well as many facts concerning materials – for example what loads different materials may safely carry – so that there will be no danger of his building falling down. Architects

must need some knowledge of sculpture, painting, design, mechanical engineering, geography, city planning, etc. The sculpture an architect creates, should give us pleasure, a sense of beauty.

Exercises

Exercise 1 **Express the following in one word, using the suffix – er/ – or:**

Model: one who reads – reader.

1. One who builds – … .
2. One who creates – … .
3. One whose occupation is to produce – … .
4. One whose occupation is to decorate – … .
5. One who designs – ... .

Exercise 2 **Give the Ukrainian equivalent for:**

Residential and industrial buildings, tunnels, canals, dams, reservoirs, aqueducts, to irrigate desert lands, to have a common aim, with all modem conveniences, to receive a great deal of scientific training, to protect the quality of water.

Exercise 3 **Make up sentences of your own. Follow the model:**

Model: Civil engineers specialize in the building of industrial or dwelling construction.

1. An architect specializes in designing … .
2. A hydrotechnician specializes in … .
3. A road engineers specializes in … .
4. A sanitary engineer specializes in protection ... .
5. A civil engineer specializes in ... .

Exercise 4 **Change the following sentences from active into passive:**

1. The building profession attracts many numbers of young men and women nowadays.
2. Civil engineers construct and reconstruct residential and industrial buildings, schools, etc.
3. They built and modernized very many irrigation systems.
4. A sanitary engineers protects the quality of water used the domestic purposes.
5. This architect received a great deal of scientific training connected with his profession.

Exercise 5 **Define the tense of the verb in the following sentences:**

1. Builders construct tunnels, industrial and residential structures, schools, palaces of culture, etc.
2. Very many irrigated systems have been built and are being built and modernized.
3. Hundreds of drams have been erected.
4. An architect has to think not only of what he wants the building to cook like when it is finished, but also what it is to be used for.
5. The building profession attracts many men and women.

Exercise 6 **Answer the following questions:**

1. Why does the building profession attract so many numbers of young men and women nowadays?
2. Do you know what civil engineer construct and reconstruct at present?
3. What purposes are aqueducts constructed for?
4. The distribution of water in irrigated areas is based on annual plans, isn't it?
5. Are very many irrigation systems being built and modernized?
6. What qualities must a person entering the building profession possess?
7. What aim do civil engineers and architect have?

Exercise 7 **Complete the following sentences:**

1. The building profession attracts … .
2. Builders construct and reconstruct … .
3. Very many irrigation systems … .
4. Civil engineers and architects have … .
5. An architect must receive … .
6. An architect must know … .
7. An architect must need … .

Exercise 8 **Correct statements if it is necessary:**

1. The building profession attracts young men and women nowadays.
2. Builders construct and reconstruct only industrial buildings.
3. Civil engineers and architects have a common aim – to provide people with all modem conveniences.
4. An architect must receive a great deal of scientific training connected with his profession.
5. A civil engineers must know only mathematics.

Exercise 9 **Translate into English:**

1. Професія інженера – будівельника сьогодні приваблює багатьох.
2. Професія інженера – будівельника – це шляхетна професія.
3. Будівники конструюють та реконструюють промислові та житлові масиви, мости, школи, музеї, театри, тощо.

4. Вони будують тунелі, канали, дамби.

5. Людина, яка обирає цю благородну професію, повинна володіти глибокими знаннями з багатьох дисциплін, мати багату уяву, бути ініціативною.

Exercise 10 **Read and translate the text without a dictionary. Try to catch the main idea.**

THE ENGINEEER AND CONSTRUCTION

The efforts of an engineer, who designs a project, and the constructor, who builds the project, are directed toward the same goal, namely, the creation of something which will serve the purpose for which it is built. Construction is the ultimate objective of a design. The application of engineering fundamentals and analyses to construction activities may reveal methods of improving the quality, while at the same time reducing the costs of construction.

An engineer is engaged to prepare the plans and specifications and usually to supervise the construction of the project. It is the duty of the engineer to design the project which will most nearly satisfy the needs of the occupant at the lowest practical cost.

The engineer should study every major item to determine if it is possible to reduce the cost of the project. It may be possible to change a design, modify the requirements for constructions, or revise portions of the specifications in such a manner that the cost of the project will be reduced without sacrificing its essential value. An engineer who practices this philosophy is rendering a real service to his client. Thus, it seems evident that an engineer should be reasonably familiar with construction methods and costs if he is to design a project that is to be constructed at the lowest practical cost.

Exercise 10a **Answer the following questions:**

1. Are the efforts of an engineer and the constructor directed towards the same goal?
2. Constructions are not the ultimate objective of a design, is it?
3. What is an engineer engaged to do?
4. Is it the duty of the engineer to design the project which will most nearly satisfy the needs of the occupant?
5. Why should the engineer study every major item?
6. Should an engineer be reasonably familiar with construction methods and costs?

Exercise 10b **Discuss the following topics:**

1. The building profession.
2. Civil engineers and architects.
3. The engineer and construction.

UNIT 3 FROM THE HISTORY OF ARCHITECTURE

Active Vocabulary

beam	– балка
timber	– лісоматеріал
vauet	– склепіння
dome	– купол, макывка
limestone	– вапняк
inherent	– невід’ємний
reinforced concrete	– залізобетон
arch	– арка
to endure	– залишатися
skeleton	– каркасний
framework	– структура, обрамлення

FROM THE HISTORY OF ARCHITECTURE

When our ancestors emerged from caves their first efforts at obtaining man – made shelters were probably devoted to supporting branches against trees and rocks and covering them with large leaves. From these beginnings was developed the column and beam system of construction.

For many centuries the column and beam was the only generally employed method of stone construction; according to this method were produced the beautiful impressive monuments of Egypt and Persia, which reached their highest point of beauty in Greece.

In Mesopotamia the presence of excellent clay and the scarcity of stone and timber led in the very early days to the introduction of brick construction and the development of the vault and dome as a means of covering spans and areas.

During the Roman Empire round arches, vaults and domes were perfected, as never before, in stone, brick, and concrete, this development being made possible by the abundance in Italy of good limestone and pozzuolana, a volcanic material, which when mixed with lime produced an excellent cement.

The pointed arch was an inherent feature of the Gothic style, but it was not the only element in this remarkable architecture.

The awakening of classical culture in the fifteenth and sixteenth centuries brought with it the Renaissance of Roman architecture. And indeed the spirit of those days made a fresh and living thing of the revived elements, developing and perfecting them far beyond their Roman values, though structurally contributing little. The constructive principles did not develop and have endured until, in our time, the use of steel and reinforced concrete introduced new possibilities into construction.

The structural scheme today is one of skeleton framework, but the materials

at hand have indefinitely expanded the possibilities. The more recent developments in arch and shell construction contain a promise of great possibilities in the architectural design of the future. Our ideal should be to develop the extraordinary possibilities of modem structural principles and of modem materials in the light of simplicity, economy, and the demands of our time.

Lexical exercises

Exercise 1 **Find the text nouns corresponding to the following words:**
Present, scarce, introduce, construct, abundant, possible, simple.

Exercise 2 **Compose short sentences using the following words:**
Obtain, man – made, probably, get, employ, artificial, indeed, perhaps, really, use.

Exercise 3 **Fill in each blank with a suitable word from the vocabulary of the text:**

1. For many centuries the ... and ... was the only generally employed method of stone construction.
2. The ... of clay in some countries led to the ... of brick construction.
3. The pointed ... was an inherent feature of the Gothic style.
4. The use of steel and ... brought new into construction.
5. The ... and ... are used for covering and ....

Exercise 4 **Answer the following questions:**

1. What did the first man – made shelters look like?
2. What method of stone construction was used for many centuries?
3. Why was brick introduced in Mesopotamia?
4. What were the means of covering spans and areas developed in Mesopotamia?
5. When and where were round arches, vaults and domes perfected?

Exercise 5 **Complete following sentences:**

1. For many centuries the column and beam ....
2. In Mesopotamia ....
3. During the Roman Empire ....
4. The awaking of classical culture ....
5. The structure scheme today ....

Exercise 6 **Correct statements if it is necessary:**

1. The column and beam reached the highest point of beauty in Egypt.
2. The pointed arch was the only element of the Gothic style.
3. The awakening of classical culture started in the I5 – 16th centuries.

4.The use of steel and reinforced concrete introduced new possibilities into construction.

5.The constructive principles developed and have not endured until in our time.

Exercise 7 **Translate into English**

1.Одним із елементів будівельних конструкцій були колони та балки.

2.Протягом багатьох століть це був єдиний метод будівництва з каменю.

3.Але наявність глини у деяких місцях дозволила здійснити перші цегляні конструкції у формі куполів та склепінь для перекриття просторів.

4.Останні досягнення в області проектування арок та оболонок містять великі можливості для розвитку сучасної архітектури.

5.У Греції вони досягли досконалості.

Exercise 8 **Retell the text according to the plan:**

1.The column and beam was the earliest method of stone construction.

2.The presence of materials other than stone led to the development of brick and concrete construction.

3.The use of steel and reinforced concrete considerably expanded the possibilities of modem structural principles and contains a great promise for the future.

Grammar exercises

Exercise 1 **Give translation of the following sentences paying special attention to the predicates.**

1.In building structures special attention must be paid to the proper use of materials.

2.The task of introducing modem structural principles into construction is of great importance.

3.Scientists and engineers succeeded in developing new materials of construction with remarkable properties.

4.In lifting large structural elements use in made of gantry cranes.

5.Speeding up construction has been made possible through using all kinds of building equipment.

6.Reinforced concrete and steel being widely used in up – to – date construction introduces new possibilities in the development of modem architecture.

7.The first efforts of our ancestors were aimed at obtaining shelters.

Exercise 2 **Translate the following sentences into Ukrainian paying attention to the words in bold type:**

The only material which can be used in this case is reinforced concrete.

Only high quality cement should be employed for reinforced concrete work.

The only ingredients of reinforced concrete are steel, cement, sand and gravel.

The nature of the site of a building is one of the most important factors in architectural design.

The question of selection of site is one with which the architect is often faced.

Any building today is the product not of one craft (ремесло) but of many crafts which are all interdependent one of the other.

In designing a building one should take care that most comfortable living conditions are created.

Additional texts

Text A. Study the following text and prepare an oral report using additional information:

A Great Russian Architect

V.I. Bazhenov (1737 – 1799) was the founder of the Russian architectural classics of the 18th century.

In 1784 – 1786 he created one of his best works, a master – piece of Russian classical architecture – the famous Pashkov house which is now the old building of the Lenin Library in Moscow.

Those who have seen his impressive buildings and looked at them with understanding will feel that he fully succeeded in his purpose and that he gave the world something that will take its place with the greatest structures of the world.

In addition to his being an outstanding artist and architect he was also a well – known figure encyclopedically educated. He was 28 when he became academician in St. Petersburg as well as a member of several academies abroad. At the same time he was a brilliant practical engineer and an incomparable designer of architectural ensembles, the Kremlin Palace being one of these.

Text B. Read the text carefully and express the main idea in one sentence:

Most of the world's great architecture is in stone, because until recently this was the material used in practically all the buildings where monumentality and permanence were desired. Thus the stone tradition has permeated much of our architectural thinking and has determined much of our taste and judgment.

To say that the history of architecture is embraced entirely in stone structures is not accurate, for this neglects the remarkable work of the Romans in concrete and many structures of wood and brick throughout the world.

Text C. Read the following text and then make up 4 or 5 questions connected with the text:

How Materials Influence the School of Architecture

It is of interest to note briefly the influence of materials upon the schools of architecture. Where clay abounded, as in Egypt, sun – dried bricks were easily and cheaply made. Stone was also obtainable, and because of its durability it became the material of the temples and palaces; the less pretentious dwellings were built of brick. In Mesopotamia large brick buildings were constructed, and, in the absence of stone and wood to span their areas, the arch and dome came into being. Greece possessed perfect marble for columns and beams, and the arch and dome received little attention. A fortunate combination of lime, limestone, clay, and pozzuolana gave Rome stone and cement, and the great mass of her structures is largely due to the union of stone, brick, strong mortar, and concrete. In Northern Europe, Switzerland, and Russia, where forests abounded and other materials were difficult to obtain, wooden architecture was characteristic for buildings of all types.

Science, machinery, and easy transportation are now bringing to the hands of architects resources of materials hitherto unknown or unobtainable.

UNIT 4 THE MOST IMPORTANT AND WIDELY USED BUILDING MATERIALS (BINDING MATERIALS, CONCRETE AND STRUCTURAL STEEL)

Active Vocabulary

to bind	–	зв’язувати
masonry	–	кам’яний
high alumina cement	–	цемент з великим вмістом глинозему
crushed stone	–	щебінь
plaster	–	штукатурка
inert material	–	нейтральний матеріал
lime	–	вапно
gypsum	–	гіпс
workability	–	оброблюваність
compressive load	–	навантаження на стискання
high rate of strength	–	велика стійкість
resistance to	–	міцність щодо …
moisture content	–	місткість вологи

The designer must be able to select and adapt such materials of construction that will give the most effective result by the most economical means. In this

choice of materials for any work of construction, the civil engineer must consider many factors. These factors include availability, cost, physical properties of materials and others.

Timber, steel and concrete all vary, sometimes over considerable ranges in the properties desired by the engineer. Even steel, uniform as it appears to be, varies considerably in its microstructure. Concrete is even less uniform than many other materials.

Lime, gypsum and cement are the three materials most widely used in building construction for the purpose of binding together masonry units, such as stone, brick and as constituents of wall plaster. Cement is furthermore the most important component of concrete. These materials form very important elements in all masonry structures. As a class they are designed as cementing materials.

The gradual improvement in Portland cement quality from the time of its introduction led to the elaboration of rapid hardening Portland cement, or «high early strength». Later developments include low heat and sulphateresisting cements, also white and colored cements. Another important class of cement is high aluminum cement. High aluminum cement is a material containing aluminum. It has an extremely high rate of strength increase which is, owing to the vioierice of the chemical reaction, accompanied by a considerable evolution of heat. It is very resistant to chemical attack.

It therefore follows that Portland Cement like other materials can to some extent be modified to suit a particular application. The scope for such purposemade cements has led to the development of an increasing variety such as high alumina cement, blast – furnace slag and pozzuolanas. Portland blast – furnace cement has greater resistance to some forms of chemic.

The most important building materials may now be considered to be structural steel and concrete. Concrete may be considered an artificial congl8m~dte of crushed stone, gravel or similar inert material with a mortar. A mixture of sand, screenings or similar inert particles with cement and water which has the capacity of hardening into a rocklike mass is called' mortar. The fundamental object in proportioning concrete or mortar mixes is the production of a durable material of requisite strength; watertightness and other essential properties at minimum .cost. To attain this end careful attention must be given to the selection of cement, aggregate, and water.

The most accurate method of measuring proportions is to weigh the required quantities of each material. This may be done whether the proportions are based upon volumes or weights. This method is being extensively used in road construction and in many central mixing and in central proportioning plants. It is also widely used in large building construction, but in small building construction the less accurate method of measuring proportions by volumes is frequently used. The chief inaccuracies in volumetric measurement arise from the wide variation in the bulk of the fme aggregate due to small changes in' its moisture content and faulty methods of filling measuring devices. It is always for a building engineer to bear

in mind that workability and strength tests are the chief control tests made on concrete. To be able to undergo high compressive loads is a specific characteristic of this material.

Exercises

Exercise 1 **Analyze the following word – combinations:**

rapid – hardening	rocklike
high – early strength	watertightness
high – alumina	light – weight
purpose – made	large – size elements
blast – furnace	semi – rigid

Exercise 2 **Translate the following international words:**

To adapt, civil, accurate, plaster, component, to contain, to modify, variety, structural, inert, essential, test.

Exercise 3 **Insert the correspondent conjunctions than, so ... as, both ... and, not so ... as, as into the sentences:**

1. Concrete ... building material is more suitable ... timber.
2. ... workability ... strength tests are the chief control tests.
3. The designer selects such materials ... to give the most effective result.
4. Timber is durable concrete.
5. Concrete is uniform many other materials.

Exercise 4 **Give verbs to the corresponding words:**

Selection, designer, considerable, addition, elaboration, development, appearance, desirable, mixture, resistant, application, production, suitable, measuring, construction, representative.

Exercise 5 **Say what sentences deal with the description of cement and which one with concrete:**

1. There are some kinds of structural materials that have appeared comparatively recently, sometimes they consist of one polymer. But in building industry some complex materials consisting of the polymer and other components are used.
2. In many cases bricks too are very satisfactory for use in the construction.
3. There are some kinds of material which are brittle and cannot withstand tensile stress.
4. If steel is introduced into some kind of material it changes its property.
5. Some building materials offer a good resistance to compressive loads.
6. In respect of physical and mechanical properties these materials are divided into rigid, semi – rigid and soft.

Exercise 6 **Differentiate the following sentences according to the three main points (A, B, C):**

A. The choice of materials for any work of construction.

B. The properties of high alumina cement.

C. The composition of concrete.

1. Another important class of cement is high alumina cement.

2. Such a material may be considered an artificial conglomerate of crushed stone or gravel with a mortar.

3. The civil engineer must consider many factors when selecting the material for construction.

4. This kind of cement is very resistant to chemical attack.

5. The principal object in proportioning concrete is the production of a durable material of adequate strength and watertightness.

6. The factors that condition the selection of materials for construction include availability, cost and physical properties.

7. This material has an extremely high rate of strength increase.

8. Timber, steel and concrete vary over considerable ranges in the properties desired by the engineer and the latter should take them into consideration in selecting the materials.

9. The most accurate method of measuring proportions for concrete is to weigh the required quantities of each material.

Exercise 7 **Choose the right answers to the questions:**

1. What influences the choice of building materials?
   - α) The choice of building materials is governed by the type and the function of a building.
   - β) Availability, cost and physical properties are the main considerations for an engineer in selecting materials for construction.
   - χ) The techniques and methods of construction are the main factors influencing the choice of building materials.
2. What are lime, gypsum and cement most widely used for?
   - a) These three materials are not widely used for the purpose of binding together masonry units.
   - b) They are used as components to produce concrete.
   - c) With the large – scale construction, lime, gypsum and cement may be considered to be the most important binding materials.

Exercise 8 **Answer the following questions:**

1. What factors must the civil engineer consider in the choice of materials?
2. What material varies considerably in its microstructure?
3. What materials are most widely used in building construction?
4. What is the most important component of concrete?

5.What did the gradual improvement in Portland cement quality from the time of its introduction lead to?

6.What is high aluminum cement?

7.Does Portland blast – furnace cement have greater resistance to some forms of chemicals?

Exercise 9 **Correct statements if it is necessary:**

Model: Steel and concrete are most widely used for binding together masonry units. This statement is incorrect. Lime, gypsum and cement are used in building construction for the purpose of binding masonry units.

1.There is no improvement in Portland cement quality.

2.The most important building materials may now be considered to be structural steel and concrete.

3.Lime, gypsum and cement are the three materials most widely used for making concrete.

4.Cement is most important component of brick.

5.High alumina cement is a material containing alumina.

Exercise 10 **Insert the corresponding forms of the Infinitive into the sentences:**

1.Under certain conditions, concrete is exposed ... by chemicals.

2.The most important building materials may now be considered ... .

3.Walls and piers may ... with stone.

4.Enough water should be used ... a placeable mix.

5.It is very essential for a building engineer ... physical and mechanical properties of the building materials.

Exercise 11 **Translate the text without a dictionary. Express the main idea of the text:**

Portland cement is a product obtained by mixing and then burning two raw materials, the one composed largely of lime and other of material – containing silica, alumina and iron. The two raw materials are ground and mixed to give definite proportions of lime, silica, alumina and iron oxide. The finished product should receive. no addition other than gypsum. Portland cement can to some extent be modified to suit a particular application. It has led to the development of an increasing variety such as high alumina cement and puzzolanas. Puzzolanic cement consists of mixtures in varying proportions of Portland cement and puzzolana. The later is an ash usually of volcanic origin, but which may be produced by the calcinations of suitable clays or shales. Puzzolanic cements are more resistant to chemical attack than Portland cement. They are generally very finely ground and have excellent working properties. To develop the maximum ultimate strength, these cements need prolonged wetting; They are therefore very suitable for use under water.

UNIT 5 THE CHOICE OF MATERIAL

Active Vocabulary

construction site	– будівельний майданчик
are advantageously utilized	– успішно використовуючи
tensile stress	– розтягуючи напруга
properties of the materials	– властивості матеріалів
depending on application	– в залежності від застосування
pleasing appearance	– приємний зовнішній вигляд
diverse properties	– різноманітні властивості
wide application	– широке застосування
ordinary brick	– проста цегла

Which material can be used to the best advantage for a particular part of the building, depends as well on the kind of load to which it is subjected and on the shape of the part. That the development of the metallurgical and machine – building industry made possible mass production of prefabricated large – size concrete and reinforced – concrete structural elements is a well – known factor to influence the choice of materials. It is most advantageous to employ reinforced concrete in such structural elements. Using prefabricated or precast elements builders perform a considerable amount of building work not in site but at a factory where highly organized and mechanized technological processes of production are practiced.

Reinforced concrete is a building material in which the joint functions of concrete and steel are advantageously utilized. Being brittle, concrete cannot withstand tensile stresses, and it cannot therefore be used in structures subjected to tensile stresses under load. But if steel is introduced into concrete it changes the property of the monolith.

Like any other stone material, concrete offers a good resistance to compressive loads. In service two oppositely directed stresses appear in reinforced elements which can successfully withstand bending loads.

There are two kinds of reinforced concrete: with ordinary reinforcement and concrete with prestressed reinforcement. To reinforce ordinary concrete structures is to introduce steel rods in stretched zones of concrete elements. Reinforced – concrete structures and elements are widely used both for residential houses and industrial building. Depending on the application of reinforced – concrete structures all kinds of concrete – heavy, light and heat insulating may be employed.

In many cases bricks too are very satisfactory for use in the construction.

Bricks generally present a pleasing appearance and can be obtained with various qualities, colours, and textures. Being of high volume weight and high thermal conductivity, ordinary brick is not always satisfactory in building practice. There are other kinds of bricks which are more effective, they are light – weight building bricks, hollow or porous bricks. Light – weight building bricks differ

from ordinary clay bricks in a lower volume weight and lower thermal conductivity, and are therefore more economical than ordinary bricks.

One of the most significant facts about both industry and building has been research on synthetics and plastics. Plastics have appeared comparatively recently but, owing to their inherent valuable and diverse properties, have found a wide application in many industrial fields (machine – building, aviation, textile industry, etc.). Application of plastics in the building field widens from year to year.

In respect to physical and mechanical properties at a normal temperature of 200 C all plastics are divide into rigid, semi – rigid, soft and plastic. In respect to the number of constituents plas ics may be classified as simple and complex.

Plastics consisting of one polymer are referred to as simple. Thus, organic glass (plexiglass) consists of one synthetic resin. But in the building field we usually deal with complex plastics, e. g, plastics consisting of a polymer and other components.

Exercises

Exercise 1 **Choose Ukrainian equivalents for the following words:**

mass production	1. розтягуючи напруга
prefabricated concrete elements	2. ламкий
reinforced concrete elements	3. теплопровідність
site	4. будівельний майданчик
tensile stress	5. жорсткий
compressive loads	6. смола
bending loads	7. масове виробництво
brittle	8. стискаючі навантаження
thermal conductivity	9. збірні бетонні елементи
volume weight	10. мінливі навантаження
rigid	11. об’ємна вага
resin	12. залізобетонні елементи

Exercise 2 **Give English equivalents for the following words and word combinations:**

Розтягуюча напруга, залізобетонні елементи, навантаження, що змінюються, об’ємна вага, стискаючі навантаження, жорсткий, смола, теплопровідність, будівельний майданчик, ламкий, масове виробництво.

Exercise 3 **Complete the following sentences:**

1. Using prefabricated or precast elements builders ...
2. Reinforced concrete is a building material in which …
3. In service two oppositely directed stresses appear in …
4. Reinforced – concrete structures and elements are widely used ...
5. Bricks generally present ...

6. Light – weight building bricks differ ...
7. Plastics have found a wide application in ...

Exercise 4 **Answer the following questions:**

1. What did the development of the metallurgical and machine – building industry make possible use?
2. What do builders perform using prefabricated or precast elements?
3. What is reinforced concrete?
4. Can concrete withstand tensile stress?
5. What does concrete offer?
6. For what types of construction are reinforced concrete structures and elements used?
7. Is ordinary brick always satisfactory in building practice?

Exercise 5 **Correct if it is necessary:**

1. The development of the metallurgical and machine – building industry made possible mass production of prefabricated large – size concrete and reinforced – concrete structural elements.
2. Being brittle, concrete can withstand tensile stresses.
3. Concrete doesn't offer good resistance to compressive loads.
4. Reinforced – concrete structures and elements are widely used both for residential houses and industrial buildings.
5. Ordinary brick is always satisfactory in building practice.
6. Light – weight building bricks differ from ordinary clay bricks in a lower volume weight and lower thermal conductivity.
7. Plastics have appeared many centuries ago.

Exercise 6 **Divide the text into logical parts and entitle each of them.**

Exercise 7 **Retell the text according to the plan.**

UNIT 6 PRESTRESSED CONCRETE

Active Vocabulary

reinforced concrete	– залізобетон, армований бетон
to cast	– відливати (в бетоні)
mould	– форма
reinforcement	– арматура
reinforce	– армувати
shearing forces	– перерізуючі сили
stress	– зусилля, напруга

tensile	– здатний розтягувати
bar	– стрижень
prestressed concrete	– попередньо напружений бетон
precast	– виготовлений на заводі, збірний
wire	– дріт
to weather	– вивітрюватися
to fracture	– тріскатися
crack	– тріщина

PRESTRESSED CONCRETE

It was – not until the end of the nineteenth century and the beginning of the 20th century that reinforced concrete really came into its own as a structural material with a great variety of uses. Great advances have been made in the knowledge of its behavior in structures and much experience has been gained in its use so that today it is deservedly a material of importance.

The outstanding characteristic of concrete is that it can be manufactured readily and cast in a mould to any desired shape. It can be said to combine strength. with plasticity, The addition of reinforcement or the application of the more recent technique of prestressing adds to its strength and does not decrease its plasticity.

Concrete has a much – higher strength when it is under compression, than it has when it is subjected to tension. In fact its tensile strength is only one tenth of its compressive strength. Its ability to sustain shearing forces is also frequently inadequate. The purpose of reinforcing is to provide a material with a high tensile strength which can be cast in the concrete in such a way that it is able to take the tensile and shear stresses which would otherwise have to be taken by the concrete, and at the same time allows full advantage to be taken of the concrete's high compressive strength.

Prestressed concrete has captured the imagination of many designers for several reasons. It enables lighter construction than ordinary reinforced work. This means that not only is less material required in prestressed members, but that reduced weight of the members makes for lighter columns and foundations. Less steel is required than in ordinary reinforced concrete. The lightness of prestressed concrete also makes it particularly useful for precast work. It is not subject to cracking, so that there is little danger of corrosion of prestressing wires, and the concrete will not weather easily.

Prestressed concrete depends for its reliability on first – class control of the concrete aggregates and mix proportions, the placing of the concrete, the quality of the prestressing wires or bars and the application of the precise degree of prestress to the wires. These requirements make it particularly suitable for factory production.

The idea of prestressing is an extremely simple one: If one has a material that has no tensile strength it will fracture immediately it is called on to take tension.

If, however, the material is given an initial compression, then, when the tension force is applied the material will be able to withstand the tension provided it does not exceed the initial compression.

The great merit of prestressed concrete is that, in giving to the concrete itself an effective tensile strength, it enables all the concrete to contribute to the strength of the member, unlike reinforced work where only the concrete in compressioii is contributing.

Exercises

Exercise 1 **Translate the following synonyms into Ukrainian and memorize them:** .

Use, application, employment; to produce, to manufacture; readily, easily; shape, form; really, actually, indeed, in fact; to gain, to obtain, to get; technique, method; to decrease, to reduce; frequently, often; to allow, to permit; several, some, a few; ordinary, common, usual; to demand, to require; exact, precise, accurate; original, initial; to withstand, to resist; to take advantage of, to make use of; immediately, at once; reason, cause; to contribute, to make for; degree, extent; full, entire, complete; outstanding, prominent.

Exercise 2 **Underline the suffixes and translate the following words into Ukrainian:**

Nineteenth, structural, knowledge, deservedly, plasticity, compressive, ability, inadequate, strength, designer, foundation, lightness, reliability, application, suitable, production, immediately, effective.

Exercise 3 **Find in the text antonyms to the following words and translate them into Ukrainian:**

The beginning, weakness, increase, lower, seldom, adequate, few, heavier, more, heaviness, useless, much, unsuitable, complex, like.

Exercise 4 **Find in the text English equivalents for the following words and word combinations:**

Успішна спроба, армований бетон, будівельні матеріали, поводження конструкції, набувати досвіду, відливати у будь – яку форму, поєднувати стійкість з пластичністю, фактично, здатність сприймати перерізуючі сили, міцність на розтягування, міцність на стискання, дозволяє повність використовувати, менша вага елементів конструкції сприяє полегшенню колон та фундаментів, перевага попередньо напруженого бетону.

Exercise 5 **Fill in the blanks with the suitable word from the vocabulary of the text:**

1. Concrete combines ... with plasticity. .
2. ... adds to the strength of concrete and does not decrease its plasticity.

3. Reinforcement allows full ... to be taken both of the ... and ... strength of concrete.
4. Reinforced concrete has a great ... of uses.
5. As prestressed concrete is not subjected to cracking, it will not ... easily.
6. Great advances have been made in the knowledge of the ... of concrete in structures.

Exercise 6 **In the following sentences explain the meaning of the words in bold type:**

1. It is necessary to use a high tensile steel wire for applying the prestress.
2. We prestress the wires either before the concrete is cast or after the concrete has set and reached an adequate strength.
3. Concrete affected by wind and frost action may weather easily.
4. At present weather does not prevent to go on with construction work on the site due to the use of plastic coverings.
5. Much experience has been gained in the use of reinforced concrete.
6. Scientists frequently experience great difficulties in putting their discoveries into effect.

Exercise 7 **Work in pairs. Ask and answer the following questions:**

1. When did reinforced concrete really come into its own?
2. What is the outstanding characteristic of concrete?
3. In what way does the addition of reinforcement affect concrete?
4. What is the purpose of reinforcement?
5. What are the advantages of prestressed concrete?
6. On what does prestressed concrete depend for its reliability?

Exercise 8 **Complete the following sentences:**

1. The outstanding characteristic of concrete is that ...
2. Concrete has a much higher strength when ...
3. The purpose of reinforcing is to ...
4. Prestress concrete has captured the imagination of ...
5. The lightness of prestressed concrete also makes it particularly useful for …
6. Prestressed concrete depends for its reliability on ...
7. The great merit of prestressed concrete is that ...

Exercise 9 **Correct the following sentences if it is necessary:**

1. At the beginning of the 19th century reinforced concrete came into its own as a structural material with a great variety of uses.
2. Concrete has a much higher strength when it is under compression.
3. The purpose of reinforcing is to provide a material with a low tensile strength.

4. The lightness of prestressed concrete also makes it particularly useful for precast work.
5. The idea of prestressing is a complex one.
6. The great merit of prestressed concrete is that, in giving to the concrete it-self an effective tensile strength.

Exercise 10 **Translate the following into English using the words of the text:**

1. Масове успішне запровадження у будівництво залізобетону викликало появу нових конструктивних форм залізобетону, в яких використовуються надстійкі матеріали – бетон та сталь.
2. Були досягнуті великі успіхи у вивченні його поведінки в конструкції, а також був набутий великий досвід у його використанні.
3. Попередньо напружений залізобетон збільшує стійкість конструкції, але не зменшує пластичності, тому попередньо напружені конструкції широко застосовуються у будівництві.
4. Стійкість попередньо напруженого залізобетону залежить від правильного підбору суміші, якості арматури і правильного попереднього напруження.
5. Він не розтріскується, і тому зменшується небезпека корозії арматури та вивітрювання бетону.
6. Попередньо напружений залізобетон придатний для виготовлення на заводі.

Exercise 11 **Divide the text into logical parts and entitle eacЬ of them.**

Exercise 12 **Retell the text according to the plan.**

UNIT 7. FOUNDATIONS

Active Vocabulary

Pile	– паля
Mortar	– розчин
To bake	– сушити на сонці, обпалювати (цеглу)
Stable	– стійкий
Log	– колода
Submerge	– занурюватися
Framework	– каркас
Boring	– зондаж
Casing	– опалубка
Fuse	– плавитися
Burner	– форсунка

PILE FOUNDATIONS

The durability of a structure depends on how the foundation is built and on the property of the ground.

Prior to the beginning of the last century buildings were put up ,mostly. on stable ground. Bands of stone and baked bricks bound together by lime mortar served as foundations.

Our ancestors could not even imagine on what kind of ground we would build. Towns and cities have appeared in places where there had recently been swamps, on the permafrost ground of the northern regions of the country. Pile foundations are widely used there. They cut through the unstable thickness of die ground and rest upon firm layers.

Piles were also used in ancient times. Peter I widely used piles in building the city. Interestingly, Ivan the Great's bell tower in the Kremlin (about 500 years old) also stands on a peculiar pile foundation. The base is comprised of round, closely bound upright logs from 120 to 180 cm high. In those days there were no mechanisms to drive in piles – that accounts for their being so short. Upon the piles rests a massive stone slab. The piles are submerged in water to protect the wood from destruction.

Ferro – concrete was discovered about 200 years ago. Wooden piles gradually became a thing of the past. They have been replaced by the ferro – concrete and metal piles.

During the last few decades pile boring has found wide application. A bore hole is first filled with steel framework, then with concrete, and the pile is ready.

A group of specialists has developed piles without using building materials for the purpose. At the depth of 16 – 18 m a hole is drilled. A special burner is then inserted'. At 1,400DC the earth fuses. It then hardens and becomes a bearing pillar. Several buildings have already been erected on such «piles».

The foundation of the Alma – Ata TV tower is quite original. The tower was ' built on a small site in the mountains, where force 10 earth – quakes can occur. The foundation is a reinforced casing. On it there stands a three – storey building together with a metal tower 360 m high.

Exercises

Exercise 1 **Find in the text nouns corresponding to the following words and translate them into Ukrainian:**

to apply, to destroy, durable, to bum, wooden, to begin

Exercise 2 **Find in the text adjectives corresponding to the following words and translate them into Ukrainian:**

to bake, stability, firmness, peculiarity, to shorten, widely

Exercise 3 **Find in the text verbs corresponding to the following words and translate them into Ukrainian:**

dependent, service, appearance, useful, binding, protection, discovery, filling, development, drill, hard, erection

Exercise 4 **Find in the text the antonyms of the following words and translate them into Ukrainian:**

the end, to disappear, stable, young, long, the present, down

Exercise 5 **Find in the text the English equivalents of the following words and word – combinations:**

Стійкість споруди, до початку минулого століття, стійкий ґрунт, стрічки з каменю та обпаленої цегли, вапняковий розчин, наші пращури, багно, фундаменти з пат, у давні часи, круглі колоди, забивати папі, величезна кам'яна плита (брила), занурювати, оберігати від руйнування, піти в минуле, без застосування будівельних матеріалів, форсунка, затвердіти, землетрус, залізобетонна коробка, буро набивна паля.

Exercise 6 **Find answers in the text to the following questions:**

1. What does the durability of a structure depend on?
2. How were foundations built prior to the beginning of the last century?
3. Can you tell us what kinds of foundations are used in the northern regions of our country?
4. Were piles used in ancient times?
5. Do you know anything about the foundation on which Ivan the Great's bell tower in Kremlin stands?
6. When was ferro – concrete discovered?
7. Pile boring has found wide application, hasn’t it?
8. Can piles be made without using building materials?
9. Why is the foundation of the Alma – Ata TV tower considered to be quite original?

Text A THE USE OF PYRAMIDAL PILES IN BUILDING

Pyramidal piles are a progressive design of piles used in building. These piles have the shape of an enlarged pyramid; they are – rammed into the ground, acute end first. Unlike prismatic piles, pyramidal piles pack the soil along the sides while sinking into it, thus enhancing the mechanical quality of the soil, and subsequently conveying the load of the whole side surface upon the packed basis –

Such distinctive features of the work of prismatic and pyramidal piles in the basis soils ensure the possibility to enhance the bearing capacity of pyramidal piles with respect to prismatic piles by 1.5 – 2 times.

Pyramidal piles are used in the basis of buildings and constructions for various purposes and designs. They are especially effective when packed soil lies on the upper part of the basis from 3 to 5 m deep, while loose soil can lie underneath.

In this case pyramidal piles must work as single piles. When pyramidal piles

are arranged in groups and joined by a low foundation raft, the depth of the loose soil should be taken into consideration as well as the number of piles in the group. If the basis is made up of packed soil along the whole depth, the number of piles in the group is not limited.

The structural design of pyramidal piles is carried out in accordance with the deformations, proceeding from the equality of the work of external and internal forces with due regard for obligatory requirements. The volume of the stabilization zone should not exceed the volume of the consolidation zone while conveying the load to the pile.

Exercise 1 **Translate the text and divide it into some logical parts. Entitle each of them**

Exercise 2 **Render the following sentences in English:**

1. Пірамідальні палі мають форму усіченої піраміди, які забиваються у ґрунт гострим кінцем.
2. Пірамідальні папі під час занурення у ґрунт ущільнюють ґрунт вздовж бокової поверхні, підвищуючи тим самим механічні властивості ґрунту.
3. Вирізнювальні особливості роботи пірамідальних паль у ґрунтах основи забезпечують можливість підвищення несучих властивостей пірамідальних паль по відношенню до призматичних у 1,5 – 2 рази.
4. Пірамідальні пари застосовуються в основі будівель та споруд різного призначення, та конструкцій.
5. Особливо ефективно їх застосовувати в тому випадку, коли у верхній частині основи на глибині 3 – 5 м залягають щільні ґрунти.
6. При кущовому розташуванні пірамідальних паль, об'єднаних низьким ростверком, враховується глибина розташування слабкого шару та кількості паль у кущі.
7. Якщо ж основа складена на всю глибину щільними ґрунтами, то кількість паль у кущі не обмежується.

Exercise 3 **Retell the text according to the plan**

SUPPLEMENTARY TEXTS

Text № 1 FORMS AND FUNCTIONS OF ARCHITECTURE

Architecture is the art and the science of building. Without consideration of structural principles, materials, and social and economic requirements a building cannot take form, but unless aesthetic quality also is inherent in its form the building cannot be considered as a work of architecture.

From the very beginnings of architecture many skills, systems, .and theories have been evolved for the construction of a buildings that have housed nations and generations of men in all their essential activities, and writing on architecture is almost as old as writing itself. Books on the theory of architecture, on the art of building, and on the aesthetic appearance of buildings exist in fair number. The oldest book we have that sets forth the principles upon which buildings should be designed and aims to guide the architects is the work of Marcus Vitruvius Pollio, written in the first century B.C.

The historical background of twentieth – century architecture finds little place in this article, but that does not imply a denial of the value of our cultural heritage. Such a recognition of continuity does not imply repetition of imitation. Architecture is an art, its contemporary expression must be creative and consequently new. The heritage of the past cannot be ignored, but it must be expressed in contemporary terminology. The paradox of the coexistence of change and survival is evident in all phases of the human story. The philosophers, and historians have taken great pains to explain it. This paradox of change and repetition is clearly illustrated in any architectural style.

Nearly two thousand years ago the Roman architect Vitruvius listed three basic factors in architecture – convenience, strength and beauty. These three factors are always present and are always interrelated in the best structures. It is impossible for the true architect to think of one of them without almost automatically considering the other two as well. Thus architectural design entails not only the study of solution for convenience, for structure, and for appearance as three separate processes but also a consideration of the constant interaction of these factors. The architect, then, does not first plan a building from the point of view of convenience, then design around his plan a strong construction to shelter it, and finally adjust and decorate the whole to make it pretty. Any design that evolves from such a procedure will produce only a confused, incoherent, and unsatisfactory building. Of any truly great building we can say that every element in it has triple implication.

This triple nature of architectural design is one of the reasons why' architecture is a difficult art; for it takes a special type of imagination as well as long years of training and experience .to produce a designer capable of making the requisite in the light of these three factors – use, construction, and aesthetic knowledge of engineering and of building materials to enable him to create economically a strong as well as practical structure and, in addition, must possess the creative imagination which will enable him to integrate the plan and the construction into one harmonious whole. The architect's feeling of satisfaction in achieving such an integration is one of his greatest rewards.

Text № 2 THE MODERN CITY AS A SYMBOL OF MODERN MAN

The modem city has still to be built, and the first step toward sinking its foundations into the earth is to raise its ideal structure in the mind. It is obvious that the «modem city» cannot be created by mechanical improvements, especially if it is conceived in the childish terms used in the 1920's by various American skyscraper architects in portraying super – skyscraper cities lived in largely under artificial light, zoned in horizontal layers according to incomes and utilizing every mechanical device. Even Le Corbusier's refinement of this picture – with wide green spaces, trees, sunlight, and sport – fields – though plainly more human, is still native, for it neglects the essentials of family life and neighborly intercourse.

The architectural embodiment of the modern city is in fact impossible until biological, social, and personal needs have been outlined, and until all of man's activities have been integrated into a balanced whole. One cannot base an architectural conception on such a sociology as that which led a group of modern architects and planners to examine the modern city with reference to only four functions: work, transportation, dwelling, and recreation. The city, if it is anything, is an expression and symbolization of man.

Conceivably a city could be built underground, or it might be enclosed within a single massive air – conditioned skyscraper with no window opening to the outer world. Proposals were current for both types. But one important· element would be lacking in such a city – the .aesthetic symbolization of its contents, its activity, its meaning. Above all, the city is a symbol of social relationships. In cities not only do the social functions exist, they signify. Architecture and city planning are the visible translations of the total meaning of culture. Each generation writes its biography in the buildings it creates; each culture characterizes in the city the unifying idea that runs through its activities. The medieval city says: «production under the eye of God»; the Baroque city says: «power under the favor of the Prince»; the industrial city says: «production no matter what the human cost»; the American metropolis says: «finance must dominate». In the ideal form of the modem city one must look for a fuller embodiment of needs than any recent culture has produced.

The physical problems of planning and the question of architectural form are closely connected with the more fundamental concerns of the relation of population to industry and to the land, the possibilities of creating a new ruralurban pattern, and a reinterpretation of human needs in terms of twentieth – century political and technical possibilities. No ideal plan can do justice to the potential nature of modem man if it does not further the interaction of the urban and the rural patterns of life bringing gardens, parks and recreation spaces into the heart of the city and making available for the most isolated country dweller the fullest resources of culture and education.

Text № 3 THE COMMUNITY AND ARCHITECTURE

The forms to be taken by communities must be decided before they are constructed. But long – term «master plans», we .have learned, must not be too detailed. Someone must plan where streets are to run, parks are to be laid out, and industrial facilities are to be furnished. Someone must plan new housing and new public buildings, parks, and play – grounds. Surely architects are necessary for these. And yet, community planning can never be the work of a single individual or class of individuals. Good community plans need the contribution of experts in many fields. Modem city planning has become so complex, so enmeshed in statistics, and so controlled by financial interests that too often community plans appear that are lifeless and mechanical. In this field it is the architect's task to redress the balance, to realize that cities exist for people (not people for cities), that business and industry and science should serve the people and not enslave them.

During the last century hundreds of cities grew up throughout the world, and thousands of country towns expanded into great industrial or commercial centers. In the sense that all the buildings in Chicago or Los Angeles were constructed in recent times, they are modern communities. But in these new cities one searches in vain for any common principle of design that would distinguish them from earlier towns.

If, however, one examines the contemporary city more closely, one comes upon forms that had no counterpart in any earlier civilization. The country villa and the suburb are time – honored forms; but only with the development of rapid transportation, however, did it become possible to disperse the population of a great center over an area at least ten times as great as the biggest cities of the past. The skyscraper has permitted the assembling of business offices and light industry in concentrated hives, served by vertical transportation; but the erection of such buildings on streets designed for four – story buildings and horsedrawn transportation has everywhere produced chaos.

Nowhere have the new forces in urbanism been organized so as to create both a functional and aesthetic unity. One cannot derive an archetype for the modern citT from any existing example. Neither can one create it merely by uncritically accepting all technological devices as essential ingredients. There is room, then, for an effort to define the modem community in ideal terms, on the basis of existing facts and tendencies. These facts and tendencies are not confined to the provinces of engineering and architecture; they issue from industry, from education, from medicine and psychology, and indeed from politics.

Text №4 GEODESY: DEFINITION, CLASSIFICATION, PROBLEMS

According to the classical definition geodesy is the «science of the measurement and mapping of the earth's surface». This definition has to this day retained its validity; it includes the determination of the earth's external gravity field as well as the surface of the ocean floor. With this definition, geodesy may be included in the geosciences, and also in the engineering sciences.

Geodesy may be divided into the areas of global geodesy, geodetic surveying. Global geodesy is responsible for the determination of the figure of the earth including the complete external gravity field. A geodetic survey defines the surface of a country by the coordinates of a sufficiently large number of control points. In this fundamental work, the overall curvature of the earth must be considered. In plane surveying (topographic surveying, cadastral surveying, engineering surveying), the details of the land surface are obtained; the horizontal plane is in general sufficient as a reference surface.

There is close interaction between global geodesy, geodetic surveying and plane surveying. The geodetic survey adopts the parameters determined by measurements of the earth, and its own results are available to those who measure the earth. The plane surveys in turn, are generally tied to the control points of the geodetic surveys and serve then particularly in the development of national map series and in the formation of real estate cadastres.

The problems of geodesy is to determine the figure and the external gravity field of the earth and of other heavenly bodies as functions of time; as well as, to determine the mean earth ellipsoid from parameters observed on the exterior to the earth's surface. This geodetic boundary – value problem incorporates a geometric (figure of the earth) and physical (gravity field) formulation of the problem; both are closely related. By the figure of the earth we mean the physical and mathematical surface of the earth.

The physical surface of the earth in the border between the solid or fluid masses and the atmosphere. Recently, the ocean floor has also been included in the formulation of the geodetic problem, being the bounding surface between the solid terrestrial body and the oceanic water masses. The extension of the problem to the oceans is designated marine geodesy. The irregular surface of the solid earth (continents and ocean floor) is incapable of being represented by a simple mathematical relation; it is there for described point wise by the use of coordinates of the control points. On the other hand, the ocean surfaces (70 % of the earth's surface) possess a simpler principle of formation. Under certain assumptions, they form a part of level (equipotential) surface (surface of constant gravity potential) of the earth's gravity field. We may think of this surface as being extended under the continents and then identify it as the mathematical figure of the earth.

What we call the surface of the earth in the geometrical sense is nothing more than that surface which intersects everywhere the direction of gravity at right an-

gles, and part of which coincides with the surface of the oceans.

The majority of the observed parameters used in geodesy refer to the earth's external gravity field, whose study thereby becomes a concern of geodesy. The upper limit of space that is of interest is governed by the geodetic usage of artificial satellites and space probes, as well as the earth's moon. The physical aspect of the problem of geodesy follows from the consideration of the earth's surface and the geoid as bounding surface in the earth's gravity field. The external gravity field may be described by the countless level surfaces extending completely or partially exterior to the earth's surface.

Reference systems with a defined metric and curvature are required for the computations in global geodesy and geodetic surveying. Because of its simple equation, a rotational ellipsoid flattened at the poles is better suited as a geodetic reference surface than the geoid, which is determined by the uneven distribution of the earth's masses. Particular significance is given to the mean earth ellipsoid, which is the optimal ellipsoid approximating the geoid.

The body of the earth and its gravity field are subjects to temporal variations of secular, periodic, and singular nature, which can occur globally, regionally, and locally. The geodetic measurement and evaluation techniques today have advanced to the extent that they can detect a part of this change. Should average conditions be ascertained, observations must be corrected for these changes. With the detection of a part of the variations, geodesy also contributes to the investigation of the dynamics of the terrestrial body. The figure of the earth and the external gravity field are accordingly conceived as time dependent variables.

Text № 5 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 Romans' 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 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 behavior 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.

ЕЛЕКТРОННЕ НАВЧАЛЬНО – МЕТОДИЧНЕ ВИДАННЯ

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МЕТОДИЧНІ ВКАЗІВКИ ДО ВИКОНАННЯ ПРАКТИЧНИХ РОБІТ З ДИСЦИПЛІНИ «АНГЛІЙСЬКА МОВА» (ДЛЯ СТУДЕНТІВ 2 – ГО КУРСУ НАПРЯМУ ПІДГОТОВКИ 6.060101 «БУДІВНИЦТВО» ДЕННОЇ ТА ЗАОЧНОЇ ФОРМИ НАВЧАННЯ)

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