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Vocational Guidance English: Engineering

Навчально-методичний посібник
для студентів денної та заочної форми навчання за спеціальністю
131 «Прикладна механіка»

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Посібник складається з дев’яти розділів, кожен розділ містить декілька частин, які відображають основні види навчальної діяльності. Окремою частиною запропоновано додаткові матеріали для інтенсивного читання у межах розвитку базових професійних компетенцій. Також до посібника увійшли таблиці найбільш уживаних математичних символів та позначень, що широко використовуються в англомовній технічній літературі.

Призначено для студентів технічних спеціальностей денної та заочної форм навчання.

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ПЕРЕДМОВА

Посібник «Vocational Guidance English: Engineering» для студентів технічних спеціальностей денної та заочної форм навчання розроблено відповідно до державного та галузевого стандартів з урахуванням Загальноєвропейських рекомендацій щодо мовної освіти. Він цілком і повністю відтворює зміст навчальної та робочої програм нормативної дисципліни «Іноземна (англійська) мова». Головна мета – формування у студентів загальних та професійно-орієнтованих мовних та мовленнєвих компетенцій.

Навчальний посібник складається з дев'яти розділів, розроблених колективом авторів. Кожен розділ містить декілька частин, які відображають основні види навчальної діяльності:

1) теоретичні матеріали та вправи для формування граматичних навичок;

2) текст, словник та лексичні вправи для аудиторної роботи;

3) текст для самостійного опрацювання за межами аудиторії з завданнями;

4) автентичні тексти для усного реферування та обговорення, під час роботи з якими рекомендується використовувати професійні словники.

Лексичні вправи побудовано таким чином, щоб студенти могли розширити та активізувати словниковий запас, подолати труднощі перекладу. Граматичні завдання на конкретних прикладах закріплюють здобуті знання з граматики.

Окремою частиною запропоновано додаткові матеріали для інтенсивного читання у межах розвитку базових професійних компетенцій. Вони відповідають інтересам і потребам сучасних студентів, дають їм можливість продемонструвати свої знання, поділитися особистим досвідом та ідеями, отриманими в ході навчання, й показати розуміння теми заняття та власний інтерес до неї. Це зумовлено тим, що навчальний посібник розглядається як система, що не тільки охоплює всі види діяльності студентів під час вивчення англійської мови, але й готує майбутніх фахівців у контексті обраної ними спеціальності (робота з оригінальною літературою). Також до посібника увійшли таблиці найбільш уживаних математичних символів та позначень, що широко використовуються в англомовній технічній літературі.

UNIT I

GRAMMAR: THE NOUN

Іменники вживаються в однині і множині. Множина іменника утворюється додаванням до форми закінчень:

-s	a shop – shops; a day – days
-es	після “y” з попередньою приголосною, при цьому “y” змінюється на “i”: a country – countries
	після “o”: a tomato –tomatoes; але a piano – pianos; a photo – photos
	після –s, – ss, – ch, – sh, – tch, –x, –z: a box – boxes; a dress – dresses; a wish – wishes; a bench – benches
	після –f, –fe, при цьому –f, -fe змінюються на “v”: wife – wives; a life – lives; a shelf – shelves; a wolf – wolves; a thief – thieves; a calf –calves; a knife – knives; a half –halves; a leaf – leaves; a loaf – loaves. Усі інші іменники на –f, –fe по загальному правилу: a safe – safes; a roof – roofs

Винятки	a man – men, a woman – women, a foot – feet, a child – children, a tooth – teeth, an ox – oxen, a goose – geese, a mouse – mice
Однина = множина	a swine – swine, a sheep – sheep, a deer – deer
Іменники грецького і латинського походження	a curriculum – curricula; a datum – data; a phenomenon – phenomena; a basis – bases; a thesis – theses; a crisis – crises; a radius – radii; a nucleus – nuclear; a stimulus – stimuli; an index – indices
Складові іменники	a mother -in law – mothers-il-law; a fellow-worker – fellow-workers; a commander-in-chief – commanders-in-chief; a forget-me-not – forget-me-nots

Ex. 1. ***Give the plural of the following nouns:***

task; port; comb; song; tube; glove; day; letter; country; city; duty; industry; factory; leaf; life; shelf; loaf; half; businessman; child; foot; woman; gentleman; potato; zero; dress; bus; wish; rose; box; cage; basis; datum; nucleus; index.

Ex. 2. ***Give the singular of the following nouns:***

lips; painters; slopes; kites; passes; types; dishes; melodies; ladies; babies; lorries; calves; wives; halves; knives; heroes; cargoes; photos; sportsman; mice; theses; curricula.

Ex. 3. ***Change the number of the nouns and make all other necessary changes.***

1) The child is playing in the yard.
2) The story was very interesting.
3) We came up to the woman who was working in the garden.

4) The match will be held in Kiev.
5) The goose is in the yard.
6) The lorry passed by.
7) The tomato is ripe.
8) The book is on the shelf.
9) This watch was made in Switzerland.
10) The cat caught a mouse.
11) That is a large factory.

Ex. 4. ***Find nouns of Greek and Latin origin and write them down both in the singular and in the plural.***

1) We shall be able to solve the task if we get the necessary data.
2) These post-graduate students will present their theses in a month.
3) We use formulae in mathematics, in chemistry and other exact sciences.
4) Electronics helps us to study atomic nuclei and elementary particles.
5) Those experiments may help us understand the nature of this phenomenon.

Іменник

Іменник має два відмінки:

– загальний (the Common Case);

– присвійний (the Possessive Case).

Загальний відмінок не має спеціальних відмінкових закінчень.

Присвійний відмінок.

Імена власні. (Proper Names)

Однина	Множина
Tim's dog. Собака Тіма. St. Paul's cathedral. Собор Святого Павла.	The Bakers house. Будинок Бейкерів.

Одушевленні Іменники. (Animate Nouns)

a girl's hat – капелюх дівчинки a cat's tail – хвіст кішки	girls hats – капелюхи дівчаток cats tails – хвости кішок

Неодушевлені іменники. (Inanimal Nouns)

що означають час і відстань	
a minute's walk – хвилинна прогулянка a kilometre's distance – відстань в один кілометр	a five minutes' walk – п'ятихвилинна прогулянка a three kilometres' distance – відстань в три кілометри
що означають назви країн, міст, суден	
a Ukrainian's pupil – український учень Kyiv's square – площа Києва the "Taras Shevchenko's" crew – команда корабля " Тарас Шевченко"	

збірні іменники	
a company's office – офіс компанії the government's decision – постанова уряду the family's tradition – сімейна традиція	companies' offices – офіси компаній the governments' decisions – постанови урядів the families' traditions – сімейні традиції

Ex. 5. ***Replace the of – phrase by the Possessive Case.***

1) the pen of our teacher;
2) the window of this room;
3) the bicycle of Tom;
4) the back of the chair;
5) the order of the captain;
6) the bags of her pupils;
7) the banks of the river;
8) the arrival of the actors;
9) the father of Dick.

Ex. 6. ***Paraphrase the following using the Possessive Case.***

1) the pen that belongs to Jack;
2) the tape – recorder that belongs to my friend;
3) the books that belong to the workers;
4) the shoes that belong to the girl;
5) the flats that belong to the workers;
6) the car that belongs to this manager;
7) the coat that belongs to his brother;
8) the watch that belongs to the teacher.

Артикль

Перед іменниками вживається артикль: неозначений a (an) і означений the. «a» вживається перед словами, що починаються з приголосного: a ball, a map. «an» – перед словами, що починаються з голосного: an egg, an apple. «a (an)» вживаються перед злічуваними іменниками в однині, коли називають будь-який предмет з групи однорідних предметів.

Give me a book, please. Дай мені книгу, будь ласка.

Означений артикль «the» вживається коли певний предмет виділяється з групи однорідних.

Give me the book, please. Дай мені книгу (певну), будь ласка.

1. Артикль не вживається:

1) перед іменниками – прізвищами людей, кличками тварин.

Victor, Olena, Kovalenko, Pussy, Spot.

Примітка: Якщо перед прізвищами у множині стоїть означений артикль, це означає, що мова йдеться про всіх членів сім'ї.

the Petrenkos – Петренки
the Greens – Гріни

2) перед назвами континентів і країн:

Europe – Європа
South Africa – Південна Африка
North America – Північна Америка
Asia – Азія
Central Asia – Центральна Азія
Siberia – Сибір
Japan – Японія

3) перед назвами міст, сіл:

Kyiv – Київ
London – Лондон
Washington – Вашингтон
Примітка: Назва столиці Голандії вживається з означеним артиклем – The Hague – Гаага

4) перед назвами вулиць і майданів:

Mayakovsky Street – вулиця Маяковського
Svobody Square – майдан Свободи

2. Артикль вживається:

З означеним артиклем «the» вживаються:

1) назви річок, озер, океанів, пустель та гірських хребтів.

the Mississippi – Міссісіпі
the Dnieper – Днепр
the Black Sea – Чорне море
Azov Sea – Азовське море
the Arctic Ocean – Північний Льодовитий океан
the Atlantic Ocean – Атлантичний океан
the Indian Ocean – Індійський океан
the Pacific Ocean – Тихий океан

Примітка: Lake Baikal – озеро Байкал вживається без артикля.

the Crimea – Кримські гори
the Caucasus – Кавказькі гори
the Pamirs – Памір
the Urals – Урал

2) назви країн, що складаються із загальної назви та означувального слова, що стоїть перед ним.

union – союз, state – штат.
the United States of America – Сполучені Штати Америки
the United Kingdom of Great Britain and Northern Ireland – Сполучене Королівство Великої Британії і Північної Ірландії.

Артикль не вживається:

1) перед іменником – звертанням.

What are you doing, boys?
Sit still, girls.

2) якщо перед іменником стоїть присвійний. вказівний, питальний займенник або неозначені займенники some, any, no, each, every:

my mother, her toy, his bag, our room, their parents, your name, this book, that building, some boys, no boxes, every week.

3) якщо після іменника стоїть кількісний числівник у значенні порядкового.

page two – друга сторінка
lesson five – п'ятий урок

Ex. 7. ***Put the article where it is necessary.***

1. This is ... book. It is my ... book. 2. Is this your ... pencil? - No, it isn't my ... pencil, it is ray sister's ... pencil. 3. I have ... sister. My ... sister is ... engineer. My sister's ... husband is ... doctor. 4. I have no ... handbag. 5. Is this ... watch? - No, it isn't ... watch, it's ... pen. 6. This ... pen is good, and that ... pen is bad. 7. I can see ... pencil on your ... table, but I can see no ... paper. 8. Give me ... chair, please. 9. They have ... dog and two ... cats. 10. I have ... spoon in my ... plate, but I have no ... soup in it.

Ex. 8. ***Put the article where it is necessary.***

1. This is ... tree. ... tree is green. 2. I can see three ... boys. ... boys are playing. 3. I have ... bicycle. ... bicycle is black. My ... friend has no ... bicycle. 4. Our ... room is large. 5. We wrote ... dictation yesterday. ... dictation was long. 6. She has two ... daughters and one ... son. Her ... son is ... pupil. 7. My ... brother's ... friend has no ... dog. 8. This ... pencil is broken. Give me that ... pencil, please. 9. She has ... ball. ... ball is ... big. 10. I got ... letter from my ... friend yesterday. ... letter was interesting.

Ex. 9. ***Put the article where it is necessary.***

1. This is ... pen. ... pen is red. 2. These are pencils. ... pencils are black. 3. This is ... soup. ... soup is tasty. 4. In the morning I eat ... sandwich and drink ... tea. 5. She gave me ... coffee and ... cake. ... coffee was hot. ... cake was tasty. 6. Do you like ... ice-cream? 7. I see ... book in your ... hand. Is ... book interesting? 8. She bought... meat, ... butter and ... potatoes yesterday. She also bought ... cake. ... cake was very ... tasty. We ate ... cake with ... tea. 9. This is my ... table. On ... table I have ... book, two ... pencils, ... pen and ... paper. 10. This is ... bag. ... bag is brown. It is my sister's ... bag. And this is my ... bag. It is ... yellow.

Ex. 10. ***Put the article where it is necessary.***

1. I have two ... sisters. My ... sisters are ... students. 2. We are at ... home. 3. My ... brother is not at ... home, he is at ... school. 4. My ... mother is at ... work. She is ... doctor. 5. I am not ... doctor. 6. I have no'... sister. 7. He is not ... pilot. 8. I have thirty-two ... teeth. 9. He has ... child. 10. She has two ... children. Her children are at ... school. 11. Is your father at ... home? – No, he is at ... work. 12. Where is your ... brother? – He is at ... home.

Ex. 11. ***Put the article where it is necessary.***

1. We have ... large ... family. 2. My granny often tells us ... long ... interesting .. stories. 3. My ... father is ... engineer. He works at ... factory. ... factory is large. 4. My ... mother is ... doctor. She works at ... large ... hospital. She is at ... work now. 5. My ... aunt is ... teacher. She works at ... school. ... school is good. My ... aunt is not at ... school now. She is at ... home. She is drinking ... tea and eating ... jam. ... jam is sweet. I am at ... home, too. I am drinking ... tea and eating ... sandwich. ... sandwich

is tasty. 6. My sister is at ... school. She is ... pupil. 7. My cousin has ... big ... black ... cat. My cousin's ... cat has two ... kittens. ... milk, too. cat likes ... milk. ... kittens like

Ex. 12. ***Put the article where it is necessary.***

1. I am ... engineer. 2. My ... son is ... pupil. 3. He is ... good ... pupil. 4. This is ... house. 5. This is my ... pencil. 6. You have some ... pencils, but I have no ... pencil. Give me ... pencil, please. 7. I like your ... beautiful ... flower. Give me ... flower, please. 8. My ... mother is at ... home. She is reading ... interesting ... book. 9. My ... father is not at ... home. He is at ... work. He is ... doctor. He is ... good ... doctor. He works at ... hospital. ... hospital is large.

TEXT 1

ENGINEERS IN THE 21st CENTURY

Vocabulary

data – дані, інформація	mix well in society – спілкуватись
knowledge gap – прогалина (у знаннях)	human interaction – взаємодія; вплив один на одного
natural curiosity – природна допитливість	profound impact – значний вплив
monetary rewards – грошова винагорода	community – суспільство, громада
take an interest in – цікавитись	at large – взагалі, в загальному значенні
broad knowledge base – база загальних знань	incredible – неймовірний
creative solutions – творчі рішення	aware of – свідомий, підготовлений
subject area – галузь знань	to tackle – енергійно братися (за щось) ; займатися (чимось)
to accomplish – виконувати, завершувати	explicit – ясний, точний; певний;
available resources – наявні ресурси	reciprocity – взаємність, обопільність

DISCUSSION:

- Do you share the point of view presented in the text?

- What should you do to achieve this aim?

Most of us choose engineering as a profession because we like to solve problems and design things. We are the modern day renaissance men and women, like Edison and DaVinci. These men could invent and create. They were artists who had a broad view of the world and saw possibilities that no one had seen before. There is no reason why we can't be like them and do even more. We understand more science and have modern tools like computers and lasers to design and build things,

plus we can use information technology to gather data when we have knowledge gaps. The point is that, once we have a clear picture of who we want to be, now more than ever before, that vision is obtainable, and that vision becomes a self-fulfilling prophecy if we choose to act on it. Certainly, if we think we cannot do it, we won't.

Successful engineers are people who take an early interest in science and engineering. They have alert minds and a natural curiosity for everything around them. They do things for the love of it, not simply for monetary rewards, but for the pride and personal satisfaction that comes with doing something particularly well. Over time, they develop a clear intuition for excellence that drives them to produce quality in whatever they do. They mix well in society because they also take an interest in people and the dynamics of human interaction. Personally, they are self-confident but not ego-driven and have respect for other human beings. With the broad knowledge base they build over time, they can come up with fantastic ideas for solving just about any kind of problem, and they are able to build marvelous things or great companies by working with other people. The success that naturally goes with all that also makes them highly respected in society. That's the kind of successful individual we can be! And, we can have a profound impact on our community at large.

So what do you do when you're just starting out?

- *Develop an interest in learning*. Everyone and everything can be your teacher if you let them. People develop incredible insights about their interests and passions, and most are willing to share what they know. You can pick up what they've learned over a lifetime just by listening.
- *Build a strong foundation in basic science* as well as a broad range of technologies to allow you to come up with creative solutions to problems. This breadth of knowledge helps you become aware of what you don't know and gives you a sense of where to look for solutions.
- *Pick one particular subject area in which to specialize*. A PhD dissertation is an invaluable vehicle for learning how to be thorough. The particular topic is not so important because once you know how to dig deeply you can do so quickly on any subject that interests you.
- *Put a high value on your time*, and only take on projects for which you have passion. Being satisfied with «It's just a job» robs you of the real opportunities. Work hard and develop a habit of completing whatever you do. What you learn in solving specific technical or people problems often enables you to tackle even bigger projects.
- *Do explicit long-range planning*. Decide on what you want to accomplish in life, and look at the trends in your particular area of interest to decide what you need to do to get there. Modify your plans periodically as you gather new information.
- *Pay attention to attitude and self-awareness early on*. Success is naturally optimized when you make the best use of available resources. An objective understanding of your own strengths and weaknesses will give you the self-confidence to take on the right project and bring in people with the needed skills that you do not possess.

• *Practice building strong relationships* because you need other people to help you succeed. As you develop an understanding and appreciation for what other people do, you will naturally respect them as individuals. Respect begets respect because reciprocity is the basis of human relationships. Be helpful to people and you'll get plenty in return over time.

Task 1

Are these sentences true or false? Correct the false sentences:

1. Modern engineers understand more science and have modern tools like computers and lasers to design and build things, plus we can use information technology to gather data when we have knowledge gaps.
2. Inventors like Edison and DaVinci didn't have a broad view of the world and saw possibilities that no one had seen before.
3. The point is that, once we have a clear picture of who we want to be, now more than ever before, that vision is obtainable.
4. Successful engineers are people who take an early interest in everything around them.
5. Contemporary engineers mix well in society because they also take an interest in people and the dynamics of human interaction.
6. Personally, they are ego-driven but not self-confident and have respect for other human beings.
7. With the broad knowledge base they build over time, they can come up with fantastic ideas for solving just about any kind of problem, and they are able to build marvelous things or great companies by working with other people.
8. People develop incredible insights about their interests and passions, and most are willing to share what they know.
9. This breadth of knowledge helps you become aware of what you know and gives you a sense of where to show your solutions.
10. An objective understanding of your own strengths and weaknesses will give you the self-confidence to take on the right project and bring in people with the necessary skills.

Task 2

Put the words in the correct order to make sentences.

1. solve /of /engineering /as /a /because /we /choose /like /to /us /problems /profession /design /most /things /and.
2. science /are /who /an /early /successful /interest /in /people /and /engineers /engineering /take.
3. they /over /them /successful /engineers /time /produce /develop /a /clear /for /that /drives /to /quality /in /excellence /intuition /whatever /do.
4. highly /that /naturally /makes /goes /with /in /all /that /the /also /them /success /respected /society.

5. profound /engineers /community /can /a /modern /impact /on /our /have /at /large.

6. can /teacher /let /everyone /your /everything /be /if /you /and /them..

7. invaluable /a /how /learning /PhD /is /an /vehicle /to /be /dissertation /for /thorough.

8. projects /people /you /in /specific /or /learn /problems /what /often /enables /you /to /technical /tackle /even /solving /bigger.

9. best /is /make /naturally /you /the /use /of /success /when /available /optimized /resources.

10.respect /as /develop /an /and /for /what /people /understanding /do /appreciation /you /will /other /naturally /them /as /you /individuals.

Task 3

Match the words and their definitions.

1	engineering	**A**	covering a large number and wide scope of subjects
2	to design	**B**	a difference, especially an undesirable one, between two views or situations
3	broad	**C**	find an answer to, explanation for, or means of effectively dealing with (a problem or mystery)
4	to invent	**D**	the branch of science and technology concerned with the design, building, and use of engines, machines, and structures; a field of study or activity concerned with modification or development in a particular area
5	data	**E**	a thing given in recognition of service, effort, or achievement
6	gap	**F**	facts and statistics collected together for reference or analysis
7	alert	**G**	an individual or collaborative enterprise that is carefully planned to achieve a particular aim
8	reward	**H**	decide upon the look and functioning of (a building, garment, or other object), by making a detailed drawing of it; do or plan (something) with a specific purpose in mind
9	to solve	**I**	able to think clearly; intellectually active
10	project	**J**	create or design (something that has not existed before); be the originator of

Task 4

Match the words in the right column with the words in the left column to make word combinations.

1	to solve problems and	***a***	gaps
2	to have a broad view	***b***	in basic science
3	to use information technology	***c***	of the world
4	to have knowledge	***d***	for everything
5	to take an early interest	***e***	project
6	to have a natural curiosity	***f***	design things
7	the dynamics of	***g***	technologies
8	to take on the right	***h***	to gather data
9	a broad range of	***i***	in science
10	to build a strong foundation	***j***	human interaction

Task 5

Choose the correct statement:

1. Most of us choose engineering as a profession because we like to **solve/decide** problems and design things.
2. They had a **wide/broad** view of the world and saw possibilities that no one had seen before.
3. Over time, they develop a clear intuition for excellence that drives them to produce **property/quality** in whatever they do.
4. They mix well in society because they also take an interest in people and the dynamics of human **cooperation/interaction**.
5. You can pick up what they've learned over a lifetime just by **learning/listening**.
6. Building a strong foundation in basic science as well as a broad range of technologies allow you to come up with creative **decisions/solutions** to problems.
7. You should pick one particular **object/subject** area in which to specialize.
8. What you learn in solving specific technical or people problems often enables you to tackle even bigger **cases/projects**.
9. You should decide on what you want to **complete/accomplish** in life, and look at the trends in your particular area of interest.
10. As you develop an understanding and appreciation for what other people do, you will naturally **recognize/respect** them as individuals.

Task 6

Fill in the blanks with appropriate words:

knowledge	base subject	alert minds
projects	reciprocity	develop
information	technology	available solutions

1. We understand more science and have modern tools like computers and lasers to design and build things, plus we can use _____to gather data when we have knowledge gaps.

2. Successful engineers are people who have _____and a natural curiosity for everything around them.

3. With the broad _____they build over time, they can come up with fantastic ideas for solving just about any kind of problem, and they are able to build marvelous things or great companies by working with other people.

4. To start out you should _____an interest in learning.

5. This breadth of knowledge helps you become aware of what you don't know and gives you a sense of where to look for _____.

6. The particular topic is not so important because once you know how to dig deeply you can do so quickly on any _____that interests you.

7. You should put a high value on your time, and only take on _____for which you have passion.

8. Success is naturally optimized when you make the best use of _____resources.

9. Respect begets respect because _____is the basis of human relationships.

TEXT 2

MATHEMATICS – THE LANGUAGE OF SCIENCE

Vocabulary

human language – мова людини
statement – твердження, судження
development – розвиток
customs and traditions – звичаї та традиції
meaning – значення
precise – точний
broad sense – широке розуміння
deal with – мати справу з
permeate – пронизувати, проникати
perfection – досконалість
unknown – невідомий
representation – представництво
expression – вираз
belief – віра, переконання
absence – відсутність
frequent – частий
medieval Europe – середньовічна Європа
duly – належним чином, гідно
turning point – переломний момент
magnitude – величина
vowel – голосний
consonant – приголосний
death – смерть
notation – позначення
susceptible – сприйнятливий
convenient – зручний

Human language is capable of precise statements because it is a system of symbols. But common language is a product of social development, customs and traditions. Even by the most careful choice of words the meaning concealed in them

may influence our reasoning. Algebra, the language of mathematics, consists mostly of signs and symbols and is carefully and purposefully designed. It is precise, concise and universal, i. e. one and the same throughout the civilized world, though the people in each country translate it into their own spoken language.

Algebra in the broad sense of the term, deals with operations upon symbolic forms. In this capacity it not only permeates all of mathematics, but pervades practically all sciences including formal logic, philosophy, and even linguistics, poetry and music. In our scientific age there is a general belief that all science, as it grows to perfection, becomes mathematical in its ideas.

It is generally true that in the development of algebra three stages have been passed successively: verbal, abbreviated and symbolic. Verbal algebra is characterized by the complete absence of any symbols, except, of course, that the words themselves are used in their symbolic sense. To this day verbal algebra is used in such a statement as "the sum is independent of the order of the terms", which in symbols is designated by $a + b = b + a$.

Abbreviated algebra is a further development of verbal one. Certain words of frequent use are gradually abbreviated. The history of the symbols "+" and "–" may illustrate the point. In medieval Europe the latter was de noted by the full word "mi nus", then by the first letter "m" duly superscribed. Eventually the letter itself was dropped, leaving the superscript only. The sign "plus" has passed through a similar metamorphosis. The abbreviation has become a symbol.

The turning point in the history of algebra was an essay written late in the sixteenth century by a French man; it was Vinte who denoted the unknown magnitudes by vowels. The given magnitudes were designated by consonants.

Within half a century of Vinte's death there appeared Descartes's Geometry. In it, the first letters of the alphabet were used for the given quantities, the last – for those unknown.

The Cartesian notation not only displaced the Vinte's one, but has survived to this day.

It is symbols that permit of concise, clear representation of ideas which are sometimes quite complex. Consider, for example, how much is involved in the calculus symbol «Dy». Once we have grasped the meaning and use of a symbol there is no need to think through the origin and development of the idea symbolized, each time it is used. It is due to a powerful technique based upon the use of symbols that mathematics is so effective in problems which are insoluble by other methods.

It is convenient because the literal notation is free from all ambiguities of words. The letter is susceptible of operations and this enables one to transform literal expressions and thus to paraphrase any statement into a number of equivalent forms. It is this power of transformation that lifts algebra above the level of a convenient short hand.

It is symbolic language that is one of the basic characteristics of modern mathematics. And modern mathematics supplies a language for the treatment of the qualitative problems of physical and social sciences.

NOTES

1. Is capable of (precise) statement – здатний (точно) передавати висловлювання
2. Dy (derivative of y) – похідна від y
3. To superscribe – робити напис зверху
4. Literal notation – буквене позначення, буквений запис
5. Susceptible (of) – який (що) допускає

Task 1

Answer the following questions.

1. Why is it important to know mathematics?
2. What is the distinction between common human language and the language of mathematics?
3. How is the language of mathematics designed?
4. Why is algebra called the language of mathematics?
5. What signs and symbols in mathematics do you know?
6. What three stages has algebra passed through in its development?
7. What event may be called the turning point in the history of algebra?
8. What sciences does mathematics embrace?
9. What can you say about the expression "mathematics is the language of science"?

Task 2

Find in the text the words which can form:

a) adverbs after the model A + ly: full – fully;
b) adjectives after the model S + ic: symbol – symbolic;
c) nouns after the model V + ation: abbreviate – abbreviation.

Task 3

Translate the following words of the same root into English:

використовувати – використовування – користь – корисний – некорисний;
ділити – поділ – подільність – подільний – неподільний;
різнитися – різниця – різний – розрізнення.

Task 4

Arrange the following words according to:

a) similar meaning: precise, identical, exact, similar, careful, complicated, complex, attentive, universal, recurrent, global, frequent, brief, entire, complete, concise;

b) opposite meaning: simple, free, different, chief, precise, minor, similar, dependent, complex, long, ambiguous, brief.

Task 5

Translate into English using words and word combinations from the text:

1. Математична мова – це мова знаків та символів.
2. Мова математики проста і універсальна.
3. Люди різних країн перекладають знаки і символи мови математики рідною мовою.
4. Алгебра – це мова математики.
5. У своєму розвитку алгебра пройшла декілька ступенів.
6. Сучасна алгебра об’єднує велику кількість самостійних дисциплін.
7. Метод аналізу математичних моделей посідає провідне місце серед інших методів дослідження.

TEXTS FOR RENDERING AND DISCUSSION

TEXT A

THE ESSENTIAL TRIANGLE

- ***Give a written/oral summary of the text.***

Technological and industrial progress depends on the scientist, the engineer and the technologist – an essential triangle. Each makes major contribution to progress. The engineer depends upon the scientist for new knowledge and upon the technologist for specialized assistance in translating engineering plans into operating reality.

The interests of the research engineer are in the area of applied science and research. Scientists work in a world of generalizations and abstractions. The technologist, on the other hand, works in the real world of specific things and concrete objects. His problems are practical and they require practical solutions. He is more interested in how to do things. He must understand engineering tables and formulas and apply them in his work. The scientists, the research engineers, the technologists – all play an important role in the modern world.

The engineer must combine many of the characteristics of the scientist, research engineer and technologist. He must have a basic knowledge of the sciences, and understanding of the abstract techniques of the research engineer and he should know much of the technology employed by technologists.

Perhaps the most important function of the engineer is to integrate the work of the essential triangle. His interest must be in combining the abstract-theoretical world and the technical-practical world.

TEXT B

INDUSTRIAL ENGINEERING AND AUTOMATION

- ***Give a written/oral summary of the text.***

A major advance in twentieth century manufacturing was the development of mass production techniques. Mass production refers to manufacturing processes in which an assembly line, usually a conveyer belt, moves the product to stations where each worker performs a limited number of operations until the product is assembled.

Mass production increases efficiency and productivity to a point beyond which the monotony of repeating an operation over and over slows down the workers. Many ways have been tried to increase productivity on assembly lines: some of them are as superficial as piping music into the plant or painting the industrial apparatus in bright colours; others entail giving workers more variety in their tasks and more responsibility for the product. These human factors are important considerations for industrial engineers.

Another factor is whether each manufacturing process can be automated in whole or in part. Automation is a word coined in the 1940s to describe processes by which machines do tasks previously performed by people.

Automation was first applied to industry in continuous-process manufacturing such as refining petroleum, making petrochemicals, and refining steel. A later development was computer-controlled automation of assembly line manufacturing, especially those in which quality control was an important factor.

UNIT II

GRAMMAR: THE ADJECTIVE

В англійській мові прикметники змінюються за ступенями порівняння. Якісні прикметники мають основну форму (the positive degree), вищий ступінь порівняння (the superlative degree).

Види прикметників	**Основна форма**	**Вищий ступінь**	**Найвищий ступінь**
Односкладові	long big hot	longer bigger hotter	the longest the biggest the hottest
Двоскладові прикметники, що закінчуються на -y, -er, -le, -ow	easy narrow simple	easier narrower simpler	the easiest the narrowest the simplest
Двоскладові прикметники з наголосом на другому складі	concise polite severe	conciser politer severer	the concisest the politest the severest
Багатоскладові прикметники	beautiful important	more beautiful more important	the most beautiful the most important
Виняток	good (хороший) bad (поганий) little (маленький) much, more (багато) far (далекий)	better (краще) worse (гірше) less (менше) more (більше) further, farther (більш далекий)	best (найкращий) worst (найгірший) least (найменший) most (більше всього) furthest, farthest (самий далекий)

Правила орфографії під час утворення простих форм ступенів порівняння:

1) якщо прикметник закінчується на букву «y» з попередньою приголосною, то перед -er, -est «y» змінюється на «i»: lasy – lasier – the lasiest.

2) в односкладових прикметниках перед закінченнями – er, – est кінцева приголосна подвоюється, якщо перед нею стоїть короткий голосний звук: big – bigger – the biggest.

3) якщо прикметник закінчується на “e”, то перед закінченнями –er, –est воно випадає: nice – nice – the nicest.

Ex. 1. ***Give the comparative and the superlative degrees of the following adjectives.***

Bright; hot; wide; easy; brave; good; active; nervous; fat; bad; profitable; dirty; old; beautiful; thin; little; courageous; happy; attentive; fresh; far; early; late; difficult; near; slow; busy; heavy; dangerous; sunny; cheap; expensive; wise.

Ex. 2. ***Answer the questions.***

1) Which month is longer: March or April?
2) Which is the largest city in the United States of America?
3) Which is the deepest lake in the world?
4) Which is the longest day of the year?
5) Which is the shortest month of the year?
6) When is it colder: in October or in November?
7) Which country is larger: Great Britain or the USA?
8) Which is the highest mountain in the world?
9) Is chemistry more difficult than physics?
10) Which is the most interesting subject?
11) Which do you like better: ice-cream or chocolate?

Ex. 3. ***Translate the sentences with double conjunction "the… the…"***

1) The more you work, the better you know English.
2) The more English books and magazines the students will read, the more new words they will remember.
3) The nearer the winter, the colder the day.
4) The darker is the night, the better we can see Venus.
5) The more widely we apply computers, the greater become the opportunities of our scientific research inn different fields.
6) The sooner you tell him the truth, the better.

Ex. 4. ***Choose the right degree of comparison.***

1) Pete is (better; the best) student in our group. His term – papers are always (better; the best) than yours.
2) This subject is (more interesting; the most interesting) of all the subjects in this faculty. But it is (more difficult; the most difficult) than other subjects.
3) This student does not work at all. He is (worse; the worst) of all the students in our group.
4) See how (good; well) you can do your work.

Ex. 5. ***Insert the correct degree of the adjectives in brackets.***

1) This room is … and … than that one (big, comfortable).
2) Your work is … than that of John's (good).
3) George is … than William. He is … in our family (old).
4) It is … book in my collection (interesting).
5) This street is … and … than that one (narrow, quiet).
6) Which is … room in your flat (large)?
7) Which is … day of the year (long)?
8) Yours is … dictation, I'm sorry to say (bad).
9) Which is … way to the University (near)?
10) Helen is … girl in our group (noisy).
11) July is … and … month of the year (hot, dry).
12) Is your brother … than you (old)?

TEXT 1

EDUCATING TOMORROW'S ENGINEERS

Vocabulary

essential – істотний, важливий
hospital equipment – лікарняне обладнання
humble kettle – простий, звичайний чайник
cash dispenser – банкомат
key individual – ключова (головна) особа
wealth – багатство, добробут
to employ – наймати на роботу
approximately – приблизно
out of recognition – до невпізнання
sheer speed of change – абсолютна швидкість змін
startling – вражаючий
gregarious – комунікабельний, контактний
to solve problems – вирішувати проблеми
a keen sense of – гостре відчуття
to be provided – бути забезпеченим
staff – персонал
appropriate – відповідний
to be recognized – бути визнаним
undergraduate education – базова вища освіта
self-assurance – впевненість у собі
to apply – застосовувати
in hand – одночасно
partnership – партнерство
to extend – поширювати, подовжувати, розповсюджувати

DISCUSSION:
- How can engineering help us in everyday life? Why is it so important?
- Is the engineering education different throughout the world?

The engineering industry makes most of the things that are essential and useful: aerospace, cars, hospital equipment, telecommunications and even the humble kettle. Engineering also makes most of the things other industries need from cash dispensers and electronic mail for the banking industry to microphones and staging for the entertainment industry. In the production of everything from chocolates to the Channel Tunnel, the key individuals are the engineers. It's an industry that still contributes significantly to the wealth of the UK, the very diverse manufacturing industry sector alone generates around a third of the national wealth and employs approximately 32 percent of the working population.

In recent years, engineering has changed out of all recognition. The sheer speed of change in many manufacturing technologies is startling. Thanks to the introduction of computers and new technologies like Virtual Reality, people are more in control than ever. This also means the engineering employers are looking for people with a wider range of skills and personalities: from lone-theorists to more gregarious and practical individuals; from managers who can handle people, lead teams and solve

problems, to creative designers with a keen sense of market realities. Engineering needs them all – women as well as men.

Engineering education developed very differently on the Continent and in the UK. On the Continent, engineering and technical sciences were set up in technical universities, while in the UK engineering departments were set up in multi-discipline universities. As a result, the Continental engineering education is a more professionally oriented subject, while in the UK the emphasis was on engineering science. The Continental technical universities have developed a much closer relationship with industry. In Germany, there are many visiting industrial professors, who will spend a day in the University. In France much of the lecturing is provided by staff from the appropriate industries.

Lastly, the objective of engineering education and training in any country should be recognized. The main objectives of undergraduate education are to educate and train people to think and search out knowledge for themselves, and to have the self-assurance to apply it to the job in hand. Industry must recognize that a graduate will need training in the specific area in which he is working, and must also be prepared to encourage him to attend continuing education courses as appropriate.

The education and training of engineers must be a partnership between industry and higher education, which extends from undergraduate education and training through to post-graduate courses and research.

Task 1

Are these sentences true or false? Correct the false sentences:

1. The engineering education should be more industrially oriented.
2. Engineers are the key individuals and if you want to produce anything you should study engineering.
3. Industrial sector generates around a third of the national wealth and employs approximately 32.5 percent of the working population.
4. The sheer speed of change in many manufacturing technologies is insufficient.
5. It is clear that there is to be much more interchange of staff between industry and higher education.
6. Practical individuals are more important for modern technologies than lone-theorists.
7. Engineering needs both genders.
8. Engineering education in EU and in the UK is the same because until recently the UK was the member of EU.
9. The main aim of undergraduate education is to educate and train people to search out knowledge for themselves.
10. Engineers must attend post-graduate courses.

Task 2

Put the words in the correct order to make sentences.

1. the/ contributes/ UK/ it's/ wealth/ significantly/ industry/ that/ an/ still/ to/ of/

the.

2. all/ women/ needs/ engineering/ men/ them/ as well as.

3. industries/ lecturing/ by/ France/ of/ the/ appropriate/ much/ is/ provided/ staff/ from/ the/ in.

4. the/ education/ is/ professionally/ continental/ engineering/ subject/ a/ more/ oriented.

5. industry/ most/ the/ makes/ things/ essential/ engineering/ useful/ of/ the/ that/ are/ and.

6. the/ country/ of/ and/ training/ should/ be/ in/ any/ education/ engineering/ recognized/ objective.

7. has changed/ out of/ years/ in/ recognition/ recent/ engineering/ all.

8. will/ specific/ he/ which/ need/ is/ working/ training/ a/ graduate/ in/ the/ area/ in.

9. developed/ industry/ closer/ the/ much/ continental/ universities/ have/ a/ with/ technical/ relationship.

10. people/ ever/ new/ thanks/ control/ to/ the/ of/ technologies/ computers/ and/ than/ are/ in/ introduction/ more.

Task 3

Match the words and their definitions.

1	manufacturing	**A**	a container or device in which water is boiled, having a lid, spout, and handle
2	multi-discipline	**B**	the intellectual and practical activity encompassing the systematic study of the structure and behaviour of the physical and natural world through observation and experiment
3	kettle	**C**	acknowledgement of the existence, validity, or legality of something
4	to handle	**D**	manage a situation or problem
5	to apply	**E**	the necessary items for a particular purpose
6	science	**F**	make a formal application or request
7	to extend	**G**	the systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions
8	equipment	**H**	combining or involving several academic disciplines or professional specializations in an approach to a topic or problem
9	recognition	**I**	the making of articles on a large scale using machinery, industrial production
10	research	**J**	cause to cover a wider area, make larger

Task 4

Match the words in the right column with the words in the left column to make word combinations.

1	working	***a***	dispensers
2	undergraduate	***b***	wealth
3	engineering	***c***	education
4	cash	***d***	employers
5	professionally	***e***	reality
6	specific	***f***	area
7	market	***g***	universities
8	virtual	***h***	population
9	multi-discipline	***i***	oriented
10	national	***j***	realities

Task 5

Choose the correct statement:

1. The very diverse **malfunctioning/manufacturing** industry sector alone generates around a third of the national wealth and employs approximately 32 percent of the working population.
2. In the production of everything from chocolates to the Channel Tunnel, the **keen/key** individuals are the engineers.
3. The engineering employers are looking for people with a **wider/higher** range of skills and personalities: from managers who can handle people, lead teams and solve problems, to creative designers with a keen sense of market realities.
4. Engineering education developed very **different/differently** on the Continent and in the UK.
5. The Continental technical universities have **succeed/developed** a much closer relationship with industry.
6. In the UK the **emphasis/significance** was on engineering science.
7. In France much of the lecturing is provided by staff from the **appropriate/approximate** industries.
8. The main objectives of undergraduate education are to **educate/elicit** and train people to think.
9. The education and training of engineers must be a **membership/partnership** between industry and higher education.
10. As a result, the Continental engineering education is a more professionally **oriental/oriented** subject.

Task 6

Fill in the blanks with appropriate words:

contributes	recognized	cash
graduate	essential	spend
multi-discipline	sheer	recognition
	set up	

1. The engineering industry makes most of the things that are _____ and useful.
2. In recent years, engineering has changed out of all _____.
3. It's an industry that still _____ significantly to the wealth of the UK.
4. Engineering and technical sciences were _____ in technical universities.
5. The objective of engineering education and training in any country should be _____.
6. In Germany, there are many visiting industrial professors, who will _____ a day in the University.
7. Industry must recognize that a _____ will need training in the specific area in which he is working.
8. The _____ speed of change in many manufacturing technologies is startling.
9. Engineering also makes most of the things other industries need from _____ dispensers and electronic mail for the banking industry.
10. In the UK engineering departments were set up in _____ universities.

TEXT 2

MY SPECIALITY (EQUIPMENT AND TECHNICAL SERVICE)

Vocabulary

education – освіта

provide – забезпечувати
highly-qualified – висококваліфікований
development – розвиток
department – кафедра
equipment – обладнання

catering – харчування
processing – обробка
future – майбутнє
research – дослідження, дослідний
useful – корисний

gradual transition – поступовий перехід
preservation – збереження
drawing – креслення
food-stuff – продукти харчування
defense – захист
graduation work – випускна (дипломна) робота
optional – факультативний
taxation – оподаткування
up-to-date – сучасний
profound – глибокий
opportunity – можливість

Higher education plays an important part in the life of any country as it provides the country with highly-qualified specialists for future development and progress.

I study at the Educational and Scientific Institute of Food Technologies and Business of the Kharkiv State University of Food Technology and Trade. This department of our University trains professionals specializing in food industry equipment and machinery. Graduates gain a qualification in Mechanics.

They work as managers of trade engineering services, catering and food-stuffs processing, chief engineers, mechanics and designers.

One of the main tasks facing the further development of catering and trade is the gradual transition to industrial methods in the processing of products, preparation of food and preservation of products.

For me, as a mechanical engineer in future, much still remains to be done to fulfill this task.

Students study following subjects:

- humanitarian: history, philosophy, economic theories, politology, sociology and labor psychology, law, foreign languages;
- general: higher mathematics, physics, chemistry, mechanics, drawing, equipment and machinery theory, material proceeding, mechanical engineering technology, computers and programming, economics.
- special: processes and food production industry apparatus, technology and science of food-stuffs commodities, organization of trade, trade enterprises equipment.

Education is completed by defense of graduation work.

Except compulsory subjects the students study different optional subjects: aesthetic and design, banking, audit, taxation, market relations theory, foreign economic activities, logic, econometrics and others.

Our University has up-to-date facilities: a computer centre, studies and research laboratories. Students have every opportunity to get profound knowledge and master their speciality.

They are sure that after graduating they will be useful for the country and the people.

Task 1

Answer the following questions.

1. Where do you study?
2. What is the main specialization at the mechanical faculty of the University?
3. What is the main qualification?
4. What subjects do students study at the faculty?
5. Is education completed by defense of graduation work?

Task 2

Complete the sentences with the appropriate word.

1 In laboratories students do _____.

a) research work;
b) lessons;
c) toys.

2 The more we study, the more we _____.

a) play;
b) know;
c) understand.

3 This new electronic device will be tested in our research_____.

a) study;
b) class;
c) laboratory.

4 The report contains a lot of new information on the problem of condensed milk_____.

a) production;
b) using;
c) quality.

5 A refrigerator is a machine that maintains a lower _____ in its chamber than that outside the refrigerator.

a) weight;
b) temperature.

Task 3

Find synonyms to the following words in the text.

Plant, aim, goods, grade, seller, manufacturing, to provide.

Find antonyms to the following words in the text.

Answer, to graduate from, to receive, after, useful, ancient, to study.

Task 4

Give English equivalents to the following:

Вищий навчальний заклад, виробництво харчових продуктів, машини та апарати харчових виробництв, теорія машин та механізмів, поступовий перехід, матеріалознавство, дипломна робота.

Task 5

Complete the sentences:

1. They work as managers of trading engineering services, catering and food-stuffs processing, chief engineers, mechanics and….

2. One of the main tasks of the further development of catering and trade is the gradual transition to industrial ……. In the processing of products, preparation of food and preservation of products.

3. Much still remains to be done to fulfill this….

4. Students have every opportunity to get profound…

5. Graduates are sure that they will be useful for the country and the…

TEXTS FOR RENDERING AND DISCUSSION

TEXT A

WHAT IS A FOOD MECHANICAL ENGINEER?

➢ ***Give a written/oral summary of the text.***

In the early decades of the 20th Century it was relatively easy to differentiate between a mechanical engineer and an engineer of other disciplines such as electrical engineering or civil engineering.

Now in the 21st Century engineers must acquire a broad range of skills which include aspects of many disciplines. Mechanical Engineers often diversify and acquire knowledge and experience, constantly learning and adding to their expertise.

The title food engineer can mean different things to different people. The interpretation depends on the context, surroundings, and environment in which the engineer operates.

KSUFT examines food engineering in the context of a mechanical engineer as opposed to a food technologist who might be more closely involved in manipulating the composition of food mixes, chemical interactions between constituent elements of food.

A food engineer might be described as someone who uses science and knowledge, to design, construct, operate, or maintain devices, equipment, or systems to provide food for the society we live in. This equipment might be associated with the agricultural industry, or the food manufacturing and processing sector, and could involve operations such as harvesting, processing, packaging, storage, and transportation.

This will embrace principles of applied mathematics, mechanics of machines, thermodynamics, fluid systems, and strength of materials, which are required for the design, manufacture, operation and maintenance of engineering systems and equipment.

A food engineer might be a mechanical engineer that works in a food organization or environment, or who is involved with food processing equipment, devices or services associated with food, and will develop specialist skills relevant to the situation. Engineers in the food industry can acquire knowledge of refrigeration, gas, electricity, and water supply systems and the particular disposal or alternative use of food waste and waste water.

TEXT B

WHY BECOME A FOOD MECHANICAL ENGINEER?

➢ ***Give a written/oral summary of the text.***

We all need food to survive and we must provide more and more food to serve the growing world population. A food engineer can help to provide conditions, facilities and equipment necessary to prepare food in the increasing quantities required.

To satisfy the ever growing demand mass production systems are required. Plants often specialize in processing specific products and product lines. The sector is currently the largest UK market for robotics as well as the largest UK economic sector. The Industry also has a focus on integrated systems engineering, sensor technology, communication systems, hygienic system design and state of the art product traceability.

At the raw material end of the food chain engineers are involved in operations associated with the rearing of animals, growing and harvesting of crops, or catching of fish or game. (These are usually agricultural engineers.) Systems are then required to process these materials into food which is safe to eat. The food must be kept safe until eaten by the consumer. This often involves refrigeration systems, pasteurization, and specialist packaging systems.

Food mechanical engineers must also be fully aware of the need for food safety at all points of the food processing chain from raw material to finished product. System and machine design must reflect the high food safety standards required.

UNIT III

GRAMMAR: THE NUMERALS

Числівники поділяються на кількісні (cardinal numerals) і порядкові (ordinal numerals).

Кількісні числівники (cardinal numerals)

seven (7)	-teen -ty hundred	seventeen (17) seventy (70) seven hundred

100 – a (one) hundred
1,000 – a (one) thousand
1,000,000 – a (one) million
1,000,000,000 – a (one) milliard (BE)
a (one) billion (AE)
2,045,329 – two million forty five thousand three hundred and twenty eight
Примітка. Зверніть увагу на написання деяких похідних числівників:

two – twelve – twenty
three – thirteen – thirty
four – fourteen – forty
five – fifteen – fifty
eight – eighteen – eighty

Якщо перед числівниками hundred, thousand, million стоїть інший числівник, то вони у множині не мають закінчення –s: two hundred, five thousand, eight million.

Якщо числівники вживаються як іменники, вони приймають у множині закінчення – s: hundreds of books – сотні книжок, millions of cars – мільйони автомобілів.

Кожні три розряди багатоцифрових чисел відокремлюються комою 2,045,328.

Порядкові числівники (Ordinal Numerals)

one – the first (1 st) – перший
two – the second (2 nd) – другий
three – the third (3 rd) – третій
four + th = the fourth (4 th) – четвертий
five – the fifth (5 th) – п’ятий
six + th = the sixth (6 th) – шостий
seven + th = the seventh (7 th) – сьомий
eight + th = the eight (8 th) – восьмий
nine + th = the ninth (9 th) – дев’ятий
ten + th = the tenth (10 th) – десятий
eleven + th = the eleventh (11 th) – одинадцятий
twelve + th = the twelfth (12 th) – дванадцятий
thirteen + th = the thirteenth (13 th) – тринадцятий
twenty + th = the twentieth (20 th) – двадцятий
twenty one – the twenty-first (21 st) – двадцять перший
thirty – thirtieth (30 th) – тридцятий
hundred – hundredth (100 th) – сотий

дати	May 9, 1945 – May the ninth (the ninth of May); nineteen forty-five; 1900 – nineteen hundred; 1905 – nineteen o (ou) five; 2000 – two thousand
дробові числівники	½ – a (one) half, ¼ – a (one) quarter/fourth, 2/3 – two thirds, 2 3/7 – two and three sevenths, 0.5 – (naught) point five, 3.751 – three point seven five one
номера телефонів, сторінок, глав і т.і.	366038 – three double six o (ou) three eight 5446 – five four four six page twenty-five – сторінка двадцять п’ята part three – частина третя

	chapter six – глава шоста room ten – кімната десята size thirty-seven – розмір тридцять сьомий

У простих дробах чисельником є кількісний числівник, а знаменником – порядковий. Якщо чисельний більший від одиниці, то знаменник має закінчення –s: 2/3 – two thirds. Між цілою і дробовою частиною вживається сполучник and: 2 3/7 – two and three sevenths. У десяткових дробах ціла частина відокремлена від дробової крапкою і читається point: 0.5 – (naught) point five.

Ex. 1. ***Read and write these cardinal numerals.***

a) 3; 13; 30; 4; 14; 40; 5; 15; 50; 2; 12; 20; 8; 18; 80.
b) 21; 82; 35; 44; 33; 55; 96; 67; 79; 41; 53; 22.
c) 143; 258; 414; 331; 972; 805; 101; 557; 999; 313.
d) 1,582; 7,111; 3,013; 5,612; 2,003; 9,444; 4,040.
e) 15; 500; 57,837; 45,971; 92,017; 65,331; 11,443.
f) 235,142; 978,218; 106,008; 321,103; 627,344; 552,331.
g) 1,352,846; 4,125,963; 35,756,394; 257,382,761.

Ex. 2. ***Form, read and write ordinal numerals from the following.***

a) 7; 4; 8; 9; 5; 12; 3; 2; 1; 13; 15; 11; 10.
b) 20; 21; 30; 32; 40; 43; 50; 54; 60; 75; 80; 98.
c) 100; 120; 125; 200; 230; 231; 300; 450; 563; 892.

Ex. 3. ***Read and write the following dates.***

17/XII 1812; 22/IV 2000; 9/V 1945; 23/II 1928; 12/IV 2001; 27/X 1977; 30/XI 1982; 17/VII 2005; 11/IX 1998; 1/I 2000; 13/VIII 2007.

Ex. 4. ***Answer the following questions.***

1) How much is 17 plus 19?
2) How much is 25 plus 32?
3) How much is 120 plus 205?
4) How much is 13 minus 4?
5) How much is 200 minus 45?
6) How much is 7 multiplied by 8?
7) How much is 42 divided by 6?

Ex. 5. ***Read and write out in words these common and decimal fraction.***

a) 1/7; 1/5; 1/9; 1/3; 1/12; 1/15; 1/25; 3/8; 2/5; 4/7; 9/23; ¾; 5/9; 1 3/40; 1 3/5; 2 5/7; 5 1/3; 4 1/6.

b) 3.5; 2.34; 12.3; 52.51; 0.1; 0.25; 0.302; 132.054; 5.37; 6.4.

TEXT 1

ELECTRICITY

Vocabulary

transmission shaft – трансмісійний вал
gear wheel – зубчате колесо
belt – ремінь
pulley – блок
induction motor – індукційний мотор
appliance – електроприлад
saving – економити; зберігати
per capita – на душу населення; на людину
by-products – побічні продукти
truly – по правді
application – застосування
longstanding – давній
device – прилад; пристрій
advantage – перевага
beam – радіус дії
mankind – людство

It is impossible to imagine our civilization without electricity: economic and social progress will be turned to the past and our daily lives completely transformed. Electrical power has become universal. Thousands of applications of electricity such as lighting, electrochemistry and electrometallurgy are longstanding and unquestionable. With the appearance of the electrical motor, power cables replaced transmission shafts, gear wheels, belts and pulleys in the 19-th century workshops. And in the home a whole range of various time and labour saving appliances have become a part of our everyday lives.

Other devices are based on specific properties of electricity: electrostatics in the case of photocopying machine and electro magnetism in the case of radar and television. These applications have made electricity most widely used. The first industrial application was in the silver workshops in Paris. The generator – a new compact source of electricity – was also developed there. The generator replaced the batteries and other devices that had been used before. Electric lighting came into wide use at the end of the XIX century with the development of the electric lamp by Thomas Edison. Then the transformer was invented, the first electric lines and networks were set up, dynamos and induction motors were designed. Since the beginning of the 20th century the successful development of electricity has begun throughout the industrial world. The consumption of electricity has doubled every ten years.

Today consumption of electricity per capita is an indicator of the state of development and economic health of a nation. Electricity has replaced other sources of energy as it has been realized that it offers improved service and reduced cost. One of the greatest advantages of electricity is that it is clean, easily-regulated and generates no by-products. Applications of electricity now cover all fields of human activity from house washing machines to the latest laser devices. Electricity is the efficient source of some of the most recent technological advances such as the laser and electron beams. Truly electricity provides mankind with the energy of the future.

Task 1

Are these sentences true or false? Correct the false sentences:

1. Thousands of applications of electricity such as lighting, electrochemistry and electrometallurgy are longstanding and unquestionable.
2. In the home a whole range of various time and labour saving appliances has become a part of our everyday lives.
3. With the appearance of the electrical motor, transmission shafts, gear wheels, belts and pulleys replaced power cables in the 19-th century workshops.
4. A lot of devices are based on specific properties of electricity: electrostatics in the case of photocopying machine and electro magnetism in the case of radar and television.
5. The first industrial application was in the silver workshops in Paris.
6. Electric lighting came into wide use at the end of the XIX century with the development of the generator by Thomas Edison.
7. Then the transformer was invented, the first electric lines and networks were set up, dynamos and induction motors were designed.
8. Since the beginning of the 19th century the successful development of electricity has begun throughout the industrial world.
9. The consumption of electricity has doubled every five years.
10. Electricity is the efficient source of some of the most recent technological advances such as the laser and electron beams.

Task 2

Put the words in the correct order to make sentences.

1. Impossible/our/electricity/is/imagine/it/civilization/to/without.
2. Power/become/electrical/has/universal.
3. Electricity/other/of/devices/properties/are/specific/based/on.
4. Used/these/widely/applications/most/have/electricity/made.
5. Generator/the/and/devices/had/used/the/replaced/batteries/other/that/been/ before.
6. Century/electric/last/ lighting/the/came/of/into/end/wide/the/use/at.
7. Consumption/the/electricity/of/doubled/has/ten/every/years.
8. Energy/electricity/of/has/sources/replaced/other.
9. Clean/one/is/of/it/the/that/greatest/is/advantages/electricity/of.
10. Electricity/mankind/the/of/future/truly/provides/with/energy/the.

Task 3

Match the words and their definitions.

1	electricity	**A**	energy or force that can be used to do work
2	transform	**B**	protected bundle of insulated wires for carrying electrical power

3	power	**C**	apparatus for giving a particular kind of light
4	lighting	**D**	all of the phenomena associated with electrons and protons
5	appearance	**E**	machine or apparatus that produces (electricity, gas, etc.)
6	cable	**F**	that which shows or can be seen
7	radar	**G**	create or design (something not existing before)
8	generator	**H**	change the shape appearance, quality or nature of
9	lamp	**I**	apparatus that shows on a screen solid objects that comes within its range
10	invent	**J**	cause to become bright

Task 4

Match the words in the right column with the words in the left column to make word combinations.

1	economic and social	***a***	electricity
2	completely	***b***	transformed
3	electrical	***c***	advances
4	applications of	***d***	energy
5	gear	***e***	human activity
6	sources of	***f***	progress
7	washing	***g***	regulated
8	all fields of	***h***	power
9	easily-	***i***	wheels
10	technological	***j***	machines

Task 5

Choose the correct statement:

1. Electrical power has become **widespread/universal**.
2. In the home a whole range of various time and labour saving **devices/appliances** has become a part of our everyday lives.
3. The first industrial **use/application** was in the silver workshops in Paris.
4. The **transformer/generator** – a new compact source of electricity – was also developed there.
5. Electric lighting came into wide use at the end of the XIX century with the development of the electric **generator/lamp** by Thomas Edison.
6. Then the transformer was invented, the first electric lines and networks were set up, dynamos and induction motors were **developed/designed**.
7. Today **application/consumption** of electricity per capita is an indicator of

the state of development and economic health of a nation.

8. One of the greatest **properties/advantages** of electricity is that it is clean, easily-regulated and generates no by-products.

9. Electricity is the efficient **base/source** of some of the most recent technological advances such as the laser and electron beams.

Task 6

Fill in the blanks with appropriate words:

electricity	consumption	technological
induction	devices	workshops
generates	generator	applications

1. Thousands of _____ of electricity such as lighting, electrochemistry and electrometallurgy are longstanding and unquestionable.
2. Other _____ are based on specific properties of electricity: electrostatics in the case of photocopying machine and electro magnetism in the case of radar and television.
3. The first industrial application was in the silver _____ in Paris.
4. The _____ replaced the batteries and other devices that had been used before.
5. Then the transformer was invented, the first electric lines and networks were set up, dynamos and _____ motors were designed.
6. Today _____ of electricity per capita is an indicator of the state of development and economic health of a nation.
7. One of the greatest advantages of electricity is that it is clean, easily-regulated and _____ no by-products.
8. Applications of _____ now cover all fields of human activity from house washing machines to the latest laser devices.
9. Electricity is the efficient source of some of the most recent _____ advances such as the laser and electron beams.

TEXT 2

POWER TRANSMISSION

Vocabulary

source – джерело
transmission – передача
expand – поширюватися
comparatively – порівняно
electricity – електрика
length – довжина
interconnection – взаємозв’язок
generator – генератор
wire system – дротяна система
subdivide – підрозділятися
distribution line – лінія розподілу
insulator – ізолятор
copper – мідь
exceedingly – надзвичайно

voltage – напруга
current flow – струмовий потік
undesirable – небажаний
decrease – зменшення, скорочення
distribution – роздача, розподіл
reverse – зворотний
fuse – запобіжник, детонатор
substation – підстанція
switchgear buse – комутаційний запобіжник
flexible – гнучкий
ignore – ігнорувати
resistance – опір
hence – отже, звідси
dangerous – небезпечний
inefficient – неефективний
depend on – залежати
cord – шнур
comprise – охоплювати, включати
auxiliary – допоміжний
reliable – надійний

They say that more than a hundred years ago, power was never carried far away from its source. Later on, the range of transmission was expanded to a few miles. Nowadays in a comparatively short period of time it has become possible converting mechanical energy into electrical and transmitting of the electricity over long distances and the length of transmitting power lines varies from area to area. So, a power system is an interconnection of electric power stations by high voltage power transmission lines. It isn't difficult to understand that the above process has been made possible owing to generators, transformers, and motors as well as to other necessary electrical equipment.

A wire system is termed a power line in case it has no parallel branches and a power network in case it has parallel branches.

According to their functions, power lines and networks are subdivided into transmission and distribution lines. Transmission lines serve to deliver power from a station to distribution centers. Distribution lines deliver power from distribution centers to the loads. Lines are also classed into: 1) overhead; 2) indoor; 3) cable (underground).Overhead lines include line conductors, insulators, and supports. The conductors are connected to the insulators, and these are connected to the supports. Conductors used for electric wiring are commonly produced of copper and aluminum. Wires connecting the components of various installations may be insulated. They may also be used without insulating. Since in short lengths of wire power loss is exceedingly low one can ignore it. However, the longer the wire, the greater is its resistance to current flow. On the other hand, the higher the offered resistance, the greater are the heating losses in electric wires. Reducing these undesirable losses is possible in two ways, namely, one can reduce either the resistance or the current. It's easy for us to see how we can decrease resistance: making use of a better conducting material is necessary and as thick wires as possible. However, such wires are calculated to require too much material and hence, they will be too expensive. Is the decreasing of the current permissible? Yes, it's quite permissible to reduce the current in the transmission line by employing transformers. In effect, the waste of useful energy has been greatly decreased due to high-voltage lines. It's well-known that high voltage means low current in its turn results in reduced heating losses in electrical wires. However, using of power at very high voltages for anything's dangerous but transmission and distribution. For that reason, the voltage is always reduced again before making use of power. Power loss

in a line should not exceed a definite value. If this value is exceeded the line becomes inefficient.

One should know that the efficiency of a line isn't constant – it may reverse. The value of the line efficiency depends on the load: the greater the load, the lower is the line efficiency. Protecting devices, fuses and relays are employed to protect the circuit against overcurrents and short-circuits.

The next line type is indoor line which includes conductors, cords and buses. The conductor may consist of one wire or a combination of wires not insulated from one another. They deliver electric current to the consumers.

As to underground lines, they are used in city areas and in the areas of industrial enterprises.

Also substations play an important role in transmitting the electric power. They are designed to receive energy from a power system, convert it and distribute it to the feeders. Thus a substation serves as a distribution centre. Substation feed various consumers provided that their basic load characteristics are similar. Therefore the energy is distributed without transforming of the voltage supplied.

Common substations comprise isolators, switchgear buses, oil circuit breakers, fuses, power and instrument transformers and reactors.

Substations are classed into step up and step down ones. The step up substation includes transformers that increase the voltage. Connected to the busbars of the substation are the power transmission lines of power plants of the system. As to step down substations, they reduce the voltage to 10 or 6 kV. At this voltage the power is supplied to the distribution centers and to the transformer substations of power consumers. A transformer substation serves for transmitting and distributing electric power. It comprises a storage battery, control devices and auxiliary structures. These substations are applied for feeding industrial enterprises. They possess certain advantages: they have flexible construction and easy and reliable operation. In case of a fault in the left-hand section, the main circuit breaker opens while the normally open section circuit breaker closes and puts the voltage of the section to normal.

Task 1

Answer the following questions.

1. What made it possible to transmit electric energy over hundreds of kilometers?
2. Can electric energy be reconverted into mechanical energy?
3. Which system has no parallel branches?
4. Into what groups are all transmitting lines classed?
5. What components does an overhead line have?
6. In what way can the heating losses be reduced in transmission lines?
7. How can resistance be decreased in electric wires?
8. When does a line become inefficient?
9. On what characteristic does the value of a line depend?
10. What mechanisms protect the circuit against short-circuits?
11. What devices does an indoor line consist of?

12. What elements do conductors include?
13. In what areas are underground lines used?
14. What does a substation serve for?
15. What type of consumers does a substation feed?
16. What parts are the power transmission lines connected to?
17. What components does a substation comprise?
18. What types are substations classed into?
19. What are the advantages of a transformer substation?

Task 2

Find the word with the similar meaning according to text.

1. fault	fuse; relay; failure; isolator.
2. circuit breaker	cut-out switch; short-circuit; fossil; pile.
3. to exceed	to convert; to expand; to deliver; to overdraw.
4. cord	substation; flex; cable; support.
5. loss	waste; bus; load; wire.
6. step up substation	low voltage substation; high voltage substation; feeder; insulator.
7. to deliver	to give; to result; to ignore; to depend on.
8. owing to	thus; that's why; thanks to; therefore.
9. to protect	to surround; to contradict; to defend; to carry.
10. auxiliary structure	subsidiary device; major device; driving mechanism; clutch.

Task 3

Match a line in A with a line in B.

A	B
indoor line	switchgear
to reduce the voltage	short-circuit
power	storage battery
overhead lines	step down substation
transmitting the electricity	to supply
a common substation	bus
to protect against	wire
a transformer substation	substation
protecting mechanisms	fuses and relays

Task 4

Match each paragraph with the appropriate summary:

1. The electric line efficiency;
2. The characteristics of indoor lines;
3. The definition of a wire system;
4. The underground lines;
5. The classification of electric lines and networks; heating losses in transmission lines;
6. Electric power systems interconnection;
7. Common substations;
8. The characteristics of step up and step down substations;
9. Substations as power transmission devices.

TEXTS FOR RENDERING AND DISCUSSION

TEXT A

ELECTRIC CURRENT IN A VACUUM

- ***Give a written/oral summary of the text.***

If a free electron were in a vacuum within the electric field set up between positive and negative electrodes, the negatively charged electron would be attracted to the positive electrode. The movement of the electron would constitute a flow of electric current. It is upon this principle that the electron tubes used in radio and television receivers operate.

We can construct an electron tube by sealing a pair of metal electrodes into opposite ends of a glass bulb and by evacuating the air from within the bulb, leaving a vacuum. Connecting the electrodes to a source of electromotive force makes them positive and negative, respectively. A question now arises: how can we get the free electron into the tube?

There is always a disorderly movement of free electrons within all substances, especially metals. If the difference of potential between the two sealed-in electrodes is made great enough, some of free electrons of the negative electrode will be attracted so strongly to the positive electrode that they will leave the former fly through the vacuum to the latter.

If a substance is heated, the movement of free electrons within that substance is increased. If the temperature is raised high enough, the movement of free electrons is increased to the point where some of the actually fly off from the substance. We call this process thermionic electron emission.

In most electron tubes, the negative electrode is heated to the point where it emits electrons. These electrons are attracted to the positive electrode and constitute a

one-way flow of electric current through a vacuum from the negative to the positive electrode.

TEXT B

ELECTRIC POWER INTERRUPTIONS

- ***Give a written/oral summary of the text.***

On November 9, 1965, at 5:16 p.m., a back-up relay failed at one the five main transmission lines at No. 2 near Toronto, Canada. As the load had shifted to the other four lines, they became overloaded, and as a result the relays failed in all four lines. The failure resulted in the load being shifted to the other plants in the system. The plants got overloaded, which caused them to shut down. Within minutes, power plants in Canada, New York, and the New England states got out of service. The blackout affected 30 million people and covered an area of 306,000 sq. m. In some areas, such as New York City, power was not restored for about 13 hours.

The massive power blackout resulted in the construction of the National Electric Reliability Council in June, 1958. This council sets standards for the design, operation, and maintenance of generating and transmission systems. These standards serve to prevent a failure in one power system from spreading to other systems. Yet local system failures can't be avoided.

Nowadays in some European countries and in the US there are from 60 to 80 power interruptions per year, in which there is a loss of service for customers for more than 15 minutes. Mostly these interruptions are caused by weather conditions – ice, freezing snow, lightning or storms. There can be also failures of equipment – transformers, relays, insulators and so on. However, the reliability of electric service is extremely high.

UNIT IV

GRAMMAR: THE PRONOUN

Особові займенники (Personal Pronouns)

Особові займенники мають два відмінки: називний і об'єктний. Займенник *it* вживається замість назв тварин, якщо їх стать невідома або не має значення.
The puppy is in the box. It is sleeping.

Присвійні займенники (Possessive Pronouns)

Присвійні займенники мають дві форма: залежну (conjoint), яка вживається лише як означення до іменника, і незалежну (absolute), яка вживається без іменника, самостійно.

Неозначені займенники (Indefinite Pronouns)

Займенники some, someone, somebody, something вживаються у стверджувальних реченнях, спеціальних та закінчених запитаннях, що виражають пропозицію або запитання:

Will you have some coffee? – Хочете каву?

Please, give me something to eat. – Дайте мені що-небудь поїсти.

Займенники any, anyone, anybody, anything вживаються в загальних запитаннях і заперечних реченнях:

Is there anything on the table? – Чи є щось на столі?

He doesn't see anybody in the classroom. – Він нікого не бачить у класі.

Займенники (The Pronouns)

Особові	**Називний відмінок**	I Я	you ти	he він	she вона	it воно (він, вона)	we ми	you ви	they вони
	Об'єктний відмінок	me мене, мені	you тебе, тобі	him його, йому	her її, їй	it його, йому, її, їй	us нас, нам	you вас, вам	them їх, їм
Присвійні	**Залежна форма**	my мій, моя, моє, мої	your твій, твоя, твоє	his його	her її	its його, її	our наш, наша, наше	your ваш, ваша, ваше	their їхній, їхня, їхнє, їхні
	Незалежна форма	mine мій, моя, моє, мої	yours твої	his його	hers її	its його, її	ours наші	yours ваші	theirs їхні
Зворотньо-ударні		myself сам, сама	yourself сам, сама	him-self сам	her-self сама	itself сама, сам	our-selves самі	your-selves самі	them-selves самі
Взаємні		each other, one another							
Вказувальні		this (these), that (those), such, the same							
Питальні		who, whom, whose, what, which							
Відносні і з'єднувальні		who, whom, whose, which, that							
Неозначені і заперечні		some, any, one, ale, each, every, other, another, both, many, much, few, little, lither, no, none, neither							

Ex. 1. ***Use the personal pronouns instead of underlined nouns.***

1) My sister went to the post-office.
2) I am waiting for my sister.
3) We listened to the teacher with great interest.
4) The teacher is helping the students to translate the article.
5) Mother will send Mary to buy the tickets.
6) The man gave the books to the boy.
7) This book is not suitable for young children.
8) John saw the girls in the park.

Ex. 2. ***Fill in the blanks with possessive pronouns.***

1) Tell him not to forget … ticket, she mustn't forget … either. 2) Whose books are those? Are they … or … ? 3) I see that he has lost … pencil; perhaps you can lend him … ? 4) Lend them … dictionary; they have left … at home. 5) We've taken … dictionaries; has she taken … ? 6) Those seats are not …, they are … . 7) Give me … photo and I'll give you … .

Ex. 3. ***Put into plural.***

1) This is an apple. 2) That is a house. 3) That is a car. 4) This is a chair. 5) Is this a table? 6) Is that a star? 7) Is this a garden? 8) Is that a bus?

Ex. 4. ***Translate into English.***

1) Вона розповіла мені вчора за свою поїздку.
2) Ось ваш словник. А де мій?
3) Він не любе розповідати про себе.
4) Віна відповість на лист сама.
5) Вони бажають це зробити самі.
6) Я сам не знав про це вчора.
7) Ми запросили їх пожити з нами на нашій дачі.
8) Віддайте йому його ручку.
9) Я не знаю куди поклав свій журнал.

Ex. 5. ***Complete the sentences by adding reflexive pronouns.***

Model: I've repaired my TV set … – I've repaired my TV set myself.
1) She cooks breakfast … . 2) We'll water the flowers … . 3) In your place, I would go there … . 4) The professor performed the operation … . 5) The soldiers built the bridge … . 6) The chief engineer went to Lviv … .

Ex. 6. ***Translate into Ukrainian.***

1) Is everybody to the teacher?
2) He somehow managed to do it.
3) Let some students come and help us.
4) Can anyone answer the question?
5) There is nobody here.
6) He is sitting and doing nothing.
7) Somebody called on you yesterday.
8) Everything in the house was clean and new.

9) I went nowhere that day.

Ex. 7. ***Fill in the blanks «some, any, no» and their derivatives.***

1) He’s got … French books at home. 2) Has she got … English magazines? 3) She hasn’t got … coffee in her cup. 4) I don’t know … about your University. Tell me … about it. 5) I can see … . It’s too dark here. 6) Is there … that you want to tell me? 7) Mother has bought … butter.

Ex. 8. ***Fill in the banks somewhere, anywhere, nowhere or everywhere.***

1. I put my dictionary ... yesterday and now I can't find it ....– Of course, that is because you leave your books ... . 2. You must go ... next summer. 3. Did you go ... on Sunday? 4. Let's go ... . The weather is fine. I don't want to stay at home in such weather. 5. I cannot find my glasses .... I always put them ... and then look for them for hours. 6. Today is a holiday. The streets are full of people. There are flags, banners and flowers ....

Ex 9. ***Fill in the blanks:***

a) *some, any, no.*

1. There were ... of my friends there. 2. Well, anyway, there is ... need to hurry, now that we have missed the train. 3. Have you ever seen ... of these pictures before? 4. There is ... water in the" kettle: they have drunk it all. 5. There were ... fir-trees in that forest, but many pines. 6. We could not buy cherries, so we bought ... plums instead.

b) *somebody, anybody, nobody*.

1.1 saw ... I knew at the lecture. 2. I dare say that there may be ... at the lecture that I know, but what does that matter? 3. Do you really think that ... visits this place? 4. I have never seen ... lace their boots like that.

c) *somewhere, anywhere, nowhere.*

1.1 haven't seen him ... . 2. I know the place is ... about here, but exactly where, I don't know. 3. Did you go ... yesterday? – No, I went ... . I stayed at home the whole day.

Ex. 10. ***Fill in the blanks «some, any, no» and their derivatives.***

1. Can I have ... milk? - Yes, you can have .... 2. Will you have ... tea? 3. Give me ... books, please. I have ... to read at home. 4. Put ... sugar in her tea: she does not like sweet tea. 5. Is ... the matter with you? Has ... offended you? I see by your face that ... has happened. 6. We did not see ... in the hall. 7. ... was present at the lesson yesterday. 8. He is busy. He has ... time to go to the cinema with us. 9. Do you need ... books to prepare for your report? 10. Have you ... questions? Ask me ... you like, I shall try to answer ... question. 11. ... liked that play: it was very dull. 12. If ... is ready, we shall begin our experiment.

Ex. 11. ***Fill in the blanks with «few», «little», «a few», «a little».***

1) Can you lend me … money? 2) … pupils speak English as well as she does. 3) We can’t play because we have … time. 4) There were very … people in the street. 5) Mary makes … mistakes in her speech. 6) Give me … apples.

Функції слова «one» (The Functions of the Word «one»)

Вживання	Приклад	Переклад
Числівник	Take one magazine.	Візьми один журнал.
Неозначений займенник – підмет неозначено-особового речення	One must know. One can't answer this question at once.	Треба знати. Неможливо відповісти на це питання зразу.
Слово-замінник (щоб не повторювати раніше вживаного іменника)	This book is more difficult then that one. I have bought the new dictionary as I have lost my old one.	Ця книга важча, ніж та. Я купив новий словник, тому що втрачений старий.

Ex. 12. ***Translate these sentences.***

1) Give me the book, please. – Which one? 2) The first train crossed the bridge at 2 o'clock, the second one at 3 p.m. 3) One never knows what may happen. 4) There are two dictionaries here. Which one do you want? 5) To be a good specialist one must study hard. 6) The more one studies, the more one knows. 7) I'll have to buy a new coat for myself and another one for my sister 8) He has only one examination to take. 9) This TV set is very expensive, show me another one. 10) When one doesn't know grammar, one often makes mistakes.

Ex. 13. ***Fill in the blanks with «one» or «ones».***

1) We live in a large country. She lives a small … . 2) There are many magazines in the book-store. Buy me two English … . 3) I've got to buy a pen. I've lost my old …. 4) No friend at all is better than a bad … . 5) We have to find new methods of investigation because the old … were unsatisfactory. 6) He has got red pencils and blue … . 7) This apparatus is more powerful than the … installed in our laboratory. 8) … thing is clear to everybody: … must study hard if … wants to pass examinations well.

TEXT 1

A GREAT CITIZEN OF THE WORLD

Vocabulary

inventor – винахідник
young – молодий; юний
factory – фабрика; завод
workshop – майстерня;цех
useful – корисний
invention – винахід
building – будівля
return – повертатися
workroom – робоча кімната
citizen – громадянин
shake – потиснути
remember – пам'ятати
shoulder – плече
still – досі; все ще
take – брати
spend – проводити

Every day many people visited Thomas A. Edison's laboratories in Orange, New Jersey. Some of them were young inventors who went to study, but many more of them were tourists. They came from all parts of the US and from other countries as well.

One day a very important citizen from England visited Edison's factories, taking with him his young son, eight years old. They spent many hours in great workshops, looking at hundreds of useful inventions.

Before leaving the laboratories the man went to the office of the main building. Giving his card to the person in charge, he asked: «May I speak to Mr. Edison, please?». The man looked at the card and then answered: «Wait a minute, I'll see». Soon he returned and said: «Come this way, please. Mr. Edison will see you».

The father and his son went into the great inventor's workroom. «Mr. Edison», said the Englishman, «I brought my young son here to see what the world's greatest citizen has done. I want this day to help him all his life. Will you please shake hands with him and say something that he will remember?».

Mr. Edison took the boy's hand. He laid his other hand on the child's shoulder and looked into his eyes. «My boy», he said, «don't watch the clock».

In 1928 Mr. Edison was eighty-one years old, but he still worked sixteen hours a day.

Task 1

Are these sentences true or false? Correct the false sentences:

1. Every day many people visited Thomas A. Edison's laboratories in Orange, New Jersey.
2. Some of them were tourists, but many more of them were young inventors who went to study.
3. One day a very important citizen from Scotland visited Edison's factories, taking with him his young son, eight years old.
4. They spent many hours in great workshops, looking at hundreds of useful inventions.
5. Visitors came from all parts of the UK and from other countries as well.
6. Before leaving the laboratories, the man went to the office of the main building.
7. Giving his card to the person in charge the Englishman asked if he could speak to Mr. Edison.
8. The Englishman brought his young son to meet the world's greatest citizen.
9. Mr. Edison took the boy's hand, laid his other hand on the child's shoulder and said: «Don't watch the clock».
10. In 1928 Mr. Edison was eighty-one years old, but he still worked fourteen hours a day.

Task 2

Put the words in the correct order to make sentences.

1. New Jersey/every/Orange/day/in/many/laboratories/people/Thomas A. Edison's/
visited.
1. Some/tourists/of/were/them/young/them/were/of/inventors/more/who/many/ went/but/to/study.
2. They/from/parts/the/and/other/as/came/all/of/US/from/countries/well.
3. Spent/hours/great/looking/hundreds/useful/they/many/in/workshops/at/of/ inventions.
4. Building/before/main/leaving/the/laboratories/the/of/the/office/man/the/went/ to.
5. Workroom/the/inventor's/father/great/and/the/his/into/son/went.
6. Bought/young/here/see/the/greatest/has/I/my/son/to/what/world's/citizen/don e.
7. Life/I/his/want/all/this/him/day/help/to.
8. Took/boy's/Mr. Edison/the/hand.
9. Day/hours/worked/he/old/eighty-one/Mr.Edison/in/a/sixteen/still/but/years/ was/1928.

Task 3

Match the words and their definitions.

1	inventor	**A**	house or other structure
2	workshop	**B**	helpful; producing good results
3	useful	**C**	person who lives in a town, not in the country
4	laboratory	**D**	person who invest money
5	building	**E**	use of bodily or mental powers with the purpose of doing or making something
6	citizen	**F**	turn the eyes in some direction
7	spend	**G**	coming, going, giving, sending, putting back
8	look	**H**	room or building in which things are made or repaired
9	work	**I**	use up
10	return	**J**	room, building, for scientific experiments, research

Task 4

Match the words in the right column with the words in the left column to make word combinations.

1	every	***a***	many hours
2	young	***b***	a minute
3	spend	***c***	citizen
4	before	***d***	day
5	wait	***e***	workroom
6	come	***f***	hands
7	inventor's	***g***	inventors
8	greatest	***h***	this way
9	shake	***i***	leaving
10	watch	***j***	the clock

Task 5

Choose the correct statement:

1. Every day many people **attended/visited** Thomas A. Edison's laboratories in Orange, New Jersey.
2. Some of them were young **researchers/inventors** who went to study, but many more of them were tourists.
3. One day a very important **person/citizen** from England visited Edison's factories, taking with him his young son, eight years old.
4. They spent many hours in great **laboratories/workshops**, looking at hundreds of useful inventions.
5. Giving his **note/card** to the person in charge, he asked: «May I speak to Mr. Edison, please?».
6. The father and his son went into the great inventor's **office/workroom**.
7. «Mr. Edison», said the Englishman, «I brought my young son here to see what the world's greatest citizen has **made/done**.
8. He laid his other hand on the child's **head/shoulder** and looked into his eyes..
9. In 1928 Mr. Edison was eighty-one years old, but he still worked sixteen hours a **week/day**.

Task 6

Fill in the blanks with appropriate words:

watch	inventions	citizen
shake	factories	workroom
office	inventors	laboratories

1. Every day many people visited Thomas A. Edison's _____ in Orange, New Jersey.

2. Some of them were young _____ who went to study, but many more of them were tourists.

3. One day a very important citizen from England visited Edison's _____, taking with him his young son, eight years old.

4. They spent many hours in great workshops, looking at hundreds of useful _____.

5. Before leaving the laboratories, the man went to the _____ of the main building.

6. The father and his son went into the great inventor's _____.

7. I brought my young son here to see what the world's greatest _____ has done.

8. Will you please _____ hands with him and say something that he will remember?

9. . «My boy», he said, «don't _____ the clock».

TEXT 2

MAGNETISM

Vocabulary

magnetism – магнетизм
lodestone – вапняк
magnetite – магнетит
repulsion – відштовхування
notably – особливо
gravity – сила тяжіння
permanent – постійний
alloy – підмішувати, змішувати
flux – постійний рух, течія
shape – форма
closed loop – замкнутий цикл
field – поле
counting – підрахунок
density – щільність
particle – частинка, частка
movement – рух

The term “magnetism” is derived from “magnesia”, the name of a region in Asia Minor where lodestone, natural magnetic iron ore, was found in ancient times. The Chinese observed the effects of magnetism as early as 2600 BC when they saw that stones like magnetite, when freely suspended, had a tendency to point a north and south direction.

Magnetism is hard to define – we all know what its effects are: the attraction or repulsion of a material by another material. But why does this happen? And why do we only see it in some materials, notably metals and particularly iron? The physics behind this is too complex to go into here, but it is useful to remember that magnetism is a fundamental force (like gravity) and it arises due to the movement of electrical charge. Magnetism is seen whenever electrically charged particles are in motion.

Materials that are attracted by a magnet, such as iron, steel, nickel and cobalt, have the ability to become magnetized. These are called magnetic materials.

There are two kinds of magnet: the permanent magnet and the electromagnet (temporary magnet). A permanent magnet is a material that, when inserted into a strong magnet field, will not only begin to exhibit a magnetic field of its own, but also continue to exhibit a magnetic field when it is removed from the original field.

Magnetic fields from permanent magnets arise from two atomic sources: the spin and orbital motion of electrons. Therefore, the magnetic characteristics of a material can change when alloyed with other elements. For example, a non-magnetic material such as aluminum can become magnetic in materials such as alnico or manganese-aluminum-carbon.

Did you ever do the famous experiment at school where you took a magnet, placed it on a piece of paper and then sprinkled iron filings over it? If you did, you would see that it looks a bit like the diagram based on a bar magnet (Figure 1).

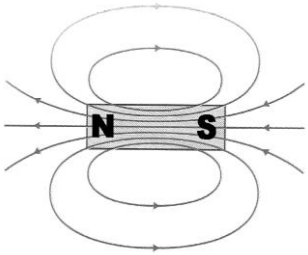


Fig. 1. Bar magnet

Each one of these lines is called a line of magnetic flux and has the following properties:

- they will never cross, but become distorted,
- they will always try to return to their original shape,
- they will always form a closed loop,
- outside the magnet they run north and south,
- the higher the number of lines of magnetic flux, the stronger the magnet.

The strength of the magnetic field at any point is calculated by counting the number of lines we have at that point and this is then called the flux density measured in webers per square metre. This unit is given the title of a tesla. We define this by saying that: “If one weber of magnetic flux is spread evenly over a cross-sectional area of one square metre, then we have a flux density of one tesla (1T)”. In other words the flux density depends on the amount of magnetic flux lines and the area to which they are applied.

Task 1

Read the text and find the answers to the following questions.

1. Where can magnetism be seen?
2. What kinds of magnets are there?
3. What properties do the lines of magnetic flux possess?
4. Where is the term magnetism derived from?

5. When did the Chinese observe the effects of magnetism?
6. Why does magnetism happen?
7. What materials are called magnetic?
8. What is a permanent magnet?
9. Under what condition can magnetic characteristics of a material change?
10. How is the flux density calculated?
11. What does the flux density depend on?

Task 2

Are these sentences true or false? Correct the false sentences:

1. Lodestone is a natural magnet.
2. It is easy to define magnetism.
3. The scientific concept of magnetism is as important as the concept of gravity.
4. An electromagnet is a type of magnet whose magnetic field is produced by the flow of electric current.
5. Tesla is a unit of a cross-sectional area.

Task 3

Choose the word which best completes each sentence.

a. physics b. physical c. physicist

1. Wilhelm Eduard Weber is a famous German ____.
2. Isaac Newton's achievements in mathematics, optics, and ____ laid the foundations for modern science and revolutionized the world.
3. Weight and volume are considered to be the ____ properties of a substance.

d. dense e. densely f. density

4. We know flux ____ to be the magnitude of a magnetic, electric, or other flux passing through a unit area.
5. Oxygen is quite a ____ gas.
6. Monaco is the world's most ____ populated country and second-smallest independent nation.

g. Power h. powerful i. powerless

7. Computers are now more compact and ____.
8. 30,000 homes were left without ____.
9. Any person who is unable to control or influence events is ____.

Task 4

Match the term in A with its definition in B.

A	B
1. Physics	a. the study of quantity, structure, space, and change
2. Electrostatics	b. the social science that studies the production, distribution and consumption of goods and services
3. Mathematics	c. the branch of science which studies matter and energy and how they interact with each other
4. Economics	d. the branch of science that deals with the phenomena arising from stationary or slow-moving electric charges.

TEXTS FOR RENDERING AND DISCUSSION

TEXT A

GENERATORS

- ***Give a written/oral summary of the text.***

Within a year of Michael Faraday's discovery of electromagnetic induction (1831), a small hand generator was demonstrated in Paris, and by 1850 generators were being manufactured in several countries. These early generators were little more than assemblies of coils and permanent magnets that could be maintained in relative motion. Further developments of significance did not appear until the experimental work of William Sturgeon of England and of Joseph Henry and Thomas Davenport of the United States led to the manufacture of practical electromagnets. This technological advance contributed much to the development of practical electrical machines.

The dynamo-electric machines turn mechanical energy directly into electrical energy with a loss of only a few percent. There are two types of dynamos, namely, the generator and the alternator. The former supplies direct current (d. c.) which is similar to the current from a battery and the latter, as its name implies provides alternating current (a. c.).

To generate electricity both of them must be continuously provided with energy from some outside source of mechanical energy such as steam engines, steam turbines or water turbines, for instance.

Both generators and alternators consist of the following principle parts: an armature and an electromagnet. The electromagnet of a d. c. generator is usually called a stator for it is in static condition while the armature (the rotor) is rotating. Alternators may be divided into two types: (1) alternators that have a stationary

armature and a rotating electro-magnet; (2) alternators whose armature serves as a rotor but this is seldom done. In order to get a strong electromotive force (e. m. f.), the rotors in large machines rotate at a speed of thousands of revolutions per minute. The faster they rotate, the greater the output voltage the machine will produce.

In order to produce electricity under the most economical conditions, the generators must be as large as possible. In addition to it, they should be kept as fully loaded as possible all the time.

TEXT B

BATTERIES

➢ ***Give a written/oral summary of the text.***

A battery is a simple device that converts chemical energy directly to electrical energy. It consists of two or more galvanic, or electrochemical, cells that produce direct-current electricity. The term battery is also commonly applied to a single galvanic cell. Every battery (or cell) has a cathode, or positive electrode, and an anode, or negative electrode. These electrodes must be separated by and are often immersed in an electrolyte that permits the passage of ions between the electrodes. The electrodes materials and electrolyte are chosen and arranged so that sufficient electromotive force (voltage) and electric current (amperes) can be developed between the terminals of a battery to operate lights, machines, or other devices. Since an electrode contains only a limited numbers of units of chemical energy convertible to electrical energy, it follows that a battery of a given size has a certain capacity to operate devices and will eventually become exhausted. The active parts of a battery are usually encased in a box (or jacket) and cover system that keeps air outside and the electrolyte solvent inside and that provides a structure for the assembly.

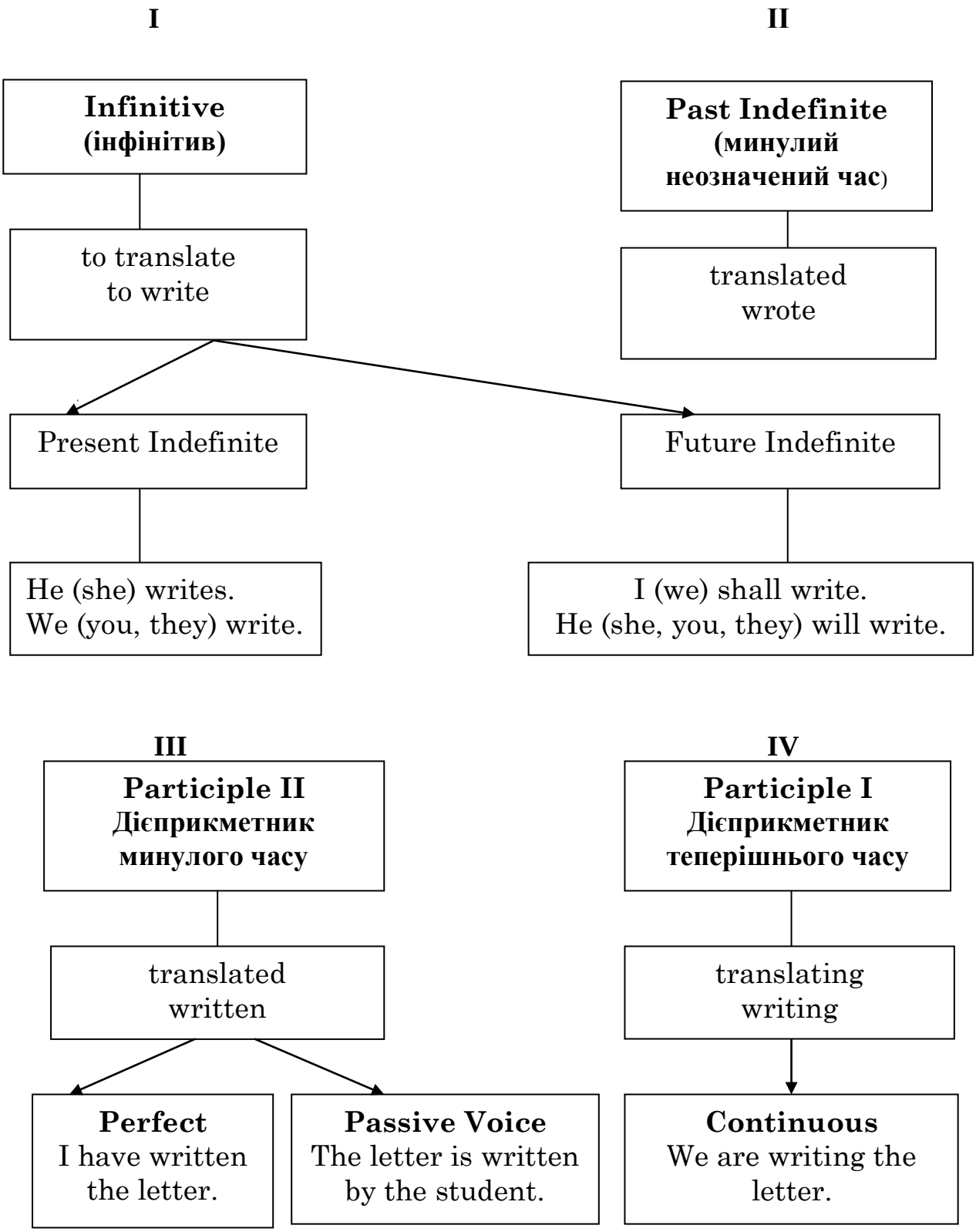
The first battery appears to have been constructed about 1800 by Alessandro Volta, a professor of natural philosophy at the University of Pavia in Italy. This device, later known as the voltaic pile, was composed of a series of silver and zinc disks in pairs, each of which was separated with a sheet of pasteboard saturated in salt water. A current was produced when the uppermost disk of silver was connected by a wire to the bottom disk of zinc. In 1836 the English chemist John Daniell developed what is considered the classic form of the voltaic cell.

Batteries are divided into two general groups: (1) primary batteries and (2) secondary, or storage, batteries. Primary batteries are designed to be used until the voltage is too low to operate a given device (flashlights, certain transistorized portable radios, electric razors, etc.) and then discarded. Secondary batteries consist of an assemblage of several identical voltaic cells. The lead-acid type of a secondary battery serves as the power source for the electrical systems of many kinds of motor vehicles, particularly automobiles and trucks.

UNIT V

GRAMMAR: THE VERB

Основні форми дієслова (The Main Forms of the Verbs)



Ex. 1. ***Give the main forms of the following verbs.***

to found, to plant, to train, to be, to number, to house, to have, to depend, to devote, to do, to equip, to give, to make, to contribute, to begin, to explore, to go, to speak, to see, to investigate, to work, to come, to know, to play, to help, to think.

Класифікація дієслів (Classification of Verbs)

Смисловий (Notional)	**Службовий (semi-auxiliary)**	**Допоміжний (auxiliary)**
He works much. Він багато працює. I wrote a letter yesterday. Вчора я написав листа.	**1. Дієслово-зв'язка:** It was a fine day. Був чудовий день. She got angry. Вона розсердилась. **2. Частина складової дієслівного присудка:** I can speak English. Я вмію говорити англійською. They were to start at 8 o'clock. Вони повинні були відправитись о 8 годині.	I don't know him. Я не знаю його. He has traveled much. Він багато подорожував.

Дієвідміна дієслова to be в теперішньому часі

Стверджувальна форма		
Особа	**Число**	
	Однина	**Множина**
1-а	I am	we are
2-а	you are	you are
3-я	he she is it	they are
Питальна форма		
1-а	am I?	are we?
2-а	are you?	are you?
3-я	he is she it	are they?
Заперечна форма		
1-а	I am not	we are not
2-а	you are not	you are not
3-я	he she is not it	they are not

В розмовній мові, як правило, вживається скорочена заперечна форма дієслова to be: He is not = He isn't, We are not = We aren't, I am not = I'm not

Функції дієслова to be

Вживається як	Приклади
1. Смислове дієслово значення «бути», «знаходитися»	Our University is in Lenin Avenue. Наш університет знаходиться на проспекті Леніна.
2. Дієслово-зв'язка	They will be good engineers. Вони будуть добрими інженерами.
3. Допоміжне дієслово: а) для створення форм Continuous, Perfect Continuous б) Для створення форм Passive Voice.	Hi is making an experiment. Він проводить експеримент. It has been raining since morning. З ранку йде дощ. This book was published last year.
4. Модальне дієслово, що виражає необхідність за домовленістю.	He is to come at 5. Він повинен прийти о 5 годині. The train was to arrive at 11. Поїзд повинен був прибути в 11 годин.

Ex. 2. ***Choose the proper of the verb «to be».***

A. I (am, are) a first-year student now. My friend (are, is) a first-year student too. We (are, is) at the University now. My friend and I (is, are) in the class-room. He (am, is) at the blackboard. I (am, is) at the blackboard. I (am, are) near him. We (are, is) both at the blackboard. Our teacher (are, is) in the class-room too. She (am, is) at the table. There (are, is) new English words on the blackboard. They (are, is) difficult. My knowledge of English (is, are) poor. But my friend (is, am) a good student. His knowledge (is, are) better.

B. Pete (is, was) a schoolboy last year. But now he (is, was) not a schoolboy any longer. He (is, was) a first-year student. All of you (are, were) not schoolchildren now. You (are, were) first-year students. But last year many of you (are, were) schoolchildren. In five years you (are, will be) economists. I think you (are, will be) good specialists.

Ex. 3. ***State the functions of the verb «to be».***

1) There are many lecture halls, studies and laboratories in our University. 2) Our dean's office is on the third floor. 3) He is writing a letter to his friend. 4) We are to study many interesting subjects at the University. 5) This room is a phonetic laboratory. 6) Are you going home now? 7) Our aim is to study well to become good specialists. 8) It was very interesting for the students to go on an excursion. 9) Is he to make a report at the next seminar? 10) To read much is to know much. 11) Our hostel is near the underground station. 12) You were to meet at 6, weren't you?

TEXT 1

SOLAR LIGHT BY NIGHT

Vocabulary

power supply – джерело енергії
charge – заряджати
consider – вважати
distant – віддалений; далекий
remain – залишатися
offer – пропонувати
solar – сонячний
shine – сяяти; світити
panel – панель
mile – миля
generation – генерування; утворення
unlimited – необмежений
pollute – забруднювати
environment – довкілля
mechanical – механічний
transform – перетворювати

Most people living in towns consider it a usual thing that streets are lit at night. But street lights need a power supply therefore distant areas with no source of electricity remain in darkness until the sun comes up again.

With new appliances now offered by several British firms, many distant places could be lit with solar-powered street lights. It may seem strange that the lamps can use the power of the sun which shines by day when the lamps are needed at night, but they work by using energy accumulated during the day from a solar panel. The solar panel produces electricity which charges a battery. When the sun goes down, the battery power is then used for lighting. Each lamp has its own panel so the system can be used for one individual light or a number of them.

In the south of Saudi Arabia a motorway tunnel miles from any power supply is lit day and night by solar-powered devices. The solar panels provide power during the day and charge batteries which accumulate enough power to light the tunnel at night. The generation of electricity by batteries is still expensive but the advantage of sun-powered lamps is that they can bring light to areas distant from any other power supply.

There is one more advantage of solar power: not only it is unlimited, but also its use does not pollute the environment. That is why it is very important to develop devices which make it possible to transform solar power into mechanical or electric forms of power.

Task 1

Are these sentences true or false? Correct the false sentences:

1. Most people living in towns consider it a usual thing that streets are lit at night.
2. But street lights in the distant areas with no source of electricity need a power supply until the sun comes up again.
3. With new appliances now offered by several American firms, many distant places could be lit with solar-powered street lights.

4. It may seem strange that the lamps can use the power of the sun that shines by day when the lamps are needed at night, but they work by using energy accumulated during the day from a solar panel.

5. The solar panel produces electricity which charges street lights.

6. When the sun goes down, the battery power is then used for lighting.

7. In the south of Saudi Arabia a motorway tunnel miles from any power supply is lit day and night by solar-powered devices.

8. The solar panels provide power during the day and charge batteries that accumulate enough power to light the tunnel at night.

9. Each battery has its own panel so the system can be used for one individual light or a number of them.

10. There is one more advantage of solar power: not only it is unlimited, but also its use does not pollute the environment.

Task 2

Put the words in the correct order to make sentences.

1. Night/most/at/people/lit/living/are/in/streets/towns/that/ consider/ thing/it/ usual/ a.

2. Distant/could/lit/solar-powered/lights/many/places/be/with/street.

3. Night/the/at/lamps/needed/can/are/use/lamps/the/when/the/power/day/of/by/ the/ shines/sun/which.

4. Solar/produces/which/a/the/panel/electricity/charges/battery.

5. When/lighting/the/for/sun/used/goes/then/down/is/the/power/battery.

6. Them/number/or/individual/for/be/system/so/own/has/each/of/a/light/one/ used/ can/the/panel/its/lamp.

7. The/day/solar/the/panels/during/provide/power.

8. Generation/the/electricity/of/batteries/by/still/is/expensive.

9. Environment/solar/the/power/pollute/does/not.

10. Is/important/it/ very/develop/to/which/devices/it/make/to/possible/ solar/ transform/into/power/or/mechanical/forms/electric/power/of.

Task 3

Match the words and their definitions.

1	supply	**A**	bringing into existence
2	distant	**B**	group of connected electric cells from which current will flow
3	accumulate	**C**	give or provide
4	panel	**D**	something useful helpful or likely to bring success
5	battery	**E**	make dirty, impure
6	device	**F**	separate part of the surface of smth.
7	generation	**G**	far away in space or time

8	advantage	**H**	surroundings, circumstances, influences
9	pollute	**I**	something thought out invented or adapted, for a special purpose
10	environment	**J**	make or become greater in number or quantity

Task 4

Match the words in the right column with the words in the left column to make word combinations.

1	street	***a***	a battery
2	power	***b***	lamps
3	source of	***c***	electricity
4	distant	***d***	power
5	charges	***e***	electricity
6	solar-powered	***f***	lights
7	generation of	***g***	the environment
8	sun-powered	***h***	places
9	pollute	***i***	devices
10	solar	***j***	supply

Task 5

Choose the correct statement:

1. Street **lamps/lights** need a power supply therefore distant areas with no source of electricity remain in darkness until the sun comes up again.
2. With new **technologies/appliances** now offered by several British firms, many distant places could be lit with solar-powered street lights.
3. The solar panel produces electricity which charges a **street light/battery**.
4. It may seem strange that the lamps can use the power of the sun that shines by day when the lamps are needed at night, but they work by using energy **stored/accumulated** during the day from a solar panel.
5. When the sun goes down, the battery **panel/power** is then used for lighting.
6. Each lamp has its own **battery/panel** so the system can be used for one individual light or a number of them.
7. The generation of electricity by batteries is still expensive but the advantage of sun-powered **panels/lamps** is that they can bring light to areas distant from any other power supply.
8. There is one more advantage of **electric/solar** power: not only it is unlimited, but also its use does not pollute the environment.
9. That is why it is very important to develop devices which make it possible to **transfer/transform** solar power into mechanical or electric forms of power.

Task 6

Fill in the blanks with appropriate words:

solar	power	panel
light	accumulated	supply
batteries	solar-powered	charges

1. Street lights need a power _____ therefore distant areas with no source of electricity remain in darkness until the sun comes up again.
2. With new appliances now offered by several British firms, many distant places could be lit with _____ street lights.
3. The solar panel produces electricity which _____ a battery.
4. When the sun goes down, the battery _____ is then used for lighting.
5. Each lamp has its own _____ so the system can be used for one individual light or a number of them.
6. The solar panels provide power during the day and charge batteries which accumulate enough power to _____ the tunnel at night.
7. The generation of electricity by _____ is still expensive but the advantage of sun-powered lamps is that they can bring light to areas distant from any other power supply.
8. It may seem strange that the lamps can use the power of the sun which shines by day when the lamps are needed at night, but they work by using energy _____ during the day from a solar panel.
9. There is one more advantage of _____ power: not only it is unlimited, but also its use does not pollute the environment.

TEXT 2

ENERGY

Vocabulary

define – визначати
capacity – здатність
coiled – згорнутий, намотаний
spring – пружина
traverse – перетинати
dimension – вимір, величина
expend – витрачати
recognize – визнавати
melted – розтоплений, м'який
fuel – пальне, топливо
hydropower – гідроенергетика
semiconductor – напівпровідник
motion – рух, хід
well-known – відомий
hydroelectric station – гідроелектростанція
turbine – турбіна
above-mentioned – вищезазначений
current – струм
civilization – цивілізація
application – застосування, використання
radiate – випромінювати
hydropower – гідроенергетика
fossil fuel – горючі корисні копалини
for instance – наприклад

furnace – піч	arrive – прибувати
low-grade – низький рівень	unthinkable – немислимий, неуявний

Energy is usually and most simply defined as the equivalent of or capacity for doing work. The word itself is derived from the Greek *energeia*: *en*, "in"; *ergon*, "work." Energy can either be associated with a material body, as in coiled spring or a moving object, or it can be independent of matter, as light and other electromagnetic radiation traversing a vacuum. The energy in a system may be only partly available for use. The dimensions of energy are those of work, which, in classical mechanics, is defined formally as the product of mass (*m*) and the square of the ratio of length (*l*) to time (*t*): ml^2/t. This means that the greater the mass or the distance through which it is moved or the less the time taken to move the mass, the greater will be the work done, or the greater the energy expended.

The idea of energy goes back to Galileo in the seventeenth century. He recognized that, when a weight is lifted with a pulley system, the force applied multiplied by the distance through which that force must be applied (a product called, by definition, the work) remains constant even though either factor may vary.

There are various forms of energy, such as: heat, mechanical, electrical, chemical, atomic and so on. One might also mention the two kinds of mechanical energy – potential and kinetic, potential energy being the energy of position while kinetic energy is the energy of motion. It is well-known that one form of energy can be changed into another.

A waterfall may serve as an example. Water falling from its raised position, energy changes from potential to kinetic energy. The energy of falling water is generally used to turn the turbines of hydroelectric stations. The turbines in their turn drive the electric generators, the latter producing electric energy. Thus, the mechanical energy of falling water is turned into electric energy. The electric energy, in its turn, may be transformed into any other necessary form.

When an object loses its potential energy, that energy is turned into kinetic energy. Thus, the above-mentioned example when water is falling from its raised position, it certainly loses its potential energy changing into kinetic energy.

We know that energy of some kind must be employed to generate the electric current. Generally speaking, the sources of energy usually employed to produce current are either chemical, as in the battery, or mechanical, as in the electromagnetic generator. Chemical sources of current having a limited application, the great quantities of electric energy generated today come from various forms of mechanical energy.

Rising standards of modern civilization and growing industrial application of the electric current result in an increasing need of energy. Every year we need more and more energy. We need it to do a lot of useful things that are done by electricity. However, the energy sources of the world are decreasing at the same time as the energy needs of the world are increasing. These needs will continue to grow as more motors and melted metals are used in industry and more electric current is employed in everyday life. As a result, it is necessary to find new sources of energy.

The Sun is an unlimited source of energy. The Sun radiates to our planet great amount of energy. This energy input fuels all our biological processes and is the original source for hydropower, wind power, and fossil fuel resources. Environmentally and economically, the Sun is our greatest energy source. Lavoisier and other greatest scientists melted metals with the help of solar furnaces. Using semiconductors, scientists, for instance, transformed solar energy into electric energy. Why then is the direct use of solar energy so limited for industrial, domestic, commercial, and transportation purposes?

First, this kind of energy arrives in small quantities – only about one kW per square meter; second, it doesn't arrive at all during night hours. Third, it is very difficult to transform it into useful energy forms except low-grade heat.

Any modern production is simply unthinkable without electrical energy. Many machines use it; they change energy from one form to another. Devices that are operated with electrical energy help us to work. Indeed, electricity plays an important part in modern life.

Task 1

Answer the following questions.

1. What does the term "energy" mean?
2. What is a physical sense of energy?
3. Who mentioned the idea of energy for the first time?
4. How did Galileo describe it?
5. Are there various types of energy?
6. Is potential energy the energy of motion?
7. Can one form of energy be transformed into another?
8. Is the energy of falling water employed to drive turbines?
9. Does a generator produce mechanical energy?
10. For what purpose do people apply the sources of energy?
11. Why are the energy sources decreasing?
12. Is the Sun an unlimited source of energy?
13. Did scientists turn solar energy into electric one?
14. Can we employ solar energy directly?

Task 2

Are the sentences True or False? Correct the false sentences.

1. We possess the unlimited sources of energy, and among them solar energy plays an important role in modern civilization.

2. Galileo proved with the help of pulley system, that energy expended is equal to work done.

3. Waterfall demonstrates us that one form of energy can be reversed into another, namely, potential energy can be transformed into kinetic.

4. Every kind of energy is applied to generate the electric current.

5. Any modern enterprise can avoid using electrical energy, because there are many new technologies which allow employing solar energy in big quantities.

Task 3

Find the word with the similar meaning, according to the text.

a. force	tension; combustion; power; energy
b. capacity	ability; availability; dimension; position
c. to employ	to radiate; to use; to traverse; to generate
d. to remain	to require; to remove; to reverse; to stay
e. to expend	to consume; to vaporize; to heat; to expand fuel; valve; oven; motor.
f. furnace	potential; low quality; industrial; atomic.
g. low-grade	to move; to employ; to change; to transform
h. to turn	magnet; resource; mineral; wave
i. fossil	melted; unrestricted; transformed; heated.
j. unlimited	

Task 4

Match a line in A with a line in B.

A	B
electricity	waterfall
hydroelectric station	coiled spring
kinetic energy	material body
physics	semiconductor
clocks	turbine
silicon	low-grade heat
weight	device
solar energy	current
machine	pulley system

TEXTS FOR RENDERING AND DISCUSSION

TEXT A

THE LAW OF ENERGY CONSERVATION

- ***Give a written/oral summary of the text.***

Heat, this most active, powerful and mysterious phenomenon of Nature, was once a really challenging problem to physicists – professionals as well as non – professionals. Among the first investigators of the problem were people of all works of life: a peer France Laplace and an English, manufacturer of beer Joule, the French philosopher and writer Voltair and an English acrobat, a musician and physicist Young, the War Minister Rumford and a French doctor Pall Marat; the leader of the French Revolution.

The first to estimate the mechanical equivalent of heat was Robert Mayer (1842). Soon, afterwards, it was also proposed by Joule and later by von Helmholtz, a physiologist and a physicist. The same idea, though not so clearly expressed, seems to have occurred to at least live other physicists or engineers. The approaches of the three principal discoveries were different Mayer was led to the conception by general philosophical considerations of a cosmical kind. He was struck by the analogy between the energy gained by bodies falling under gravity and the heat given off by compressed gases. Joule was led to the idea first by experiments aimed at finding out how far the new electric motor could become a practical source of power. Helmholtz in 1847, by an attempt to generalize the Newtonian conception, of motion to that of a large number of bodies acting under mutual attraction, showed that the sun of force and tension, what we now call kinetic and potential energy, remained the same.

This is the principle of the Conservation of Energy in its most formal sense, but it was important in that it reconciled the new doctrines of heat with older ones of mechanics, a process that was to be largely completed by William Thompson (later Lord Kelvin), a friend of both Joule and Helmholts, in his paper *The Dynamical Equivalents of Heat (1851).*

TEXT B

THE HISTORY OF RADIOGRAPHY: X-RAYS

- ***Give a written/oral summary of the text.***

X-RAYS were discovered in 1895 by Wilhelm Conrad Röntgen (1845-1923) who was a Professor at Wurzburg University in Germany. Working with a cathode-ray tube in his laboratory, Röntgen observed a fluorescent glow of crystals on a table near his tube. The tube that Röntgen was working with consisted of a glass envelope (bulb) with positive and negative electrodes encapsulated in it. The air in the tube was evacuated, and when a high voltage was applied, the tube produced a fluorescent

glow. Röntgen shielded the tube with heavy black paper, and discovered a green colored fluorescent light generated by a material located a few feet away from the tube.

He concluded that a new type of ray was being emitted from the tube. This ray was capable of passing through the heavy paper covering and exciting the phosphorescent materials in the room. He found the new ray could pass through most substances casting shadows of solid objects. Röntgen also discovered that the ray could pass through the tissue of humans, but not bones and metal objects. One of Röntgen's first experiments in 1895 was a film of the hand of his wife, Bertha. It is interesting that the first use of X-rays were for an industrial (not medical) application as Röntgen produced a radiograph of a set of weights in a box to show his colleagues.

Röntgen's discovery was a scientific bombshell, and was received with extraordinary interest by both scientist and laymen. Scientists everywhere could duplicate his experiment because the cathode tube was very well known during this period. Many scientists dropped other lines of research to pursue the mysterious rays. Newspapers and magazines of the day provided the public with numerous stories, some true, others fanciful, about the properties of the newly discovered rays.

UNIT VI

GRAMMAR: INDEFINITE TENSES

Поняття про неозначені часи

Часи групи Indefinite вживаються для вираження дії, що відбувається в теперішньому, минулому чи майбутньому часах, без зазначення їх характеру, тривалості, завершеності, співвіднесеності з іншою дією.

Утворення теперішнього неозначеного часу (Present Indefinite Tense)

Стверджувальна форма дієслова в Present Indefinite в усіх особах однини і множини, крім третьої особи однини, зберігається з інфінітивом без частки to:

I You We They	watch	TV every evening.

У третій особі однини до форми інфінітива додається закінчення -s або -es.

He She	watches	TV every evening.

У дієсловах, що закінчуються на -y з попередньою приголосною, перед закінченням -es буква змінюється на і:

to try – tries
to cry – cries
Якщо перед -y стоїть голосна, то до дієслова додається лише закінчення -s:
to play – plays
to stay – stays
Якщо дієслова закінчуються на: -s, -sh, -ss, -ch, -tch, -x, то в третій особі однини до них додається закінчення -es:
to watch – watches
to teach – teaches

Дієслово to go має у третій особі однини закінчення -es:

She He It	goes.

Дієслова can, must, may в усіх особах однини і множини мають однакову форму:

I He She You We They	can must may	go home.

Питальна форма Present Indefinite утворюється з допомогою дієслова *to do* в Present Indefinite та інфінітива основного дієслова без частки *to*. Допоміжне дієслово do (does) ставиться перед підметом.

Do I read? Do you read? Does he (she) read?	Do we read? Do you read? Do they read?

Питальна форма дієслів can, must, may утворюється без допоміжного дієслова:
May I come in?
Can he play football?

Заперечна форма Present Indefinite утворюється за допомогою дієслова *to do* у Present Indefinite заперечної частки *not* та інфінітива основного дієслова без частки *to:*

I
You
We } don’t write
They

He
She } doesn’t write

В усному мовленні замість do not вживається don’t, заміть does not – doesn’t.

Дієвідміна дієслова to have в теперішньому часі.

Особа	**Число**	
	Однина	**Множина**
1-а	I have a ball.	We have a ball.
1-а	You have a ball.	You have a ball.
3-я	He, She, It } has a ball.	They have a ball.
Питальна форма (дієслово to have може утворювати питальну форму без допомоги дієслова to do)		
1-а	Have I ball?	Have we a ball?
2-а	Have you a ball?	Have you a ball?
3-я	Has { he, she, it } a ball?	Have they a ball?
Дієслово to have може утворювати питальну форму за допомогою дієслова to do		
1-а	Do I have a ball?	Do we have a ball?
2-а	Do you have a ball?	Do you have a ball?
3-я	Does { he, she, It } have a ball?	Do they have a ball?
Заперечна форма		
1-а	I have not a ball.	We have not a ball.
2-а	You have not a ball.	You have not a ball.
3-я	He, She, It } has not a ball.	They have not a ball.

В усному мовленні замість have not вживається скорочена форма have not – haven’t, has not – hasn’t.

Функції дієслова to have (The Functions of the verb «to have»)

Вживається як	**Приклади**
1. Змістове дієслово в значенні «мати», «володіти»	We have a new TV set at our hostel. В нас в гуртожитку є новий телевізор.
2. Допоміжне дієслово для утворення форм Perfect	They have already passed the examination in Physics. Вони вже здали екзамени з фізики.
3. Модальне дієслово, яке виражає необхідність в силу обставин	We had to repeat the experiment. Ми були вимушені повторити дослід.

Дієвідміна дієслова to do в теперішньому часі

Особа	**Число**	
	Однина	**Множина**
Стверджувальна форма		
1-а	I do morning exercises.	We do morning exercises.
2-а	You do morning exercises.	You do morning exercises.
3-я	He / She / It } does morning exercises.	They do morning exercises.
Питальна форма		
1-а	Do I do morning exercises?	Do we do morning exercises?
2-а	Do you do morning exercises?	Do you do morning exercises?
3-я	Does { he / she / it } do morning exercises?	Do they do morning exercises?
Заперечна форма		
1-а	I do not do morning exercises.	We do not do morning exercises.
2-а	You do not do morning exercises.	You do not do morning exercises.
3-я	He / She / It } does not do morning exercises.	They do not do morning exercises.

В усному мовленні замість do not вживається don’t, замість does not – doesn’t.

Функції дієслова to do (The Functions of the Verb «to do»)

Вживається як	Приклади
1. Змістове дієслово в значенні «робити», «виконувати»	Every man must do his duty. Кожен повинен виконувати свій обов'язок.
2. Допоміжне дієслово: – для утворення негативної і позитивної форми Present and Past Indefinite – для утворення негативної форми наказового способу – для посилення значення дієслова-присудка	Do you want to take part in this work? Ви хочете взяти участь у цій роботі? Don't be late for the lessons. I did tell him about it. Я ж казав йому про це.
3. Замісник змістового дієслова: – в коротких відповідях в Present and Past Indefinite – для уникнення повторення змістового дієслова.	Do you know how to use this device? Yes, I do. Ви знаєте як використовувати цей прилад. Так. He knows this rule as well as you do. Він знає це правило так само добре як і ви.

Вживання Present Indefinite Tense

Present Indefinite вживається для вираження постійної, звичайної дії, яка відбувається не в момент мовлення, а взагалі.

I go to school every day. – Я ходжу до школи кожного дня.

We speak English well. – Ми добре розмовляємо англійською мовою.

Present Indefinite вживається також для вираження майбутньої дії в підрядних реченнях умови й часу, які вводяться сполучниками when – коли, if – якщо, after – після того як, till, until – поки не, before – перш ніж.

Ex. 1. ***Read the sentence and say that your friend (sister, father, etc.) does the same.***

Model: I get up at 7 o'clock.

My friend gets up at 7 o'clock too.

1) I like classical music. 2) I understand my English teacher well. 3) We read and translate English texts. 4) I listen to the news in the evening. 5) I want to become an economist. 6) I always work hard at my English. 7) They go shopping in the morning. 8) I sometimes watch hockey matches on TV. 9) I water flowers regularly. 10) We often play tennis on Sundays.

Ex. 2. ***Put the verbs in brackets into the correct form.***

The Smiths (live) in London. In the morning Mr. Smith (go) and the children (go) to school. Their father (take) them to school every day. Mrs. Smith(stay) at home. She (do) the housework. She always (eat) her lunch at noon. In the afternoon she usually (see) her friends. They often (have) tea together. In the evening the children (come)

home from school. Mr. Smith (come) home from work. At night Mr. Smith usually (read) his newspaper. Sometimes he and his wife (watch)TV.

Ex. 3. ***Ask one of the students.***

1) if he travels much; 2) if he wants to become a good specialist; 3)whether his friend speaks English; 4) if he lives in a new house;5) if his mother likes to drink coffee; 6) if his parents come home late; 7)if his father reads newspapers in the evening; 8)what his sister does on Sundays; 9)why he sometimes misses classes; 10) where he keeps his books; 11)how his friend gets to the University; 12) who helps him with his studies.

Ex. 4. ***Make these sentences interrogative and negative.***

1) I come to the University at 9. 2) He drinks a lot of tea at break-fast. 3) They have an English lesson every day. 4) We study German. 5) Mike repairs his TV set himself. 6) You work hard at your English. 7) She makes many mistakes in her written tests.

Ex. 5. ***Correct the sentences as in the model.***

Model: The Sun rises in the west.

The Sun doesn't rise in the west. The Sun rises in the east.

1) It often snows in summer. 2) Wolves kill hunters. 3) The River Volga flows into the Black Sea. 4) We buy shoes and boots at the bookstore. 5) In our country children begin to go to school at the age of 10. 6) They usually have breakfast at 8 o'clock in the evening.

Утворення Past Indefinite

За способом утворення Past Indefinite дієслова поділяються на правильні і неправильні.

Стверджувальна форма Past Indefinite правильних дієслів утворюється додаванням закінчення -ed до інфінітива без частки to.

Особа	**Число**	
	Однина	**Множина**
1-а	I played yesterday.	We played yesterday.
2-а	You played yesterday.	You played yesterday.
3-я	He She played yesterday. It	They played yesterday.

Дієслова, що закінчуються в інфінітиві буквою – e, втрачають її перед закінченням -ed.

to like – liked

В дієсловах, що закінчуються в інфінітиві буквою -у, який передує приголосна, замінюють -у на -і.

to try – tried

Форми Past Indefinite неправильних дієслів необхідно запам’ятати.

<table>
<tr><th rowspan="2">Особа</th><th colspan="2">Число</th></tr>
<tr><th>Однина</th><th>Множина</th></tr>
<tr><td colspan="3">Стверджувальна форма неправильних дієслів</td></tr>
<tr><td>1-а</td><td>I had nose.</td><td>We had a nose.</td></tr>
<tr><td>2-а</td><td>You had a nose.</td><td>You had a nose.</td></tr>
<tr><td>3-я</td><td>He
She
It } had a nose.</td><td>They had a nose.</td></tr>
<tr><td colspan="3">Виняток – дієслово to be</td></tr>
<tr><td colspan="2">Однина</td><td>Множина</td></tr>
<tr><td colspan="2">I
He
She
It } was</td><td>We
You
They } were</td></tr>
<tr><td colspan="3">Питальна форма неправильних дієслів</td></tr>
<tr><td>1-а</td><td>Did I go home?</td><td>Did we go home?</td></tr>
<tr><td>2-а</td><td>Did you go home?</td><td>Did you go home?</td></tr>
<tr><td>3-я</td><td>Did { he
she
it } go home?</td><td>Did they go home?</td></tr>
<tr><td colspan="3">Заперечна форма неправильних дієслів</td></tr>
<tr><td>1-а</td><td>I did not go home.</td><td>We did not go home.</td></tr>
<tr><td>2-а</td><td>You did not go home.</td><td>You did not go home.</td></tr>
<tr><td>3-я</td><td>He
She
It } did not go home.</td><td>They did not go home.</td></tr>
</table>

В усному мовлення замість did not вживається didn’t.

Вживання Past Indefinite

Past Indefinite вживається для вираження дії, що відбулась або відбувалась у минулому і не пов’язана з теперішнім моментом мовлення.

Past Indefinite – це форма для опису минулих подій для вираження низки послідовних або повторюваних дій у минулому, Past Indefinite часто вживається зі словами yesterday – учора, last summer – минулого літа, last autumn – минулої осені, last week – минулого тижня, last year – торік, other day – нещодавно і т.д.

He spoke at the meeting yesterday.

I met my old friend and we went to the cinema.

Утворення та вживання Future Indefinite

Особа	**Число**	
	Однина	**Множина**
Стверджувальна форма		
1-а	I shall go to school.	We shall go to school.
2-а	You will go to school.	You will go to school.
3-я	He / She / It } will go to school.	They will go to school.

Допоміжне дієслово will може вживатись і для утворення першої особи однини і множини.

I shall / will write a letter tomorrow. Я напишу листа завтра.

We shall/will watch TV. Ми будемо дивитися телевізор.

В усному мовленні замість I shall вживається I'll, he will – he'll, she will – she'll, it will – it'll, you will – you'll, they will – they'll.

Питальна форма		
Особа	**Число**	
	Однина	**Множина**
1-а	Shall I go to school?	Shall we go to school?
2-а	Will you go to school?	Will you go to school?
3-я	Will { he / she / it } go to school?	Will they go to school?
Заперечна форма		
1-а	I shall not go to school.	We shall not go to school.
2-а	You will not go to school.	You will not go to school.
3-я	He / She / It } will not go to school.	They will not go to school.

В усному мовленні замість shall not вживається shan't, замість will not – won't.

Future Indefinite вживається для вираження постійної або повторної дії, що відбудеться в майбутньому. Future Indefinite часто вживається з обставинними словами tomorrow – завтра, next week – наступного тижня, next month – наступного місяця, next year – наступного року та ін.

У підрядному реченні часу і умови форми Future Indefinite не вживаються. В таких реченнях для вираження майбутньої дії вживаються форми Present Indefinite.

She will go to see her grandmother if she has a day off.

When I come, they will sit at the table.

Утворення і вживання майбутнього неозначеного часу в минулому (Future Indefinite-in-the-Past)

Особа	**Число**	
	Однина	**Множина**
Стверджувальна форма		
1-а	I should go to school.	We should go to school.
2-а	You would go to school.	You would go to school.
3-я	He / She / It } would go to school.	They would go to school.
Питальна форма		
1-а	Should I go to school?	Should we go to school?
2-а	Would you go to school?	Would you go to school?
3-я	Would { he / she / it } go to school?	Would they go to school?
Особа	**Число**	
	Однина	**Множина**
Заперечна форма		
1-а	I should not go to school.	We should not go to school.
2-а	You would not go to school.	You would not go to school.
3-я	He / She / It } would not go to school.	They would not go to school.

В усному мовленні замість should not вживається shouldn’t, замість would not – wouldn’t.

Future Indefinite-in-the-Past виражає дію, яка є майбутньою з точки зору якогось минулого моменту.

His mother said that he would come in time tomorrow.

Ex. 6. ***Refer the following sentences to the future.***

1) I visit my relatives on Sundays.
2) She reads many English books in summer.
3) We usually have dinner at 3o’clock.
4) My mother usually makes a cake on her days off.
5) Students take their examinations in January.
6) They usually spend two hours in their laboratory on Mondays.
7) My friend helps me with my homework.

Ex. 7. ***Make sentences of the following phrases in the future.***

1) if he will stay here;
2) if the weather will be fine;
3) if the students will have a practical class on Wednesday;

4) if he will come in time;
5) what he will do tomorrow;
6) when he will see his friend;
7) where his parents will go in the evening;
8) what problem they will discuss at the meeting.

Ex. 8. ***Complete the sentences with "I'll" + a suitable verb.***

Model: I'm too tired to walk home. I think I'll get a taxi.

1) I feel a bit hungry. I think _____something to eat.
2) It's too late to telephone Tom now. _____ him in the morning.
3) What would you like to drink? _____ coffee, please.
4) You have, left the door open. Oh, _____ and shut it.
5) It's raining. I think _____ at home this evening.
6) I need some money. Don't worry, _____ you some.

Ex. 9. ***Make the sentences negative.***

1) I'll open the window.
2) He'll arrive tonight.
3) We'll go to London next week.
4) She'll be back quite soon.
5) You'll miss her very much.
6) They'll go there by train.
7) It'll rain soon.

Ex. 10. ***Put the verbs in brackets into the correct form.***

1) When I (see) Tom, I (invite) him to our party. 2) I (phone) you as soon as I (arrive) in London. 3) Please, don't touch anything before the police (come). 4) Everyone (be) very surprised if he (pass) the exam. 5) When you (see) Boris again, you (not/recognize) him. 6) We (not/start) dinner until Nick (arrive). 7) You (be) lonely without me while I (be) away. 8) If I (need) any help, I (ask) you. 9) Come on! Hurry up! Ann (be) annoyed if we (be) late.

Ex. 11. ***Translate into English.***

1) Коли він прочитає книгу, він поверне її тобі. 2) Якщо погода буде добра, ми підемо в ліс. 3) Я прийду до тебе, якщо в мене буде час. 4) Вона зробить успіхи в англійській мові, якщо ти допоможеш їй. 5) Якщо ви підете у цьому напрямку, ви доберетесь до залізниці швидше. 6) Я подзвоню тобі ввечері, якщо не забуду. 7) Якщо він не відповість на мого листа, я не буду більше писати йому. 8) Ми не будемо обідати, поки ти не прийдеш.

TEXT 1

DEVELOPMENT OF RADIO TECHNOLOGY

Vocabulary

to be based on – базуватися на

electromagnetic waves – електромагнітні хвилі

wireless communication system – система бездротового зв'язку

spark coil – іскрова катушка

transmitters and receivers – передавачі та приймачі

to improve the equipment – вдосконалювати обладнання

cellular telephones – стільниковий телефон

broadband world – широкосмуговий світ

the electronic (vacuum) tube – електронна (вакуумна) трубка

to detect radio waves – виявлення радіохвиль

the only invention – єдиний винахід

to meet the needs – задовольняти потреби

to be applied to – застосовувати

long-range radio reception – радіоприймач дальнього прийому

to develop the mathematical theory – розвивати математичну теорію

the invention of the semiconductor – винахід напівпровідника

Radio is based on the studies of James Clerk Maxwell who developed the mathematical theory of electromagnetic waves, and Heinrich Hertz who devised an apparatus for generating and detecting them. Guglielmo Marconi, recognizing the possibility of using these waves for a wireless communication system, gave a demonstration (1895) of the wireless telegraph, using Hertz's spark coil as a transmitter and Edouard Branly's coherer (a radio detector in which the conductance between two conductors is improved by the passage of a high-frequency current) as the first radio receiver. The effective operating distance of this system increased as the equipment was improved, and in 1901, Marconi succeeded in sending the letter S across the Atlantic Ocean using Morse code. In 1904, Sir John A. Fleming developed the first vacuum tube, which was able to detect radio waves electronically. Two years later, Lee de Forest invented the audion, a type of triode, or three-element tube, which not only detected radio waves but also amplified them.

Radio telephony – the transmission of music and speech – began in 1906 with the work of Reginald Fessenden and Ernst F.W. Alexanderson. In 1913 Edwin H. Armstrong patented the circuit for the regenerative receiver and long-range radio reception became practicable. In 1926 the first broadcasting network was formed, ushering in the golden age of radio. Generally credited with creating the first modern broadband FM system, Armstrong built and operated the first FM radio station.

The radio is probably the only invention which has found universal recognition and application in a comparatively short time.

Radio supplies the communication service which is so essential to the modern world, and meeting these needs it has become a rapidly developing industry itself. It is from radio that the subject of electronics was born which, being applied to automation, brought such remarkable changes to the technique of today.

Radios that combine transmitters and receivers are now widely used for communications. Cellular telephones, despite the name, are another popular form of radio used for communication.

Advances in radio communication and spectrum management have led to tipping points in technology, for example the invention of the semiconductor and microprocessor, the shift to a digital, converged, personalized, broadband world, and now the advent of spectrum cognition in radio devices. During this period radio has moved from utility-based to technology-based devices, and wireless has evolved from an exclusive technology to become a core function embedded in every device.

Task 1

Are these sentences true or false? Correct the false sentences:

1. Guglielmo Marconi gave a demonstration (1895) of the wireless telegraph, using Hertz's spark coil as a transmitter.
2. Radio is based on the studies of James Clerk Maxwell who devised an apparatus for generating and detecting them, and Heinrich Hertz who developed the mathematical theory of electromagnetic waves.
3. Edouard Branly's coherer is a radio detector in which the conductance between two conductors is improved by the passage of a high-frequency current.
4. And in 1901, Marconi succeeded in receiving the letter C across the Atlantic Ocean using Morse code.
5. In 1904, Sir John A. Fleming developed the first vacuum tube, which was able to detect radio waves electronically.
6. Four years later, Lee de Forest invented the audion, a type of triode, or three-element tube, which not only transmit radio waves but also amplified them.
7. Radio telephony – the transmission of music and speech – began in 1906 with the work of Reginald Fessenden and Ernst F.W. Alexanderson.
8. Generally credited with creating the first modern broadband FM system, Armstrong built and operated the first FM radio station.
9. The radio is probably the only invention which hasn't found universal recognition and application in a comparatively short time.
10. Cellular telephones, despite the name, are another popular form of radio used for communication.

Task 2

Put the words in the correct order to make sentences.

1. /the /operating /equipment /distance /of /increased /system /as /the /was /effective /improved /this.
2. /in /developed /the /first /detect /vacuum /which /tube /was /able /to /radio

/Sir John A. Fleming /waves /1904 /electronically.

3. /in /for /Edwin H. Armstrong /the /circuit /the /regenerative /1913 /receiver /patented.

4. /found /credited /with /the /first /modern /comparatively /broadband /FM /system, /Armstrong /built /and / generally /operated /the /first / FM /radio /station.

5. /the /recognition /is /the /only /has /universal /probably /which /and /application /invention /creating /in /a /short /radio /time.

6. /combine /radios /that /widely /and /receivers /are /now /used /transmitters /for /communications.

7. /used /telephones /despite /the /are /another /cellular /popular /form /of /radio /for /name /communication.

8. /in /led /radio /and /spectrum /advances /management /have /to /points /in /tipping /technology /communication.

9. /become /has /evolved /an /exclusive /function /technology /to /a /core /from /embedded /in /every /wireless /device.

Task 3

Match the words and their definitions.

1	electromagnetic wave	**A**	produce (energy, especially electricity)
2	to devise	**B**	an electrical component formerly used to detect radio waves, consisting of a tube containing loosely packed metal particles. The waves caused the particles to cohere, thereby changing the current through the circuit
3	to generate	**C**	discover or identify the presence or existence of
4	wireless	**D**	a wave of energy propagated in an electromagnetic field
5	transmitter	**E**	increase the amplitude of (an electrical signal or other oscillation)
6	coherer	**F**	a piece of equipment that is used for broadcasting television or radio programmes.
7	current	**G**	a high-capacity transmission technique using a wide range of frequencies, which enables a large number of messages to be communicated simultaneously
8	to amplify	**H**	plan or invent (a complex procedure, system, or mechanism) by careful thought
9	to detect	**I**	a flow of electricity which results from the ordered directional movement of electrically charged particles
10	broadband	**J**	using radio, microwaves, etc. (as opposed to wires or cables) to transmit signals

Task 4

Match the words in the right column with the words in the left column to make word combinations.

1	to be based on	***a***	electronically
2	to develop the mathematical theory of	***b***	and spectrum management
3	to develop the first	***c***	electromagnetic waves
4	to detect radio waves	***d***	receiver
5	the transmission of	***e***	application
6	the circuit for the regenerative	***f***	the studies
7	modern broadband	***g***	to the technique
8	universal recognition and	***h***	vacuum tube
9	to bring such remarkable changes	***i***	FM system
10	advances in radio communication	***j***	music and speech

Task 5

Choose the correct statement:

1. Radio is based on the studies of James Clerk Maxwell who developed the mathematical theory of **radio/electromagnetic** waves, and Heinrich Hertz who devised an apparatus for generating and detecting them.
2. Guglielmo Marconi, recognizing the possibility of using these waves for a wireless communication system, gave a demonstration (1895) of the wireless telegraph, using Hertz's spark coil as a **coherer/transmitter**.
3. The effective **broadcasting/operating** distance of this system increased as the equipment was improved.
4. in 1901, Marconi succeeded in sending the letter S across the Atlantic Ocean using Morse **alphabet/code**.
5. In 1904, Sir John A. Fleming developed the first vacuum tube, which was able to **generate/detect** radio waves electronically.
6. In 1913 Edwin H. Armstrong patented the circuit for the regenerative receiver and long-range radio **transmission/reception** became practicable.
7. In 1926 the first **reception/broadcasting** network was formed, ushering in the golden age of radio.
8. Radio supplies the communication **network/service** which is so essential to the modern world, and meeting these needs it has become a rapidly developing industry itself.
9. Radios that combine transmitters and receivers are now widely used for **broadcasting/communications**.
10. Wireless has evolved from an exclusive technology to become a core function embedded in every **apparatus/device**.

Task 6

Fill in the blanks with appropriate words:

receiver	transmission	vacuum tube
amplified	application	transmitters
broadcasting	wireless	communication

1. Guglielmo Marconi, recognizing the possibility of using these waves for a _____communication system, gave a demonstration (1895) of the wireless telegraph, using Hertz's spark coil as a transmitter and Edouard Branly's coherer as the first radio receiver.
2. In 1904, Sir John A. Fleming developed the first_____, which was able to detect radio waves electronically.
3. Two years later, Lee de Forest invented the audion, a type of triode, or three-element tube, which not only detected radio waves but also _____them.
4. Radio telephony – the _____of music and speech – began in 1906 with the work of Reginald Fessenden and Ernst F.W. Alexanderson.
5. In 1913 Edwin H. Armstrong patented the circuit for the regenerative _____and long-range radio reception became practicable.
6. In 1926 the first _____network was formed, ushering in the golden age of radio.
7. The radio is probably the only invention which has found universal recognition and _____in a comparatively short time.
8. Radio supplies the _____service which is so essential to the modern world, and meeting these needs it has become a rapidly developing industry itself.
9. Radios that combine _____ and receivers are now widely used for communications.

TEXT 2

GUGLIELMO MARCONI

Vocabulary

deliver – доставляти, випускати
signaling – сигналізація
wire – дріт
vacation – відпустка

transmitter – радіопередавач, передавач
attic – мансарда
sheet – лист
spark gap – розрядник
relay – реле

resemble – нагадувати, бути схожим
awarded – нагороджений
wireless – бездротовий
inductive-conductive method – індуктивно-провідний метод
considerable – значний, чималий
empirical – емпіричний
invention – винахід
utility – корисність
shore – берег

Guglielmo Marconi studied at the Leghorn Technical School, and acquainted himself with the published writings of Professor Augusto Righi of the University of Bologna. In 1894, Sir William Preece delivered a paper to the Royal Institution in London on electric signaling without wires. In 1894 at the Royal Institution lectures, Lodge delivered "The Work of Hertz and Some of His Successors". Marconi was said to have read, while on vacation in 1894, about the experiments that Hertz did in the 1880s. Marconi also read about Tesla's work. It was at this time that Marconi began to understand that radio waves could be used for wireless communications. At first Marconi used a transmitter to ring a bell in a receiver in his attic laboratory. He then moved his experiments out-of-doors on the family estate near Bologna, Italy, to communicate further. He replaced Hertz's vertical dipole with a vertical wire topped by a metal sheet, with an opposing terminal connected to the ground. On the receiver side, Marconi replaced the spark gap with a metal powder coherer, a detector developed by Edouard Branly and other experimenters. Marconi transmitted radio signals for about 1.5 miles (2.4 km) at the end of 1895. Marconi was awarded a patent for radio with British patent No. 12,039, improvements in Transmitting Electrical Impulses and Signals. The complete specification was filed March 2, 1897. This was Marconi's initial patent for the radio, though it used various earlier techniques of various other experimenters and resembled the instrument demonstrated by others (including Popov). During this time spark-gap wireless telegraphy was widely researched. In July, 1896, Marconi got his invention and new method of telegraphy to the attention of Preece, who had for the previous twelve years interested himself in the development of wireless telegraphy by the inductive-conductive method. On June 4, 1897, he delivered "Signaling through Space without Wires". Preece devoted considerable time to exhibiting and explaining the Marconi apparatus at the Royal Institution in London, stating that Marconi invented a new relay which had high sensitiveness.

The Marconi Company Ltd. was founded by Marconi in 1897, known as the Wireless Telegraph Trading Signal Company. Also in 1897, Marconi established the radio station at Niton, Isle of Wight, England. Marconi's wireless telegraphy was inspected by the Post Office Telegraph authorities; they made a series of experiments with Marconi's system of telegraphy without connecting wires, in the Bristol Channel. In October of 1897 wireless signals were sent from Salisbury Plain to Bath, a distance of 34 miles (55 km). Around 1900 Marconi developed an empirical law that, for simple vertical sending and receiving antennas of equal height, the maximum working telegraphic distance varied as the square of the height of the antenna. This became known as Marconi's law.

In 1898, Marconi opened a radio factory in Hall Street, Chelmsford, England, employing around 50 people. In 1899, Marconi announced his invention of the «iron-mercury-iron coherer with telephone detector» in a paper presented at Royal Society, London. At the end of 1898 electric wave telegraphy established by Marconi had demonstrated its utility, especially for communication between ship and ship, and ship and shore. In 1899, he transmitted messages across the English Channel. Also in 1899, Marconi delivered «Wireless Telegraphy» to the Institution of Electrical Engineers.

The Marconi Company was renamed Marconi's Wireless Telegraph Company in 1900. In 1901, Marconi claimed to have received daytime transatlantic radio frequency signals at a wavelength of 366 metres (820 kHz). Marconi established a wireless transmitting station at Marconi House, Rosslare Strand, Co. Wexford in 1901 to act as a link between Poldhu in Cornwall and Clifden in Co. Galway. His announcement on 12 December 1901, using a 152.4-metre (500 ft) kite-supported antenna for reception, stated that the message was received at Signal Hill in St. John's, Newfoundland (now part of Canada) via signals transmitted by the company's new high-power station at Poldhu, Cornwall. The message received had been prearranged and was known to Marconi, consisting of the Morse letter «S» – three dots.

Task 1

Answer the following questions using the word combinations and phrases:

1. Where did Guglielmo Marconi study?
2. What works did Marconi read while studying at University?
3. What experiments did he conduct on the family estate near Bologna?
4. How far did Marconi transmit radio signals at the end of 1895?
5. Who devoted considerable time to exhibiting and explaining the Marconi apparatus at the Royal Institution in London?
6. When was the Marconi Company Ltd. founded?
7. Where did Marconi establish the radio station in 1897?
8. When did Marconi open a radio factory in Hall Street, Chelmsford, England?
9. What did Marconi establish a wireless transmitting station at Marconi House, Rosslare Strand, Co. Wexford?
10. What did the prearranged message consist of?

Task 2

Complete the following sentences using the words from the box:

aerial developed first spark jar transmitted discharge

1. Marconi _____ radio signals for about 1.5 miles (2.4km) at the end of 1895.
2. Electromagnetic waves can be generated by the _____ of a capacitor.
3. David Hughes _____a way to interrupt his induction balance to produce a series of sparks.
4. At _____Marconi used a transmitter to ring a bell in a receiver in his laboratory.
5. In October, 1899, the progress of the yachts in the international race was successfully reported by _____ telegraphy.
6. B.W. Feddersen succeeded in experiments with the Leyden _____ to prove that electric sparks were composed of damped oscillations.

7. Marconi replaced the _____ gap with a metal powder coherer.

Task 3

Complete the text about developments in radio and television. Put the verbs in brackets in the correct form: Past Simple or Present Perfect.

In just over a hundred years, radio _____ (develop) into a major form of entertainment and communication. Marconi _____(invent) a wireless telegraph system in 1896. This ____ (be) the birth of radio. Voice transmission ____ (start) in 1909 following the invention of the valve.

Semiconductors _____ (make) it possible to develop much smaller, portable radios.

The introduction in recent years of digital radios _____ (allow) us to enjoy much better sound quality.

There _____ (be) many changes in television too. In the UK, the BBC _____ (start) daily TV broadcasts in 1936. Colour broadcasts _____ (begin) in the late 1960s. Since the 1970s satellite broadcasting _____ (allow) viewers a wider choice of programmes.

The recent introduction of digital TV _____ (mean) better picture and sound quality.

Manufacturers _____ now _____ (develop) entertainment systems which include television, radio, DVD recorder / player, and computer. The Internet ____(make) it possible to enjoy radio and television from around the world on our PCs.

TEXTS FOR RENDERING AND DISCUSSION

TEXT A

HOW THE RADIO SPECTRUM WORKS

- ***Give a written/oral summary of the text.***

You've probably heard about "AM radio" and "FM radio", "VHF" and "UHF" television, "citizens band radio", "short wave radio" and so on. Have you ever wondered what all of those different names really mean? What's the difference between them?

A radio wave is an electromagnetic wave propagated by an antenna. Radio waves have different frequencies, and by tuning a radio receiver to a specific frequency you can pick up a specific signal.

In the United States, the FCC (Federal Communications Commission) decides who is able to use which frequencies for which purposes, and it issues licenses to stations for specific frequencies.

When you listen to a radio station and the announcer says, "You are listening to 91.5 FM WRKX The Rock!" what the announcer means is that you are listening to a radio station broadcasting an FM radio signal at a frequency of 91.5 megahertz, with

FCC-assigned call letters of WRKX. Megahertz means "millions of cycles per second", so "91.5 megahertz" means that the transmitter at the radio station is oscillating at a frequency of 91,500,000 cycles per second. Your FM (frequency modulated) radio can tune in to that specific frequency and give you clear reception of that station. All FM radio stations transmit in a band of frequencies between 88 megahertz and 108 megahertz. This band of the radio spectrum is used for no other purpose but FM radio broadcasts.

In the same way, AM radio is confined to a band from 535 kilohertz to 1,700 kilohertz (kilo meaning "thousands," so 535,000 to 1,700,000 cycles per second). So an AM (amplitude modulated) radio station that says, "This is AM 680 WPTF" means that the radio station is broadcasting an AM radio signal at 680 kilohertz and its FCC-assigned call letters are WPTF.

TEXT B

THE ELECTROMAGNETIC SPECTRUM

- ***Give a written/oral summary of the text***

The basis for all telecommunication channels both wired and wireless, is the electromagnetic spectrum.

Telephone signals, radar waves, and the invisible commands from a garage-door opener all represent different waves on what is called the electromagnetic spectrum.

The electromagnetic spectrum consists of fields of electrical energy and magnetic energy, which travel in waves.

The electromagnetic spectrum is the range of all possible frequencies of electromagnetic radiation. The "electromagnetic spectrum" of an object has a different meaning, and is instead the characteristic distribution of an electromagnetic radiation emitted or absorbed by that particular object.

All radio signals, light rays, X-rays, and radioactivity radiate an energy that behaves like rippling waves. The waves vary according to two characteristics, frequency and wavelength. The electromagnetic spectrum extends from below the low frequencies used for modern radio communication to gamma radiation at the short-wavelength (high-frequency) end, thereby covering wavelengths from thousands of kilometers down to a fraction of the size of an atom.

Frequency is the number of times a wave repeats (makes a cycle) in a second.

Frequency is measured in hertz (Hz), with 1Hz equal to 1 cycle per second. One thousand hertz is called a kilohertz (KHz), 1 million hertz is called a megahertz (MHz), and 1 billion hertz is called a gigahertz (GHz).

Ranges of frequencies are called bands or bandwidths. The bandwidth is the difference between the lowest and highest frequencies transmitted. For example, cellular phones are on the 800-900 megahertz bandwidth – that is, their bandwidth is 100 megahertz. The wider the bandwidth, the faster data can be transmitted.

Low-frequency waves can travel far but can't carry much information. High-frequency waves can travel only a short distance before breaking up, but they can

carry much more information. Thus, different technologies are best suited to different purposes, depending on the frequency range (bandwidth) they are in.

Waves also vary according to their length – their wavelength. At the low end of the spectrum, the waves are of low frequency and of long wavelength (such as domestic electricity). At the high end, the waves are of high frequency and of short wavelength (such as cosmic rays).

UNIT VII

GRAMMAR: CONTINUOUS TENSES

Тривалі часи (Continuous Tenses)
Утворення і вживання теперішнього тривалого часу (Present Continuous)

Continuous Tenses утворюється з допоміжного дієслова to be у відповідній часовій формі та дієприкметника теперішнього часу (Present Participle) основного дієслова.

Present Participle утворюється додаванням закінчення -ing до інфінітива дієслова без частки to.

Дієслова, що закінчуються в інфінітиві на приголосну з попередньою короткою наголошеною голосною, перед закінченням -ing:

to move – moving

to give – giving

У дієсловах, що закінчуються в інфінітиві на приголосну з попередньою коротко наголошеною голосною, перед закінченням -ing кінцева приголосна подвоюється:

to sit – sitting

to run – running

Якщо дієслово закінчується буквосполученням -ie, то перед закінченням -ing закінчення -ie змінюється на y.

Особа	**Число**	
	Однина	**Множина**
Стверджувальна форма		
1-а	I am sitting	We are sitting.
2-а	You are sitting.	You are sitting.
3-я	He She } is sitting It	They are sitting.
Питальна форма		
1-а	Am I sitting?	Are we sitting?
2-а	Are you sitting?	Are you sitting?

3-я	Is { he / she / it } sitting?	Are they sitting?
Заперечна форма		
1-а	I am not sitting.	We are not sitting.
2-а	You are not sitting.	You are not sitting.
3-я	{ He / She / It } is not sitting.	They are not sitting.

У коротких відповідях після yes або no вживається лише допоміжне дієслово.

Am I sitting? – Yes, I am (No, I am not).

Are they sitting? – Yes, they are. (No, they are not.)

Present Continuous вживається для вираження дії як процесу, що триває в момент мовлення або в теперішній період часу. Наявність слів, що позначають момент мовлення (now – зараз, at this moment – у цей момент) не обов'язкова.

У Present Continuous не вживаються дієслова to see, to hear, to know, to feel, to like, to want, to understand та інші.

Ex. 1. ***Make the sentences interrogative and negative.***

1) The sun is shining.
2) They are listening to the teacher.
3) I am writing a letter.
4) She is reading a text.
5) We are having dinner.
6) He is opening the window.
7) I am talking to my friend.
8) The baby is sleeping.

Ex. 2. ***Change the sentences into the Present Continuous Tense.***

1) She usually drinks tea in the morning, but this morning she … coffee. 2) They usually play in the garden in the afternoon, but this afternoon they … in the park. 3) She usually washes dishes at night, but tonight she … clothes. 4) He usually reads his newspaper at night, but tonight he … a book. 5) They usually go to work by bus, but today they … by car. 6) I usually have lunch alone, but today I … lunch together with my friends.

Ex. 3. ***Put the verbs in brackets into the correct form.***

1) Please, be quiet. I (try) to concentrate. 2) Look! It (snow). 3) Why you (look) at me like that? Have I said something wrong? 4) You (make) a lot of noise. Can you be a bit quieter? 5) Excuse me, I (look) for a phone box. Is there one near here? 6) Listen! Can you hear those people next door? They (shout) at each other again. 7) Why you (wear) your coat today? It's very warm. 8) I (not/work) this week. I'm on holiday.

Ex. 4. ***Put the verbs in brackets into the Present Continuous Tense or the "be going to" form.***

1) My uncle (make) a speech on Friday. 2) I (take) the children to the Zoo tomorrow. 3) She (call) for me at six. 4) It (rain). Look at those clouds. 5) He (play) at Wimbledon next summer. 6) You (eat) all that? 7) I (meet) her at the station at 10. 8) She (come) out of the hospital next week. 9) When you (cut) the grass? 10) He (give) a lecture tonight. 11) I (not/stay) here another minute. 12) You (ask) him to help you? 13) They (celebrate) their golden wedding next Sunday.

Утворення і вживання минулого тривалого часу (Past Continuous)

Особа	**Число**	
	Однина	**Множина**
Стверджувальна форма		
1-а	I was sitting.	We were sitting.
2-а	You were sitting.	You were sitting.
3-я	He / She / It } was sitting.	They were sitting.
Питальна форма		
1-а	Was I sitting?	Were we sitting?
2-а	Were you sitting?	Were you sitting?
3-я	Was { he / she / it } sitting?	Were they sitting?
Заперечна форма		
1-а	I was not sitting.	We were not sitting.
2-а	You were not sitting.	You were not sitting.
3-я	He / She / It } was not sitting.	They were not sitting.

В усному мовленні замість was not вживається wasn't, замість were not – weren't.

Past Continuous вживається для вираження дії, що тривала в певний момент у минулому, цей момент позначається обставинними словами at 6 o'clock yesterday – о 6 годині вчора, at that moment – у той момент або підрядним реченням з дієсловом присудком у Past Indefinite.

I was asking at that moment. Я запитував у той момент.

We were playing chess when our mother came. Ми грали у шахи, коли ввійшла наша мати.

Ex. 5. ***Change the following into Past Continuous.***

1) The man is standing near the door.

2) Tom told a story.
3) The children swam in the river.
4) Is Mary wearing a write dress?
5) She went to the cinema.
6) They did not work in the garden.
7) We are not sitting by the window.
8) The workers built a bridge.
9) The old man spoke in a low voice.
10) I am listening to their conversation.

Ex. 6. ***Make the sentences negative and interrogative.***

1) Helen was having her dinner at 3 o'clock. 2) Mike was preparing for his exam in January. 3) Ann was writing on the blackboard. 4) They were singing in the next room. 5) He was earning his living by fishing. 6) We were playing in the park. 7) Jane was working in the laboratory the whole day.

Ex. 7. ***Put the verbs in brackets into the Past Continuous Tense.***

1) What you (do) yesterday at 10.20 p.m.? – I (play) chess with my brother and Mary (listen) to a play on the radio. 2) My wife and I (talk) about you the other day. 3) When I first met him, he (study) painting. 4) Who you (talk) to on the telephone as I came in? – I (talk) to Mr. Smith. 5) The traffic made so much noise that I could not hear what he (say). 6) From the sounds it was clear that Mary (practice) the piano. 7) It (rain) when we went out. 8) She (live) in England when the war began. 9) While he (learn) to drive he had twenty-five accidents. 10) The baby (eat) his dinner when I came home.

TEXT 1

TELEGRAPH

Vocabulary

famous – відомий
wonderful – дивовижний
question – питання
communication – комунікація; зв'язок
prove – доводити; підтверджувати
instantly – зразу; відразу; негайно
wire – дріт; провід
message – повідомлення; послання
discover – відкривати; виявляти
floor – дно
needle – голка
government – урядовий
portrait painter – портретист
connect – з'єднувати; поєднувати
wavy – хвилястий
dot – крапка; цяточка
dash – риска; тире
sound – звук
stretch – розтягуватися
transatlantic – трансатлантичний

Benjamin Franklin, an American who is famous for his interesting and useful inventions, published his ideas about electricity in 1752. Scientists in many countries became interested in this wonderful form of energy. They wanted to find the answer

to a very important question: could the electricity be used to develop a fast, efficient system of long-distance communication? Experiments proved that electricity could travel instantly over a very long piece of wire. But a note that was written on a piece of paper couldn't be put into a wire. How could electricity be used to send a message? A Danish scientist discovered that electricity could move a needle from left to right and that the needle could be pointed at letters on a piece of paper. Then a German government worker made up a code system that could be used with an electric needle. In 1837 two English scientists sent a message by electric telegraph for a distance of more than 1.6 kilometers.

Samuel Morse, an American portrait painter, was experimenting with an electric telegraph too. At first he connected a pencil to an electric wire. When the electricity came through the wire the pencil made wavy lines. Then Morse invented a code that used dots and dashes for the letters of the alphabet. Finally, he discovered that telegraph messages did not have to be written, they could be sent in sound.

On May 24, 1844, the first long-distance message was sent by telegraph for 64 kilometers.

Telegraph companies were formed in many cities. By 1861 telegraph wires stretched from the Atlantic to the Pacific. In Europe too, Samuel Morse's system became popular.

But telegraph wires couldn't be hung over an ocean. Messages to and from Europe had to be sent by ship – a journey of two or three weeks. A new method was needed.

The Atlantic Telegraph Company which was organized in 1856 wanted to try to lay a cable on the floor of the Atlantic Ocean. The 4,000-kilometer cable broke three times. Each time a new cable had to be made. Finally, on July 27, 1866, the first transatlantic message was sent from Newfoundland to Ireland.

Later cables were laid to Central and South America. After 1900 transpacific cables were laid to Asia and Australia. At last news and business information could be sent instantly to almost every country in the world.

Task 1

Are these sentences true or false? Correct the false sentences:

1. Benjamin Franklin, an American who is famous for his interesting and useful inventions, published his ideas about electricity in 1752.
2. Experiments proved that electricity could not travel instantly over a very long piece of wire.
3. A Danish scientist discovered that electricity could move a needle from left to right and that the needle could be pointed at letters on a piece of paper.
4. Then a German inventor made up a code system that could be used with an electric needle.
5. In 1887 two English scientists sent a message by electric telegraph for a distance of more than 1.6 kilometers.
6. Samuel Morse, an American portrait painter, was experimenting with an electric telegraph too.

7. Then Morse invented a code that used dots and dashes for the letters of the alphabet.

8. On May 24, 1894, the first long-distance message was sent by telegraph for 64 kilometers.

9. The Atlantic Telegraph Company which was organized in 1856 wanted to try to lay a cable on the floor of the Atlantic Ocean.

10. Finally, on July 27, 1866, the first transatlantic message was sent from Newfoundland to Iceland.

Task 2

Put the words in the correct order to make sentences.

1. Published/ideas/electricity/1752/Benjamin Franklin/his/about/in.
2. Energy/of/wonderful/form/in/this/became/interested/many/countries/ scientists/in.
3. Proved/electricity/travel/over/very/piece/wire/experiments/that/could/ instantly/a/long/of.
4. Needle/German/electric/government/an/worker/with/made/used/up/be/a/ could/code/that/system.
5. Samuel Morse/too/an/telegraph/American/electric/portrait/an/painter/with/ was/experimenting.
6. Lines/made/the/through/the/came/the/wavy/pencil/wire/electricity/when.
7. Invented/Morse/code/a/used/that/and/dots/for/dashed/letters/the/of/alphabet/ the.
8. Cities/telegraph/many/companies/in/were/formed.
9. Telegraph/couldn't/hung/an/wires/be/over/ocean.
10. Last/and/information/be/instantly/almost/country/the/at/news/business/could/ sent/to/every/in/world.

Task 3

Match the words and their definitions.

1	wire	**A**	move to and fro, up and down
2	message	**B**	bottom of the sea, of a cave, etc.
3	floor	**C**	stroke of the pen or a mark (-) used in printing
4	needle	**D**	(piece or length of) metal in the form of a thread
5	connect	**E**	that which is or can be heard
6	wave	**F**	(length of) thick, strong rope (of fibre or wire), used on ships, bridges, etc.
7	dot	**G**	small, thin piece of polished steel, pointed at one end and with a small hole at the other end

8	dash	**H**	piece of news, or a request, sent to a person
9	sound	**I**	small round mark
10	cable	**J**	join, be joined

Task 4

Match the words in the right column with the words in the left column to make word combinations.

1	wavy	***a***	communication
2	a piece	***b***	needle
3	electric	***c***	on the floor
4	code	***d***	dashes
5	dots and	***e***	lines
6	long-distance	***f***	cables
7	telegraph	***g***	wires
8	lay a cable	***h***	of paper
9	transatlantic	***i***	message
10	transpacific	***j***	system

Task 5

Choose the correct statement:

1. They wanted to find the answer to a very important question: could the electricity be used to **create/develop** a fast, efficient system of long-distance communication?
2. Experiments proved that electricity could travel instantly over a very long piece of **cable/wire**.
3. A Danish scientist **invented/discovered** that electricity could move a needle from left to right and that the needle could be pointed at letters on a piece of paper.
4. Then a German government worker made up a code system that could be used with an electric **wire/needle**.
5. Samuel Morse, an American portrait painter, was **working/experimenting** with an electric telegraph too.
6. When the electricity came through the wire the pencil made **straight/wavy** lines.
7. Finally, he discovered that telegraph messages did not have to be written, they could be **transferred/sent** in sound.
8. The Atlantic Telegraph Company which was organized in 1856 wanted to try to lay a **wire/cable** on the floor of the Atlantic Ocean.
9. Finally, on July 27, 1866, the first **transpacific/transatlantic** message was sent from Newfoundland to Ireland.

Task 6

Fill in the blanks with appropriate words:

cable	code	move
message	telegraph	develop
wire	electricity	needle

1. Could the electricity be used to _____ a fast, efficient system of long-distance communication?
2. Experiments proved that _____ could travel instantly over a very long piece of wire.
3. A Danish scientist discovered that electricity could _____ a needle from left to right and that the needle could be pointed at letters on a piece of paper.
4. Then a German government worker made up a code system that could be used with an electric _____.
5. In 1837 two English scientists sent a message by electric _____ for a distance of more than 1.6 kilometers.
6. When the electricity came through the _____, the pencil made wavy lines.
7. Then Morse invented a _____ that used dots and dashes for the letters of the alphabet.
8. The Atlantic Telegraph Company which was organized in 1856 wanted to try to lay a _____ on the floor of the Atlantic Ocean.
9. Finally, on July 27, 1866, the first transatlantic _____ was sent from Newfoundland to Ireland.

TEXT 2

WIRELESS TELEGRAPHY

Vocabulary

discovery – відкриття
propose – пропонувати
convection current – конвекційний струм
eliminate – усувати
existing – існуючий
incorporate – об’єднувати
abandon – відмовлятися
ridicule – висміювати, осміювати
mutual-inductively – взаємно-індуктивно
coupled – сполучений, об’єднаний
phenomenon – явище
observation – спостереження
validate – підтверджувати
spark-gap – розрядник
jointly – спільно
allow – дозволяти
sound – звук
pick up – забирати, підхоплювати
series – ряд, серія
spark – іскра; спалах
trial – випробування
aerial – повітряний, антенний
device – пристрій, прилад
representative – представник
merely – просто, лише, тільки
pursue – проводити, переслідувати
detect – виявляти
oscillation – коливання

intentionally – навмисно
unequivocally – однозначно
inductance – індуктивність
equation – рівняння

Before the discovery of electromagnetic waves and the development of radio communication there were many wireless telegraph systems proposed or tried out.

In April 1872 William Henry Ward received U.S. Patent 126,356 for a wireless telegraphy system where he theorized that convection currents in the atmosphere could carry signals like a telegraph wire. A few months after Ward received his patent, Mahlon Loomis of West Virginia received U.S. Patent 129,971 for a «wireless telegraph» in July 1872. This claimed to utilize atmospheric electricity to eliminate the overhead wire used by the existing telegraph systems. It did not contain diagrams or specific methods and it did not refer to or incorporate any known scientific theory. It was similar to William Henry Ward's patent.

Towards the end of 1875, while experimenting with the telegraph, Thomas Edison noted a phenomenon that he termed «etheric force», announcing it to the press on November 28. He abandoned this research when E. Thomson, among others, ridiculed the idea. The idea was not based on the electromagnetic waves described by Maxwell. In 1885, Edison took out U.S. Patent 465,971 on a system of electrical wireless communication between ships (which later he sold to the Marconi Company). The patent, however, was based on the mutual-inductively coupled or magnetically coupled communication.

An alternative form of Wireless telephony is recorded in four patents for the photophone, invented jointly by Alexander Graham Bell and Charles Sumner Tainter in 1880. The photophone allowed for the transmission of sound on a beam of light, and on June 3, 1880 Bell and Tainter transmitted the world's first wireless telephone message on their newly invented form of telecommunication. Nathan Stubblefield claimed to have developed radio between 1885 and 1892, but his devices seemed to have worked by induction transmission rather than radio transmission.

Hughes

In 1879 the experimenter and inventor David Edward Hughes working in London discovered that a bad contact in a Bell telephone he was using in his experiments seamed to be sparking when he worked on a nearby induction balance (an early form of metal detector). He developed an improved detector to pick up this unknown «extra current» based on his new microphone design (similar to later detectors known as coherers or crystal detectors) and developed a way to interrupt his induction balance to produce a series of sparks. By trial and error experiments he eventually found he could pick up these «aerial waves» as he carried his telephone device down the street out to a range of 500 yards (460 m). On February 20, 1880 he demonstrated his technology to representatives of the Royal Society including President of the Society. Stokes was convinced the phenomenon Hughes was demonstrating was merely electromagnetic induction, not a type of conduction through the air. Hughes was not a physicist and seemed to have accepted Stokes observations and did not pursue the experiments any further.

Heinrich Hertz

Between 1886 and 1888 Heinrich Rudolf Hertz studied Maxwell's theory and conducted scientific experiments that validated it. He engineered a method of detecting spark-gap radio waves by observing that another unpowered spark-gap, acting as an antenna, would absorb the radio energy and convert it back into an electric spark. Hertz published his results in a series of papers between 1887 and 1890, and again in complete book form in 1893. The first of the papers published, «On Very Rapid Electric Oscillations», gives an account of the chronological course of his investigation, as far as it was carried out up to the end of the year 1886 and the beginning of 1887. For the first time, electromagnetic radio waves («Hertzian waves») were intentionally and unequivocally proven to have been transmitted through free space by a spark-gap device, and detected over a short distance. Hertz was able to have some control over the frequencies of his radiated waves by altering the inductance and capacitance of his transmitting and receiving antennas. He focused the electromagnetic waves using a corner reflector and a parabolic reflector, to demonstrate that radio behaved the same as light, as Maxwell's electromagnetic theory had predicted more than 20 years earlier. He demonstrated that radio had all the properties of waves, and discovered that the electromagnetic equations could be reformulated into a partial differential equation called the wave equation.

Oliver Joseph Lodge

One of the first investigators to notice and measure stationary waves on wires produced by direct coupling (resonance) with the coatings of a Leyden jar was Sir Oliver Lodge, entitled "Experiments On The Discharge Of Leyden Jars" (1891). On June 1, 1894, Oliver Lodge at the Royal Institution lectures, delivered "The Work of Hertz and Some of His Successors". Lodge performed a transmission on August 14, 1894. Lodge did this at a meeting of the British Association for the Advancement of Science at Oxford University. Also in 1894, Lodge would state that Alexander Muirhead clearly foresaw the telegraphic importance of the transmission of transverse Hertzian waves. A convenient method of establishing stationary electric waves on wires is one which is generally attributed to Ernst Lecher, and called the Lecher arrangement. As a matter of fact, it originated with Lodge and Hertz. On that day in August 1894, Lodge demonstrated the reception of Morse code signaling via radio waves using a "coherer". He later improved Branly's coherer by adding a "trembler" which dislodged clumped filings, thus restoring the device's sensitivity. In August 1898 he got U.S. Patent 609,154, "Electric Telegraphy". This patent utilized the concept of "syntonic" tuning. In 1912 Lodge sold the patent to Marconi. In 1894 Lodge showed that the Branly’s coherer could be employed to transmit telegraphic signals, and in order that the filings should not remain "cohered" after the cessation of the electric oscillations, he devised an electro-mechanical "tapper" on the principle of the ordinary "buzzer," or electric door-bell, the hammer of which was caused to tap the glass tube as long as the electric oscillations continued. The filings thus virtually take the place of a key in the ordinary telegraph circuit. In the normal state the key is open; in the presence of electrical oscillations the key is closed. Thus, by opening and closing the key for a longer or shorter period, signals corresponding to dots and

dashes may be produced. In other words, by setting up electric oscillations for periods of time corresponding to dots and dashes, messages may be transmitted from the sending station, and if, at the receiving station, a recording instrument (controlled by the coherer), such as the ordinary Morse register, be provided, a record of the message in dots and dashes may be obtained. Dr. Lodge in fact used a tapper operated continuously by clockwork. In 1894, with the help of the Branly's filings tube, Lodge gave a couple of demonstrations, one in June at the Royal Institution at Oxford and one in August at Oxford, to the British Association, using Hertz oscillators for transmitting signals, using a Morse key in connection with the sending coil, and a Thomson marine galvanometer for receiving them – sending the signals from one room to another through walls, and so on. Lodge sent them also across the quadrangle of Liverpool College, but he applied very small power and did not try for big distances.

Edouard Branly

In 1890, Edouard Branly demonstrated what he later called the "radio-conductor", which Lodge in 1893 named the coherer, the first sensitive device for detecting radio waves. Shortly after the experiments of Hertz, Branly discovered that loose metal filings, which in a normal state have a high electrical resistance, lose this resistance in the presence of electric oscillations and become practically conductors of electricity. Branly showed this by placing metal filings in a glass box or tube, and making them part of an ordinary electric circuit. According to the common explanation, when electric waves are set up in the neighborhood of this circuit, electromotive forces are generated in it which appear to bring the filings more closely together, that is, to cohere, and thus their electrical resistance decreases, from which cause this piece of apparatus was termed by Sir Oliver Lodge a coherer. Hence the receiving instrument, which may be a telegraph relay, that normally would not indicate any sign of current from the small battery, can be operated when electric oscillations are set up. Branly further found that when the filings had once cohered they retained their low resistance until shaken apart, for instance, by tapping on the tube. The coherer, however, was not sensitive enough to be used reliably as radio developed.

Task 1

Study and memorize the following words and word combinations:

the discovery of electromagnetic waves, convection current, to carry signals, to claim, to eliminate the overhead wire, a scientific theory, wireless communication, an inventor, to be sparking, to pick up an extra current, to pursue the experiments, to validate the theory, unpowered spark-gap, to absorb the radio energy, investigation, unequivocally, to be proven, to have control over the frequencies, by altering the inductance and capacitance, to have properties, an equation, to measure stationary waves, direct coupling with, the coating of a Leyden jar, a coil, to originate with, to dislodge clumped filings, after the cessation, to tap the glass tube, oscillations, dots

and dashes, quadrangle, the first sensitive device, loose metal filings, a high electrical resistance, an ordinary electric circuit.

Task 2

Ask 10 questions to the above text using the words and word combinations from Task 1.

Task 3

Translate the following sentences into English:

1. Цей експеримент Герца мав велике значення для науки, тому у Німеччині фізика Герца вважають винахідником радіо. 2. Герц намагався експериментально підтвердити теорію Максвела. 3. Англійський фізик та винахідник сер Лодж вирішив знайти можливість передавати інформацію у просторі за допомогою азбуки Морзе. 4. Для досягнення цієї мети він використовував приймач Герца. 5. Але пристрій Лоджа не був надійним. 6. У 1895 році Попов зацікавився дослідами Лоджа та побудував аналогічний пристрій. 7. 7 травня 1895 року Попов продемонстрував приймач радіохвиль, який був здатний ловити хвилі на відстані 60 метрів. 8. Когерер Лоджа, уперше продемонстрований перед аудиторією Королівського інституту у 1894 році, дозволяв приймати сигнали кода Морзе, передані радіохвилями, та давав можливість їх запису спеціальним апаратом.

TEXTS FOR RENDERING AND DISCUSSION

TEXT A

ECHO LOCATION. RADAR

- ***Give a written/oral summary of the text.***

A common method of obtaining information about a remote object is to bounce a wave off of it. For example, radar operates by transmitting pulses of radio waves, and examining the received signal for echoes from aircraft. In sonar, sound waves are transmitted through the water to detect submarines and other submerged objects.

Radar is an acronym for RAdio Detection And Ranging. In the simplest radar system, a radio transmitter produces a pulse of radio-frequency energy a few microseconds long. This pulse is fed into a highly directional antenna, where the resulting radio wave propagates away at the speed of light. Aircraft in the path of this wave will reflect a small portion of the energy back toward a receiving antenna, situated near the transmission site. The distance to the object is calculated from the elapsed time between the transmitted pulse and the received echo. The direction to the object is found more simply; you know where you pointed the directional antenna when the echo was received.

The operating range of a radar system is determined by two parameters: how much energy is in the initial pulse, and the noise level of the radio receiver. Unfortunately, increasing the energy in the pulse usually requires making the pulse longer. In turn, the longer pulse reduces the accuracy and precision of the elapsed time measurement. It results in a conflict between two important parameters: the ability to detect objects at a long range, and the ability to accurately determine an object's distance.

DSP (Digital Signal Processing) has revolutionized radar in three areas, all of which relate to this basic problem. First, DSP can compress the pulse after it is received, providing better distance determination without reducing the operating range. Second, DSP can filter the received signal to decrease the noise. This increases the range, without degrading the distance determination. Third, DSP enables the rapid selection and generation of different pulse shapes and lengths.

TEXT B

ECHO LOCATION. SONAR

- ***Give a written/oral summary of the text.***

Sonar is an acronym for SOund NAvigation and Ranging. It is divided into two categories, active and passive. In active sonar, sound pulses between 2 kHz and 40 kHz are transmitted into the water, and the resulting echoes detected and analyzed. Uses of active sonar include: detection and localization of undersea bodies, navigation, communication, and mapping the sea floor. A maximum operating range of 10 to 100 kilometres is typical. In comparison, passive sonar simply listens to underwater sounds, which include: natural turbulence, marine life, and mechanical sounds from submarines and surface vessels. Since passive sonar emits no energy, it is ideal for covert operations. The most important application of passive sonar is in military surveillance systems that detect and track submarines. Passive sonar typically uses lower frequencies than active sonar because they propagate through the water with less absorption. Detection ranges can be thousands of kilometres.

In one view, sonar is simpler than radar because of the lower frequencies involved. In another view, sonar is more difficult than radar because the environment is much less uniform and stable. Sonar systems usually employ extensive arrays of transmitting and receiving elements, rather than just a single channel. By properly controlling and mixing the signals in these many elements, the sonar system can steer the emitted pulse to the desired location and determine the direction that echoes are received from.

UNIT VIII

GRAMMAR: PERFECT TENSES

Утворення і вживання Present Perfect.

Present Perfect утворюється з допоміжного дієслова to have, has і дієприкметника минулого часу (Past Participle) основного дієслова.

Past Participle правильних дієслів збігається з формою Past Indefinite. Past Participle неправильних дієслів потрібно запам'ятати.

Особа	**Число**	
	Однина	**Множина**
Стверджувальна форма		
1-а	I have opened the window.	We have opened the window.
2-а	You have opened the window.	You have opened the window.
3-я	He / She / It } has opened the window.	They have opened the window.
Питальна форма		
1-а	Have I opened the window?	Have we opened the window?
2-а	Have you opened the window?	Have you opened the window?
3-я	Has he / she / it } opened the window?	Have they opened the window?
Заперечна форма		
1-а	I have not opened the window.	We have not opened the window.
2-а	You have not opened the window.	You have not opened the window.
3-я	He / She / It } has not opened the window.	They have not opened the window.

В усному мовленні замість I have opened вживається I've opened; замість you have opened – you've opened; замість he has opened – he's opened; she has opened – she's opened; it has opened – it's opened; they have opened – they've opened.

В усному мовленні замість have not вживається haven't, замість has not – hasn't.

Present Perfect виражає наявність якогось результату дії, зв'язок її з наступними подіями. Present Perfect вживається без зазначення часу виконання дії, тому, що в центрі уваги результати дії, а не час її перебігу, або з прислівниками неозначеного часу і частотності: often – часто, seldom – рідко, never – ніколи, just – щойно, already – вже, always – завжди, yet – усе ще.

Ex. 1. ***Make the sentences interrogative and negative.***

1) Mary has switched on the light.
2) My relatives have received the parcel.
3) Our grandfather has traveled much.
4) The boy has passed all his exams.
5) The director has signed the order.
6) The Pavlovs have left for Canada.

Ex. 2. ***Replace the words in brackets by Present Perfect***

1) The children (do) their homework.
2) You ever (be) to London?
3) I already (send) the telegram.
4) I (not/see) him since January.
5) We (not/receive) any letters from her lately.
6) He just (fall asleep).
7) She (have breakfast) already?

Ex. 3. ***Answer the questions***

1) Have you traveled a lot?
2) Have you ever been to London?
3) Have you listened to the latest news?
4) Have you ever eaten caviar?
5) Have you ever driven a car?
6) How many times have you been to the theatre?
7) How many English books have you read?
8) What good habits have you form?
9) What bad habits have you given up?

Утворення і вживання Past Perfect

Past Perfect утворюється з допоміжного дієслова to have у Past Indefinite – had і Past Participle основного дієслова.

Особа	**Число**	
	Однина	**Множина**
Стверджувальна форма		
1-а	I had opened the window.	We had opened the window.
2-а	You had opened the window.	You had opened the window.
3-я	He / She / It had opened the window.	They had opened the window.
Заперечна форма		
1-а	I had not opened the window.	We had not opened the window.
2-а	You had not opened the window.	You had not opened the window.
3-я	He / She / It had not opened the window.	They had not opened the window.

В усному мовленні замість had not вживається hadn't.

Past Perfect вживається для вираження минулої дії, яка вже відбулася до певного моменту або іншої дії в минулому. Цей момент позначається такими обставинними словами by Monday – до понеділка; by 3 o'clock – до 3 години; by that time – до того часу; by the first of May – до першого травня, тощо.

She had finished her work by 5 o'clock.

Вона закінчила свою роботу до 5 години.

I had not done the exercise when my father came in.

Я ще не виконав вправу, коли увійшов мій тато.

Had you ever seen that film?

Ти коли-небудь бачив той фільм?

Ex. 4. ***Make the sentences interrogative and negative.***

1) Kate had done her lessons by eight o'clock.
2) We had reached the village before the sun set.
3) I had posted the letter by that time.
4) Mother had cooked dinner before I came.
5) The students had translated the text before the bell rang.
6) Peter had studied English before he entered the Institute.

Ex. 5. ***Combine two sentences into one with the help of «when», «before», «after».***

1) We got home. It began to rain.
2) I came to the airport. The plane landed safely.
3) The organizing committee invited him to take part in the conference. He wrote a paper.
4) The conference started its work. Professor Belov arrived there.
5) I visited my friends. I left for London.
6) I met him. I turned round the corner.
7) She rang me up. She returned home.

Ex. 6. ***Complete the sentences using the verbs in brackets.***

Model: They were very nervous in the plane. They (fly) _____ before.

They had never flown before.

1) The woman was a complete stranger to me. I (see) before. 2) Nora was late for work. Her boss was very surprised. She (be late) before. 3) Jane played tennis yesterday. She wasn't very good at it. She (play) before. 4) It was Tom's first driving lesson. He was very nervous. He (drive) before.

TEXT 1

TELEPHONE

Vocabulary

inventor – винахідник
deaf – глухий
subject – предмет; дисципліна
painter – живописець; художник
experiment – дослід; експеримент
human – людський
voice – голос
contribute – вносити (гроші)
equipment – устаткування; обладнання
dial – набирати номер
appear – з'являтися
addition – доповнення; додавання
tube – трубка; об'єктив
mirror – дзеркало; люстро
scan – сканувати; пильно розглядати
together – разом
discourage – знеохочувати
transmitter – передавач
spill – розливати; переливати
acid – кислота
alone – один; сам; одинокий
receiver – телефонна трубка
design – конструкторський
bureau – бюро; контора
pick up – піднімати
screen – екран
include – включати
allow – дозволяти
attachment – пристосування
adjust – регулювати

Alexander Graham Bell never planned to be an inventor; he wanted to be a musician or a teacher of deaf people. The subjects that he studied at school included music, art, literature, Latin and Greek. They did not include German which all scientists used in their books. Alexander's mother was a painter and a musician. His father was a well-known teacher of deaf people.

When Alexander was only sixteen, he became a teacher in boy's school in Scotland. He liked teaching there, but he still wanted to become a teacher of deaf people as his father.

He read all the books about sound that he could find and started to work on some of his own experiments.

At twenty five Alexander became interested in finding a way to send human voice through an electric wire. The parents of his pupils contributed money for the equipment. He found an assistant, Tom Watson, who worked in an electrical shop. For two years Tom and Alexander were working together to build a machine that people could use to talk to one another over long distances. After two years, the two young men were becoming discouraged. Then, one day, when they were working on a new transmitter Alexander spilled some acid on himself. Tom Watson, who was alone in another room, heard a voice. The voice was coming through a wire to a receiver on the table! The voice was Alexander Bell's! It was saying: «Come here, Mr. Watson. I need you!»

The first telephone line was built in Germany in 1877. By 1915 a telephone line was opened in the United States – 5,440 kilometers from New York to San Francisco.

Now design bureaus all over the world are conducting experiments to develop video-phone or picture phone. A young man in Moscow wants to speak to his friend in Vladivostok. He lifts his telephone receiver, dials a number. After a very short time his friend answers. As he picks up his receiver, his picture appears on the screen. They can speak to each other face to face because they are using a new kind of telephone which may be called «a video-phone». In addition to the usual telephone, the equipment includes a small television screen (14 cm by 13 cm) and, combined with the screen, a television camera. The camera tube will allow the user to switch from a wide view of the room to the face of the person speaking. The focus can be changed to give clear pictures of objects 0.3, 0.9 and 6.0 meters away from the camera. There is also a mirror attachment, which allows the camera to scan documents which may be lying on the table. The camera adjusts itself automatically to different lighting conditions.

Task 1

Are these sentences true or false? Correct the false sentences:

1. Alexander Graham Bell never planned to be an inventor; he wanted to be a musician or a teacher of deaf people.
2. The subjects that he studied at school included music, art, literature, Latin, Greek and German that all scientists used in their books.
3. When Alexander was only sixteen, he became a teacher in boy's school in Scotland.
4. He read all the books about sound that he could find and started to work on some of his own experiments.
5. At twenty-nine Alexander became interested in finding a way to send human voice through an electric wire.
6. He found an assistant, Tom Watson, who worked in his school.
7. For two years Tom and Alexander were working together to build a machine that people could use to talk to one another over long distances.
8. The first telephone line was built in Germany in 1877.
9. Then, one day, when they were working on a new transmitter Alexander spilled some acid on the transmitter.
10. There is also a mirror attachment, which allows the camera to switch from a wide view of the room to the face of the person speaking.

Task 2

Put the words in the correct order to make sentences.

1. People/ Alexander Graham Bell/deaf/wanted/of/to/teacher/be/a/musician/a/or.
2. Subjects/the/he/that/at/studied/included/school/art/music/Latin/literature/ Greek/and.
3. Scotland/school/in/a/he/only/Alexander/in/boy’s/teacher/became/sixteen/was/ when.
4. Read/the/about/that/could/and/to/on/of/own/he/all/books/sound/he/find/

started/work/some/his/experiments.

5. At/five/became/in/a/to/human/through/electric/twenty/Alexander/interested/finding/way/send/voice/an/wire.

6. Two/for/Tom/years/Alexander/and/working/were/to/together/a/build/that/machine/could/people/to/use/to/talk/another/one/long/over/distances.

7. First/line/built/in/Germany/1877/the/telephone/was/in.

8. Now/phone/design/picture/bureaus/or/all/ video-phone/over/develop/the/to/world/experiments/are/conducting.

9. Camera/a/the/combined/screen/small/includes/the/usual/to/in/television/screen/with/and/television/a/equipment/telephone/the/addition.

10. Camera/the/will/tube/the/allow/to/user/from/switch/wide/a/of/view/room/the/the/to/of/face/person/the/speaking.

Task 3

Match the words and their definitions.

1	deaf	**A**	look attentively or over every part of
2	adjust	**B**	part of the telephone, with numbers, and/or letters, used to make a connection
3	dial	**C**	part of apparatus for receiving something eg that part of a telephone that is held to the ear
4	voice	**D**	put right; put in order; regulate
5	human	**E**	of man or mankind
6	mirror	**F**	sour; sharp to the taste
7	scan	**G**	unable to hear at all
8	acid	**H**	give permission
9	allow	**I**	sounds made when speaking or singing
10	receiver	**J**	polished surface (usually of glass) that reflects images

Task 4

Match the words in the right column with the words in the left column to make word combinations.

1	deaf	***a***	a number
2	electric	***b***	phone
3	all over	***c***	camera
4	video-	***d***	to face
5	telephone	***e***	people
6	dial	***f***	attachment
7	face	***g***	wire
8	television	***h***	conditions

9	mirror	***i***	the world
10	lighting	***j***	line

Task 5

Choose the correct statement:

1. The subjects did not include **Latin/German** that all scientists used in their books.
2. He liked **studying/teaching** there, but he still wanted to become a teacher of deaf people as his father.
3. He read all the books about sound that he could find and started to work on some of his own **studies/experiments**.
4. At twenty-five Alexander became interested in finding a way to **transfer/send** human voice through an electric wire.
5. For two years Tom and Alexander were working together to **design/build** a machine that people could use to talk to one another over long distances.
6. Then, one day, when they were working on a new **receiver/transmitter** Alexander spilled some acid on himself.
7. The voice was coming through a **transmitter/wire** to a receiver on the table.
8. He **picks up/lifts** his telephone receiver, dials a number.
9. The camera adjusts itself automatically to different lighting **parameters/conditions**.

Task 6

Fill in the blanks with appropriate words:

attachment	voice	sound
adjusts	transmitter	dials
receiver	inventor	telephone

1. Alexander Graham Bell never planned to be an _____; he wanted to be a musician or a teacher of deaf people.
2. He read all the books about _____ that he could find and started to work on some of his own experiments.
3. At twenty-five Alexander became interested in finding a way to send human _____ through an electric wire.
4. Then, one day, when they were working on a new _____ Alexander spilled some acid on himself.
5. The voice was coming through a wire to a _____ on the table.
6. By 1915 a _____ line was opened in the United States – 5,440 kilometers from New York to San Francisco.
7. He lifts his telephone receiver, _____ a number.
8. There is also a mirror _____, which allows the camera to scan documents which may be lying on the table.
9. The camera _____ itself automatically to different lighting conditions.

TEXT 2

TYPES OF RADIO SYSTEMS

Vocabulary

digital – цифровий
satellite – супутник
pioneer – піонер, першовідкривач
rotating – обертовий, поворотний
spark gap – розрядник, іскровий проміжок
commutator – комутатор
hiss – шипіння
indistinguishable – невідмінний
frequency – частота, частотність
tube – трубка, труба
oscillator – генератор коливань
whistle-like – свистоподібний
vulnerable – уразливий
cell phone – мобільний телефон
subchannel – підканал
ghosting – виникнення
bandwidth – пропускна здатність
equipment – обладнання
military – військовий
create – створювати
skilled – кваліфікований
bit – уривок
teleprinter – телетайп, телепринт
aircraft – авіація
altitude – висота
gate – ворота, вихід
quadrature – квадратура
narrowband – вузькосмуговий
jamming – глушіння
reliability – надійність
fading – затухання, згасання
resist – протистояти

Most new radio systems are digital, including Digital TV, satellite radio, and Digital Audio Broadcasting. The oldest form of digital broadcast was spark gap telegraphy, used by pioneers such as Marconi. By pressing the key, the operator could send messages in Morse code by energizing a rotating commutating spark gap. The rotating commutator produced a tone in the receiver, where a simple spark gap would produce a hiss, indistinguishable from static.

The next advance was continuous wave telegraphy, or CW (Continuous Wave), in which a pure radio frequency, produced by a vacuum tube electronic oscillator was switched on and off by a key. A receiver with a local oscillator would "heterodyne" with the pure radio frequency, creating a whistle-like audio tone. CW uses less than 100 Hz of bandwidth. CW is still used, these days primarily by amateur radio operators.

Radio teletype equipment usually operates on short-wave (HF) and is much loved by the military because they create written information without a skilled operator. They send a bit as one of two tones using frequency-shift keying. Groups of five or seven bits become a character printed by a teleprinter.

Aircraft use a 1200 Baud radio teletype service over VHF to send their ID, altitude and position, and get gate and connecting-flight data. Microwave dishes on satellites, telephone exchanges and TV stations usually use quadrature amplitude modulation (QAM). QAM sends data by changing both the phase and the amplitude of the radio signal. Engineers like QAM because it packs the most bits into a radio signal when given an exclusive (non-shared) fixed narrowband frequency range.

Communication systems that limit themselves to a fixed narrowband frequency range are vulnerable to jamming. A variety of jamming-resistant spread spectrum techniques were initially developed for military use, most famously for Global Positioning System satellite transmissions. Commercial use of spread spectrum began in the 1980s. Bluetooth, most cell phones, and the 802.11b version of Wi-Fi each use various forms of spread spectrum.

Systems that need reliability, or that share their frequency with other services, may use «coded orthogonal frequency-division multiplexing» (COFDM).

COFDM breaks a digital signal into as many as several hundred slower subchannels. The digital signal is often sent as QAM on the subchannels. Modern COFDM systems use a small computer to make and decode the signal with digital signal processing, which is more flexible and far less expensive than older systems that implemented separate electronic channels. COFDM resists fading and ghosting because the narrow-channel QAM signals can be sent slowly. COFDM is used for Wi-Fi, some cell phones, and many other local area network, digital TV and radio standards.

Task 1

Answer the following questions.

1. What types of radio systems do you know? Which one among them is the oldest?
2. What is the function of the rotating commutator?
3. Can you retell us the principles of CW?
4. How does radio teletype equipment usually operate?
5. Why do engineers like QAM?
6. What communication systems are vulnerable to jamming?
7. In what way can we send a digital signal?

Task 2

Translate and memorize the following words and word combinations.

Cell phones, frequency-shift keying, to implement, to switch on/off, a whistle-like audio tone, amateur radio, a spark gap, altitude, jamming, a fixed narrowband frequency range, to break into subchannels, flexible, fading, ghosting, a skilled operator, a microwave dish, indistinguishable from, reliability, digital broadcast, to be vulnerable to, to energize.

Task 3

Translate and memorize the following definition.

Quadrature amplitude modulation: A digital modulation scheme in which the source information is carried by the amplitude and by the phase of sinusoidal waveform.

TEXTS FOR RENDERING AND DISCUSSION

TEXT A

PACKET RADIO

- ***Give a written/oral summary of the text.***

Radio can transmit a continuous bit stream or it can group the bits into packets. This type of radio is called a packet radio and is characterized by burst transmissions: the radio is idle except when it transmits a packet. The first network based on packet radio, ALOHANET, was developed at the University of Hawaii in 1971. This network enabled computer sites at seven campuses spread out over four islands to communicate with a central computer on Oahu via radio transmission. The network architecture used a star topology with the central computer at its hub. Any two computers could establish a bi-directional communications link between them by going through the central hub. ALOHANET incorporated the first set of protocols for channel access and routing in packet radios systems, and many of the underlying principles in these protocols are still in use today.

Packet radio networks found commercial application in supporting wide-area wireless data services. These services, first introduced in the early 1990's, enable 161 wireless data access (including email, file transfer, and web browsing) at fairly low speeds, on the order of 20 Kbps. A strong market for these wide-area wireless data services never really materialized, due mainly to their low data rates, high cost, and lack of "killer applications". These services mostly disappeared in the 1990s, supplanted by the wireless data capabilities of cellular telephones and wireless local area networks (LANs). The introduction of wired Ethernet technology in the 1970's steered many commercial companies away from radio-based networking. Ethernet's 10 Mbps data rate far exceeded anything available using radio, and companies did not mind running cables within and between their facilities to take advantage of these high rates.

In 1985 the Federal Communications Commission (FCC) enabled the commercial development of wireless LANs by authorizing the public use of the Industrial, Scientific, and Medical (ISM) frequency bands for wireless LAN products. The ISM band was very attractive to wireless LAN vendors since they did not need to obtain an FCC license to operate in this band. However, the wireless LAN systems could not interfere with the primary ISM band users, which forced them to use a low power profile and an inefficient signaling scheme. Moreover, the interference from primary users within this frequency band was quite high.

As a result these initial wireless LANs had very poor performance in terms of data rates and coverage. This poor performance, coupled with concerns about security, lack of standardization, and high cost (the first wireless LAN access points listed for $1,400 as compared to a few hundred dollars for a wired Ethernet card) resulted in weak sales. Few of these systems were actually used for data networking: they were relegated to low-tech applications like inventory control.

The current generation of wireless LANs, based on the family of IEEE 802.11 standards, have better performance, although the data rates are still relatively low (maximum collective data rates of tens of Mbps) and the coverage area is still small (around 150 m.).Wired Ethernets of today offer data rates of 100 Mbps, and the performance gap between wired and wireless LANs is likely to increase over time without additional spectrum allocation.

Despite the big data rate differences, wireless LANs are becoming the preferred Internet access method in many homes, offices, and campus environments due to their convenience and freedom from wires. However, most wireless LANs support applications such as email and web browsing that are not bandwidth-intensive. The challenge for future wireless LANs will be to support many users simultaneously with bandwidth-intensive and delay-constrained applications such as video. Range extensions are also a critical goal for future wireless LAN systems. By far the most successful application of wireless networking has been the cellular telephone system. The roots of this system began in 1915, when wireless voice transmission between New York and San Francisco was first established. In 1946 public mobile telephone service was introduced in 25 cities across the United States.

TEXT B

CELLULAR PHONES

- ***Give a written/oral summary of the text.***

A mobile phone (also known as a cellular phone, cell phone, hand phone, or simply a phone) is a phone that can make and receive telephone calls over a radio link while moving around a wide geographic area. It does so by connecting to a cellular network provided by a mobile phone operator, allowing access to the public telephone network. By contrast, a cordless telephone is used only within the short range of a single, private base station.

In addition to telephony, modern mobile phones also support a wide variety of other services such as text messaging, MMS, email, Internet access, short-range wireless communications (infrared, Bluetooth), business applications, gaming, and photography. Mobile phones that offer these and more general computing capabilities are referred to as smartphones.

A hand-held mobile radiotelephone is an old dream of radio engineering. One of the earliest descriptions can be found in the 1948 science fiction novel Space Cadet by Robert Heinlein. The protagonist, who has just traveled to Colorado from his home in Iowa, receives a call from his father on a telephone in his pocket. Before leaving for earth orbit, he decides to ship the telephone home "since it was limited by its short range to the neighborhood of an earth-side [i.e. terrestrial] relay office." Ten years later, an essay by Arthur C. Clarke envisioned a "personal transceiver, so small and compact that every man carries one." Clarke wrote: "the time will come when we will be able to call a person anywhere on Earth merely by dialing a number." Such a device would also, in Clarke's vision, include means for global positioning so that "no

one need ever again be lost." Later, in Profiles of the Future, he predicted the advent of such a device taking place in the mid-1980s.

Radio spectrum coupled with the state of radio technology of the past severely limited the system capacity. A solution to this capacity problem emerged during the 50's and 60's when researchers at AT&T Bell Laboratories developed the cellular concept. Cellular systems exploit the fact that the power of a transmitted signal falls off with distance. Thus, two users can operate on the same frequency at spatially-separate locations with minimal interference between them. This allows very efficient use of cellular spectrum so that a large number of users can be accommodated.

In 1947 AT&T requested spectrum for cellular service from the FCC. The design was mostly completed by the end of the 1960's, the first field test was in 1978, and the FCC granted service authorization in 1982, by which time much of the original technology was out-of-date. The first analog cellular system deployed in Chicago in 1983 was already saturated by 1984, at which point the FCC increased the cellular spectral allocation from 40 MHz to 50 MHz. The explosive growth of the cellular industry took almost everyone by surprise.

Throughout the late 1980's, as more and more cities became saturated with demand for cellular service, the development of digital cellular technology for increased capacity and better performance became essential. The second generation of cellular systems, first deployed in the early 1990's, were based on digital communications. The shift from analog to digital was driven by its higher capacity and the improved cost, speed, and power efficiency of digital hardware. While second generation cellular systems initially provided mainly voice services, these systems gradually evolved to support data services such as email, Internet access, and short messaging. Unfortunately, the great market potential for cellular phones led to a proliferation of second generation cellular standards: three different standards in the U.S. alone, and other standards in Europe and Japan, all incompatible.

The fact that different cities have different incompatible standards makes roaming throughout the world using one cellular phone standard impossible. Moreover, some countries have initiated service for third generation systems, for which there are also multiple incompatible standards. As a result of the standards proliferation, many cellular phones today are multi-mode: they incorporate multiple digital standards to facilitate nationwide and worldwide roaming, and possibly the first generation analog standard as well.

COMMENTARY

FCC: The Federal Communications Commission regulates interstate and international communications by radio, television, wire, satellite and cable.

MMS: Multimedia Messaging Service is a standard way to send messages that include multimedia content to and from mobile phones. II. Translate and memorize the following words and word combinations: over a radio link, incompatible standards, proliferation, by contrast, a cordless telephone, a wide variety of, to be out-of-date, computing capabilities, to envision, to fall off with distance, the public telephone network, by dialing a number, to exploit the fact, spatially-separate locations, to accommodate, to be saturated, to deploy the cellular system, the shift, to support data services, unfortunately.

UNIT IX

GRAMMAR: THE PASSIVE VOICE

Пасивний стан

Якщо підмет означає предмет або особу, на які спрямована дія іншого предмета або особи, то дієслово-присудок ставиться у формі пасивного стану.

Часи пасивного стану утворюються з допоміжного дієслова to be у відповідному часі і Past Participle основного дієслова.

He read the newspaper yesterday. – Він читав газету вчора.

The newspaper was read by him yesterday. – Газета була прочитана ним вчора.

Пасивна форма

	Indefinite	**Continuous**	**Perfect**	**Perfect Continuous**
Present	-am -is } asked -are (Питають взагалі, звичайно, завжди)	-am -is } being asked -are (питають зараз)	-have -has } been asked (вже спитали)	–
Past	-was -were } asked (спитали колись)	-was -were } being asked (питали у той момент)	had been asked (до того моменту вже спитали)	–
Future	-shall -will be asked (спитають коли-небудь)	–	-shall -will have been asked (спитають до того часу)	–
Future-in-the-Past	-should -will } be asked (спитають коли-небудь)	–	-should -would } have been asked (спитають до того часу)	–

Ex.7. ***Translate the sentences into Ukraine.***

1. The books were taken from the library.
2. The newspapers are usually brought in the morning.
3. An interesting problem was discussed at the lecture.
4. All the works will be done by automatic machinery.
5. The young workers are trained how to use the new equipment.
6. The child was being taken care of.
7. The doctor has been sent for.
8. Several new proposals are being considered by the committee.
9. Some new equipment had been ordered by the company before the strike began.

Ex.8. ***Change the following sentences from the active to the passive voice.***

1. They grow wheat here.
2. The girls water the flowers every day.
3. We do not discuss such questions at our meetings.
4. Popov invented the radio.
5. They didn't show this film last week.
6. They will not finish this work tomorrow.
7. The workers are repairing the road.
8. John is calling the other members.
9. They are cleaning the room now.
10. The doctor is examining me.
11. The company has ordered some new equipment.
12. The teacher has checked our dictations.
13. Someone has broken my pencil.
14. They had written the composition before the bell rang.
15. She has locked the door.
16. They had sold all the tickets by that time.

TEXT 1

TELEVISION

Vocabulary

evidently – очевидно; явно
considerably – значно
tiny – мініатюрний; крихітний
attention – увага
transmit – передавати; транслювати
to have a look – глянути; подивитись
instead – замість
assembly – складання; монтаж
via – через
channel – канал
surprisingly – надзвичайно
influence – вплив
boundary – границя; межа; кордон
space – відстань; простір
artificial – штучний
satellite – супутник
convenient – зручний
wire – дріт; провід
rural – сільський
pocket-size – кишеньковий

digital television – цифрове телебачення
visual – видимий; оптичний
once a week – раз на тиждень
hang – висіти
simultaneously – одночасно
flat – плоский
liquid-crystal display – пристрій зображення на рідких кристалах
high-definition television – телебачення високої чіткості
width-to-height ratio – відношення ширини до висоти
plasma display panel technology – виробництво плазмових панелей

The television set is evidently the most important and popular electronic product of all time. All homes in developed countries have more than one TV sets.

But in 1939 at the World's Fair in New York a tiny nine-by-twelve inch box was the centre of attention for hundreds of people. They were the first to see a television set in action. Compared to today's TV shows of underwater and outer-space research, those first black-white pictures were not very good. The pictures were only transmitted from one side of the Fair territory to the other. But in 1939 they were of historical importance.

Within a few days the news of television spread throughout the world. A lot of people wanted to have a look at the new invention. Everyone was interested in it. But only few people owned television sets in the next few years. When World War II broke out electronic factories that began the TV production stopped making them and started making war materials instead. When the war was over, TV sets began coming off factory assembly lines. By 1958 there were millions of them.

In a surprisingly short time people watched fewer films and turned from newspapers and magazines to TV. In its short history television has had great influence on people's life and way of thinking. Rocket-launching, concerts and football and tennis matches can be seen direct as they occur. The boundaries of time and space have disappeared.

At present TV communication is provided with the help of a system of artificial earth satellites so that people living in different parts of the country and all over the world and in different time zones are able to watch the central TV programs at the most convenient hours.

Nowadays countries also have cable TV, a system using wires for the transmission of television programs (like telephone calls). Cable television first appeared in 1949 as a means of transmitting TV signals to rural and mountain areas far from big cities. Cable television's next big step forward was made by the mid – 1980s. Scientists announced that many technical problems had been solved and in the future it would be possible via satellite and cable TV to use more channels on a TV set at every home in the world.

Then we saw how a new technical invention, colour television, was rapidly replacing black-and-white television. Recently it was reported that the first pocket-size colour television set had been developed. It was stated that a liquid-crystal display was used similar to those on calculators and watches and that it weighed less than a pound.

A few years ago it became evident that the next major advance for TV would be digital television. In a digital system the usual continuous signal is replaced by a

digital code containing detailed information on brightness, colour, etc. A digital TV set hangs on the wall like a picture. Essentially, it is a minicomputer with a visual display. Once a week you put the programs you like into the memory, and the TV set will automatically switch on the desired channel at the right time. You can watch several programs simultaneously on miniscreens and then produce one of them in full format. Also, the TV set can automatically video-record the programs when you are absent or occupied.

By the end of 1980s television has moved to a new and the most important stage in its development since the appearance of colour television. Technically it is called high-definition television (HDTV) or Hi-Vision. This is the much higher resolution television of the 21st century. This revolution was started by Japanese manufacturers when they developed a new video system with a picture resembling a wide-screen film more than traditional television. The new system increases the screen's width-to-height ratio (16:9). The result is a picture several times sharper than in the existing TV sets. Besides, recent developments in plasma display panel technology make HDTV commercially practicable. The plasma display makes it possible to produce a large, bright, colour, flat TV screen so thin and light that it can also be hung on a wall like a framed picture. The engineering problem that has existed almost since the first days of television may be solved now.

Task 1

Are these sentences true or false? Correct the false sentences:

1. In 1939 the first black-white pictures were only transmitted from one side of the Fair territory to the other.
2. Within a few months the news of television spread throughout the world.
3. When World War II broke out electronic factories that began the TV production stopped making them and started making war materials instead.
4. In a surprisingly short time people watched more films and turned from newspapers and magazines to TV.
5. In its short history television has had great influence on people's life and way of thinking.
6. Cable television first appeared in 1959 as a means of transmitting TV signals to rural and mountain areas far from big cities.
7. Scientists announced that many technical problems had been solved and in the future it would be possible via satellite and cable TV to use more channels on a TV set at every home in the world.
8. In a digital system the usual continuous signal is replaced by a digital code containing detailed information on brightness, colour, etc.
9. By the end of 1990s television has moved to a new and the most important stage in its development since the appearance of colour television.
10. Recent developments in plasma display panel technology make HDTV commercially practicable.

Task 2

Put the words in the correct order to make sentences.

1. Homes/developed/have/or/TV sets/all/in/countries/one/more.
2. Other/the/to/pictures/the/were/only/territory/transmitted/Fair/from/the/one/of/ side.
3. The/spread/of/the/few/within/world/throughout/television/news/days/a.
4. Lot/people/to/a/at/new/a/of/wanted/have/look/the/invention.
5. Thinking/way/life/on/great/has/history/its/of/and/people's/influence/had/ television/short/in.
6. Present/communication/provided/the/of/system/artificial/satellites/at/TV/is/ with/help/a/of/earth.
7. Cable/ mid – 1980s/television's/the/next/by/big/made/step/was/forward.
8. Developed/had/television/pocket-size/the/reported/it/been/set/colour/first/ that/ was/recently.
9. A/picture/digital/a/TV/like/set/wall/hangs/the/on.
10. Engineering/that/existed/since/first/of/may/solved/the/problem/has/almost/ the/days/television/be/now.

Task 3

Match the words and their definitions.

1	transmit	**A**	not natural or real; made by man
2	influence	**B**	substance like water or oil that flows freely and is neither a solid nor a gas
3	boundary	**C**	power to affect a person's character, beliefs or actions through example, fear, admiration, etc.
4	artificial	**D**	concerned with, used in, seeing
5	cable	**E**	(making of) movement, (showing of a) light, (sending of a) message, device used, to give a warning, an order or information
6	liquid	**F**	pass or hand on; send on
7	signal	**G**	White or silver surface on to which film transparencies, cinema films, TV pictures are projected
8	visual	**H**	line that marks a limit; dividing line
9	screen	**I**	apparatus for receiving and showing these pictures and sound
10	television	**J**	(length of) thick, strong rope (of fibre or wire), used on ships, bridges, etc.

Task 4

Match the words in the right column with the words in the left column to make word combinations.

1	full	***a***	television
2	different	***b***	of time and space
3	artificial	***c***	system
4	boundaries	***d***	time zones
5	liquid-crystal	***e***	problem
6	digital	***f***	earth satellites
7	high-definition	***g***	display
8	wide-screen	***h***	format
9	plasma	***i***	film
10	engineering	***j***	display

Task 5

Choose the correct statement:

1. The pictures were only **transferred/transmitted** from one side of the Fair territory to the other.
2. A lot of people wanted to have a look at the new **creation/invention**.
3. When the war was over, TV sets began coming off factory **production/assembly** lines.
4. Rocket-launching, concerts and football and tennis matches can be seen direct as they **happen/occur**.
5. At present TV **transmission/communication** is provided with the help of a system of artificial earth satellites.
6. **Cable/high-definition** television first appeared in 1949 as a means of transmitting TV signals to rural and mountain areas far from big cities.
7. In a digital system the usual continuous signal is **substituted/replaced** by a digital code containing detailed information on brightness, colour, etc.
8. HDTV was started by Japanese **inventors/manufacturers** when they developed a new video system with a picture resembling a wide-screen film more than traditional television.
9. The **liquid-crystal/plasma** display makes it possible to produce a large, bright, colour, flat TV screen so thin and light that it can also be hung on a wall like a framed picture.

Task 6

Fill in the blanks with appropriate words:

liquid-crystal	transmitted	digital
plasma	satellite	assembly
visual	HDTV	cable

1. When the war was over, TV sets began coming off factory _____ lines.
2. The first pictures were only _____ from one side of the Fair territory to the other.
3. Nowadays many countries also have _____ TV, a system using wires for the transmission of television programs.
4. Scientists announced that many technical problems had been solved and in the future it would be possible via _____ and cable TV to use more channels on a TV set at every home in the world.
5. It was stated that a _____ display was used similar to those on calculators and watches and that it weighed less than a pound.
6. A few years ago it became evident that the next major advance for TV would be _____ television.
7. Essentially, it is a minicomputer with a _____ display.
8. Recent developments in plasma display panel technology make _____ commercially practicable.
9. The _____ display makes it possible to produce a large, bright, colour, flat TV screen so thin and light that it can also be hung on a wall like a framed picture.

TEXT 2

TELEVISION: FOR AND AGAINST

Vocabulary

emergence – виникнення
invade – вторгатися
source – джерело
ritual – ритуал, обряд
profitable – вигідний, прибутковий
advertiser – рекламодавець
meaning – значення
divide – поділяти, розділяти, відділяти
society – суспільство
approve – одобряти, схвалювати
doubt – сумнів
average – нормальний, середній
reasonable – розсудливий, розумний
get aware – усвідомлювати
wisely – мудро, з розумом
relaxation – розслаблення
glue – прилипати, приклеюватися
entirely – повністю
upbringing – виховання
immerse – поглинати, занурюватися
eyestrain – перевтома (напруга) очей
substitute – підмінювати, заміняти

harmful – шкідливий self-control – самоконтроль

Public interest to world current events and some other reasons were the keys to emergence of TV. After the Second World War television invaded people's homes.

At first it was the main source of information and then the process of watching TV became a social ritual. Also TV was a profitable enterprise for various firms and corporations, as it provided large audience for advertisers.

The name «Television» comes from Greek word meaning «far», and a Latin word meaning «to see», so the word «television» means «to see far».

Television divided our society into several groups: some people are against TV and some approve it. No doubt, television is harmful in some way, but those who are against it watch TV too. The fact is that nothing in the world is useful or harmful: usually these qualities are combined.

Many people think that TV occupies our time and that we have substituted our hobbies, friends, and sports for it. But it seems to me that nobody makes you watch it.

Everything is good in average quantities. If you aren't firm and strong – willed enough to switch your TV off – then don't switch it on. Reasonable people get aware of this fact and choose the way of spending time wisely.

If you need, TV will give you a great amount of information. TV is a means of passive relaxation when you are tired and aren't able to read.

But still there is a great variety of problems connected with television: it's said that children are glued to a TV set and you need to share it when your choice doesn't satisfy the members of your family. I disagree entirely. Those problems are the problems of mutual understanding and upbringing. Modern teenagers, for example, have no time for watching a TV set, we are deeply immersed in lessons, so our spare time is devoted to books, friends and fresh air. Children, who really want to get education, don't watch TV.

The only point of "against" I agree with is that TV may lead to poor health due to rushed meals, lack of sleep and eyestrain. But even this problem can be solved by self-control.

Task 1

Read the text and find the answers to the following questions.

1. Television has a powerful effect on all of us. It makes us laugh, cry, get angry or feel happy. But what do you get if you watch it all day and all night?
2. Say what problems are raised by television and speak about yourself as a TV viewer.
3. There are a lot of scientific studies that prove that films and television contain much violence. The surveys suggest a direct link between screen violence and real life crimes. What's your opinion?
4. What does the word television mean?

Task 2

Write out sentences with the following word combinations from the above text and translate them.

To invade people's homes, mutual understanding and upbringing, to be good in, useful or harmful, to be devoted to, to disagree entirely, a profitable enterprise, to be glued to.

Task 3

Comment on the following:

1. Television was not invented by a single inventor, instead many people working together and alone over the years, contributed to the evolution of television.
2. Radio and television have made newspapers unnecessary.
3. The good and harm done by television.

Task 4

Match the term in A with its definition in B.

A	B
1. current	d. a feeling of uncertainly or lack of conviction
2. doubt	e. constituting the result obtained by adding together several amounts and then dividing this total by the number of amounts
3. average	f. involve oneself deeply in a particular activity
4. to immerse	d. belonging to the present time; happening or being used or done now

TEXTS FOR RENDERING AND DISCUSSION

TEXT A

FROM THE HISTORY OF TELEVISION

- ***Give a written/oral summary of the text.***

The invention of the cathode ray tube in 1897 by Ferdinand Braun quickly made possible the technology that we call television. Indeed, by 1907, the cathode ray tube was supplying television images. Within 50 years, television had become a dominant form of entertainment and an important way to acquire information. This remains true today, as an average individual usually spends between two and five hours each day watching television.

The name television means distance seeing. Television, or TV, is the technology used to transmit pictures with sound using radio frequency and microwave signals or closed-circuit connections. Television operates on two principles that underlie how the human brain perceives the visual world. First, if an image is divided into a group of very small colored dots (called pixels), the brain is able to reassemble the individual dots to produce a meaningful image. Second, if a moving image is divided into a series of pictures, with each picture displaying a successive part of the overall sequence, the brain can put all the images together to form a single flowing image. The technology of the television (as well as computers) utilizes these two features of the brain to present images. The dominant basis of the technology is still the cathode ray tube.

The cathode ray tube (CRT) is a vacuum tube containing one or more electron guns (a source of electrons or electron emitter) and a fluorescent screen used to view images. It has a means to accelerate and deflect the electron beam(s) onto the screen to create the images.

The images may represent electrical waveforms (oscilloscope), pictures (television, computer monitor), radar targets or others. CRTs have also been used as memory devices, in which case the visible light emitted from the fluorescent material (if any) is not intended to have significant meaning to a visual observer (though the visible pattern on the tube face may cryptically represent the stored data).

The CRT uses an evacuated glass envelope which is large, deep (i.e. long from front screen face to rear end), fairly heavy, and relatively fragile. As a matter of safety, the face is typically made of thick lead glass so as to be highly shatter-resistant and to block most X-ray emissions, particularly if the CRT is used in a consumer product.

The vacuum level inside the tube is high vacuum on the order of 0.01 Pa to133 nPa.

In television sets and computer monitors, the entire front area of the tube is scanned repetitively and systematically in a fixed pattern called a raster. An image is produced by controlling the intensity of each of the three electron beams, one for each additive primary color (red, green, and blue) with a video signal as a reference. In all modern CRT monitors and televisions, the beams are bent by magnetic deflection, a varying magnetic field generated by coils and driven by electronic circuits around the neck of the tube, although electrostatic deflection is commonly used in oscilloscopes, a type of diagnostic instrument.

Plasma televisions do not have a cathode ray tube. Thus, the screen can be very thin. Typically television screens are about 6 in (15 cm) thick. This allows the screen to be hung from a wall. In a plasma television, fluorescent lights are present instead of phosphors. Red, green, and blue fluorescent lights enable a spectrum of colors to be produced, in much the same way as with conventional television. Each fluorescent light contains a gas called plasma. Plasma consists of electrically charged atoms (ions) and electrons (negative in charge). When an electrical signal encounters plasma, the added energy starts a process where the particles bump into one another. This bump releases a form of energy called a photon. The release of ultraviolet photons causes a reaction with phosphor material, which then glows.

NOTES:

Pa: (pascal), unit of pressure in the metre-kilogram-second system. A pascal is a pressure of one newton per square metre.

nPa: (nanopascal), 1 nanopascal= 10^{-9} pascals.

TEXT B

OPERATION OF THE CATHODE RAY TUBE

- ***Give a written/oral summary of the text.***

A cathode ray tube contains a positively charged region (the anode) and a negatively charged region (the cathode). The cathode is located at the back of the tube. As electrons exit the cathode, they are attracted to the anode. The electrons are also focused electronically into a light beam, which passes into the central area of the television screen. The central region is almost free of air, so that there are few air molecules to deflect the electrons from their path. The electrons travel to the far end of the tube where they encounter a flat screen. The screen is coated with a molecule called phosphor. When an electron hits a phosphor, the phosphor will glow. The electron beam can be focused in a coordinated way on different part of the phosphor screen, effectively painting the screen (a raster pattern). This process occurs very quickly – about 30 times each second – producing multiple images each second. The resulting pattern of glowing and dark phosphors is what is interpreted by the brain as a moving image.

Black and white television was the first to be developed, as it utilized the simplest technology. In this technology, the phosphor is white. Color television followed, as the medium became more popular, and demands for a more realistic image increased. In a color television, three electron beams are present. They are called the red, green, and blue beams. Additionally, the phosphor coating is not just white. Rather, the screen is coated with red, green, and blue phosphors that are arranged in stripes. Depending on which electron beam is firing and which color phosphor dots are being hit, a spectrum of colors is produced. As with the black and white television, the brain reassembles the information to produce a recognizable image.

SELF-STUDY: EXTENSIVE READING

TEXT 1

OHM'S LAW

We know that current is the amount of electrons flowing past a point every second and that a force known as the e.m.f. (or voltage) is pushing them. We also know that the conductor will try to oppose the current, by offering a resistance to the flow of electrons.

Ohm's law, the means by which these three topics (current, voltage, resistance) are linked together, is probably the most important electrical concept that you will need to understand and is stated as follows: the current in a circuit is directly proportional to the voltage applied to the circuit, and indirectly proportional to the resistance of the circuit, provided that the temperature affecting the circuit remains constant.

Ohm's law was named after the nineteenth-century German physicist Georg Simon Ohm, who researched how current, potential difference and resistance are related to each other.

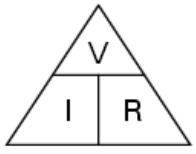
In simple language we could rewrite Ohm's law as follows: the amount of electrons passing by every second will depend on how hard we push them, and what obstacles are put in their way. We can prove this is true, because if we increase the voltage (push harder), then we must increase the number of electrons that we can get at the other end. Try flicking a coin along the desk. The harder you flick it, the further it travels along the desk. This is what we mean by directly proportional. If one thing goes up (voltage), then so will the other thing (current).

Equally we could prove that if we increase the resistance (put more obstacles in the way), then this will reduce the amount of electrons that we can get along the wire. This time put an obstacle in front of the coin before you flick it. If flicked at the same strength, it will not go as far as it did before. This is what we mean by indirectly proportional. If one thing goes up (resistance), then the other thing will go down (current).

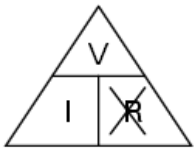
Ohm's law can be expressed by the following formula:

$$\text{Current } (I) = \frac{\text{Voltage } (V)}{\text{Resistance } (R)}$$

Ohm's law is a very simple and useful tool for analyzing electric circuits. It is used so often in the study of electricity and electronics that it needs to be committed to memory by the serious student. There is a trick to remembering how to solve for any one quantity if the other two are given. First, arrange the letters V, I, and R in a triangle like this:



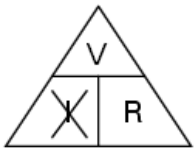
If you know V and I, and wish to determine R, just eliminate R from the picture



$$R = \frac{V}{I}$$

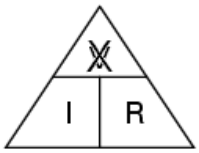
and see what is left:

If you know V and R, and wish to determine I, eliminate I and see what is left:



$$I = \frac{V}{R}$$

Lastly, if you know I and R, and wish to determine V, eliminate V and see what is left:



$$V = I\,R$$

If you are comfortable with algebra, all you need to do is commit V=IR to memory and derive the other two formulas from that when you need them.

➢ ***Answer the following questions.***

1. How is Ohm's law stated?
2. What formula can Ohm's law be expressed by?
3. What is the electric current?
4. What is the electromotive force?
5. What is the resistance?
6. What three topics are linked together in Ohm's law?
7. What did Georg Simon Ohm research?
8. What example is given in the text to illustrate Ohm's law?
9. What simple method for remembering Ohm's law do you know?

➢ ***Are these sentences true or false? Correct the false sentences:***

1. In the nineteenth century the German physicist Georg Simon Ohm investigated the relationship between current, potential difference and resistance.
2. The resistance of a conductor is a measure of its opposition to the passage of an electric current.
3. According to Ohm's law the current in a circuit is directly proportional to the resistance of the circuit.
4. From the Ohm's law formula we can say that the current in a circuit is indirectly proportional to the voltage applied to the circuit.
5. The more the resistance of the circuit, the less the current.
6. The more the voltage, the more the current.

TEXT 2

CURRENT FLOW

In order for current to flow, two conditions must be met[1]. First, there has to be a potential difference (voltage) to force the current to flow and, second, there must be a continuous circuit (circle) for the current to flow around. When we start to look at circuits, we see that there are different combinations: series circuits, parallel circuits and parallel-series circuits.

If a number of resistors are connected together end to end and then connected to a battery, the current can only take one route through the circuit. This type of connection is called a series circuit (Fig. 1).

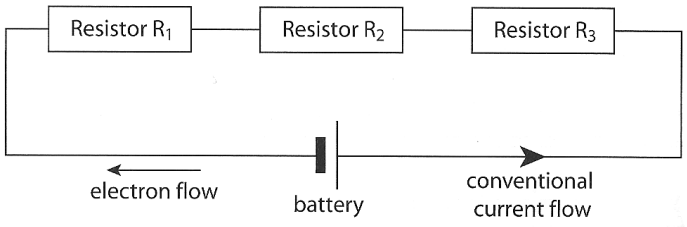


Fig. 1. Series circuit

If a number of resistors are connected together so that there are two or more routes for the current to flow, as shown in Figure 2, then they are said to be connected in parallel. In this type of connection the total current splits up and divides itself among the different branches of the circuit. However, note that the pressure pushing electrons along (voltage) will be the same through each of the branches. Therefore, any branch of a parallel circuit can be disconnected without affecting the other remaining branches.

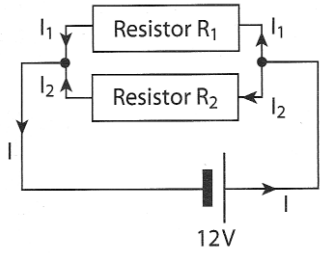


Fig. 2. Parallel circuit

A series/parallel circuit combines the series and parallel circuits as shown in Figures 1 and 2. To calculate the total resistance in a combined circuit, we must first calculate the resistance of the parallel group. Then, having found the equivalent value for the parallel group, we simply treat the circuit as being made up of [2] series connected resistors and now add this value to any series resistors in the circuit, thus giving us the total resistance for the whole network.

➢ ***Answer the following questions.***

1. What kinds of circuits exist?
2. How is the total resistance in a combined circuit calculated?
3. What two conditions must be met in order for current to flow?

4. What is a series circuit?
5. What is a parallel connection?
6. What does a series/parallel circuit combine?

➢ ***Sort the six statements into two groups under the following headings.***

Series circuits	Parallel circuits

a. There is only one path for the current.
b. There are several paths for the current.
c. The current is not the same at all points in the circuit.
d. The current is the same at all points in the circuit.
e. The potential difference across each component is the same.
f. The potential difference across each component is usually different

TEXT 3

INSTRUMENTS AND MEASUREMENTS

Electricians are responsible for measurement of different electrical quantities. Some must be measured as part of the inspection and testing of an installation (e.g. insulation resistance). The most common quantities that we often come across[1] are shown in the table given below

Quantity	**Instrument**
Current	Ammeter
Voltage	Voltmeter
Resistance	Ohmmeter
Power	Wattmeter

But before using any meter, we must always ask ourselves these questions:

- Have we chosen the correct instrument?
- Is it working correctly?
- Has it been set to the correct scale?
- How should it be connected?

Although we know a multimeter to be used for measuring different quantities including current, the actual name for an instrument that measures current is an ammeter. Ammeters are connected in series so that the current to be measured passes through them. The circuit diagram in Figure 3 illustrates this. Consequently, they need to have a very low resistance or they will give a false reading.

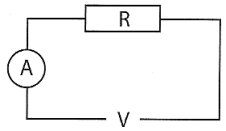


Fig. 3. Ammeter in circuit

If we now look at the same circuit, but use a correctly set multimeter, the connections would look as in Figure 4.

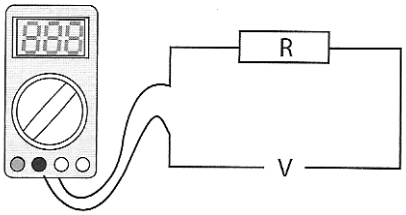


Fig. 4. Multimeter in circuit

For general purposes we can use a multimeter to measure voltage, but the actual device used for measuring voltage is called a voltmeter. It measures the potential difference between two points (for instance, across the two connections of a resistor). The voltmeter must be connected in parallel across the load or circuit to be measured as shown in Figure 5.

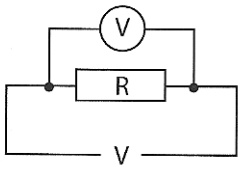


Fig. 5. Voltmeter in circuit

If we now look at the same circuit, but use our correctly set multimeter, the connections would look as in Figure 6. The internal resistance of a voltmeter must be very high if we wish to get accurate readings.

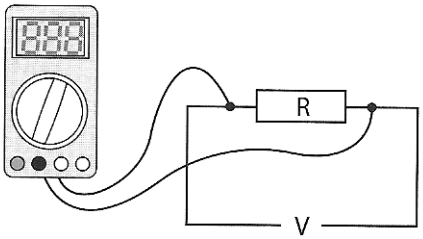


Fig. 6. Multimeter measuring circuit

There are many ways in which we can measure resistance. However, in the majority of cases we do so by executing a calculation based upon instrument readings (ammeter/voltmeter) or from other known resistance values. Once again we can use our multimeter to perform the task, but we refer to the actual meter as being[2] an ohmmeter. The principle of operation involves the meter having its own internal supply (battery). The current, which then flow through the meter, must be dependent upon the value of the resistance under scrutiny[3]. However before we start our measurement, we must ensure that the supply is off and then connect both leads[4] of the meter together and adjust the meter's variable resistor until full-scale deflection[5] (zero) is reached.

➢ ***Answer the following questions.***

1. What instruments are used for measurement of different electrical quantities?
2. What should electricians know for selecting the right instrument?
3. What does an ammeter measure in the circuit?
4. How must it be connected?
5. What does a voltmeter measure?
6. How must a voltmeter be connected across the circuit?
7. What do we use an ohmmeter for?
8. What must be done before we start the measurement by means of an ohmmeter?
9. What can a multimeter be used for?
10. How is a multimeter set correctly?

➢ ***Are these sentences true or false? Correct the false sentences:***

1. Different instruments are used to measure electrical quantities.
2. It does not matter how to connect electrical instruments in the circuit.
3. Both an ammeter and voltmeter must have a very low resistance.
4. There is only one way which can be used to measure resistance.

TEXT 4

ELECTRICITY

There are two types of electricity, namely, electricity at rest or in a static condition and electricity in motion, that is, the electric current. Both of them is made up of electric charges, static charges being at rest, while electric current flows and does work. Thus, they differ in their ability to serve mankind as well as in their behaviour.

Let us now turn our attention to the early facts, that is to say, let us see how it all started. History shows us that at least 2.500 years ago, or so, the Greeks were already familiar with the strange force being known today as electricity. Three phenomena made up all of man's knowledge of electrical effects: (1) lightning flash; (2) the process of rubbing; and (3) so-called electric fish. As we have mentioned, the Greeks knew how to get electricity by rubbing substances, however, the electricity being obtained by rubbing objects can't be used to light lamps, to boil water, to run electric trains.

As early as 1753, Franklin was the first to prove that unlike charges are produced due to rubbing dissimilar objects. Showing that the charges are opposite, he decided to call the charge on the rubber – negative and that on the glass – positive.

Petrov was the first to carry on experiments and observations on the electrification of metals being rubbed one against another. And he was the first scientist in the world who solved that problem. Who doesn't know that the first man having got the electric current was Volta after whom the unit of electric pressure, the volt, was named? His discovery developed out of Galvani's experiments with the

frog. Galvani observed that the legs of a dead frog jumped as a result of an electric charge. Having tried his experiment several of the charging force. An electric current is also a displacement of electricity in a closed conductor circuit.

The conductor offers a certain resistance, akin to friction, to the displacement of electricity, and heat is developed in the conductor, proportional to the square of the current. The resistance of dielectric is of a different nature and has been compared to the compression of multitudes of springs, which under compression yield with an increasing back pressure, up to a point where the total back pressure equals the initial pressure. When the initial pressure is withdrawn the energy returns to the circuit, to their original condition, thus producing a reaction in the opposite direction. Consequently, the current due to the displacement of electricity in a conductor may be continuous, while the displacement currents in a dielectric are momentary and, in a circuit or medium which contains little resistance compared with capacity or inductance reaction, the currents of discharge are of an oscillatory or alternating nature.

Maxwell extended this view of displacement currents in dielectrics to the ether of free space. Assuming light to be the manifestation of alterations of electric currents in the ether and vibrating at the rate of light vibrations, these vibrations by induction set up corresponding vibrations in adjoining portions of the ether, and in this way the undulations corresponding to those of light are propagated as an electromagnetic effect in the ether. Maxwell's electromagnetic theory of light obviously involved the existence of electric waves in free space, and his followers experimentally demonstrated the truth of this theory.

- ***Answer the following questions.***

1. What types is electricity classed into?
2. How does electricity at rest differ from electricity in motion?
3. With what electrical effects were human-beings familiar?
4. What did the Greeks achieve in the sphere of electricity?
5. Is it possible to light lamps by rubbing objects?
6. What is Franklin famous for?
7. What are the two kinds of electrical charges?
8. What contribution did Russian academician Petrov make?
9. What kind of experiments did Galvani carry out?
10. Who was the first to produce a steady, continuous current?
11. What did Volta try to prove in his experiment in contradiction to the results of Galvani's tests?
12. What did Volta's device consist of?
13. What are the types of current flow?
14. What is the distinction between a d. c. and an a. c.?
15. Can you give the definition of such terms as «period», «frequency» and «amplitude»?
16. For what are low-frequency currents and high-frequency currents used?
17. What are the advantages of electricity?

- ***Match paragraphs with the appropriate summary.***

1. Positive aspects of electricity application;
2. The definition of a d. c.;
3. Historical data about electricity;
4. Kinds of electricity and their difference;
5. The definition of an a. c. and its usage.

TEXT 5

TRANSFORMERS

A transformer is a device that transfers electric energy from one alternating-current circuit to one or more other circuits either increasing (stepping up) or reducing (stepping down) the voltage. Transformers are employed for widely varying purposes; e. g., to reduce the voltage of conventional power circuits to operate low-voltage devices, such as doorbells and toy electric trains, and to raise the voltage from electric generators so that electric power can be transmitted over long distances.

The principal parts of a transformer are: two windings that are coils, and an iron core. Transformers change voltage through electromagnetic induction; i. e., as the magnetic lines of force (flux lines) build up and collapse with the changes in current passing through the primary coil, current is induced in another coil, called the secondary. The secondary voltage is calculated by multiplying the primary voltage by the ratio of the number of turns in the secondary coil to the number of turns in the primary coil, a quantity called the turns ratio.

A two-winding transformer consists of a closed core and two coils (windings). The primary winding is connected to the voltage source. It receives energy. The secondary winding is connected to the load resistance and supplies energy to the load.

Air-core transformers are designed to transfer high-frequency currents – i. e., the currents used for radio transmission; they consist of two or more coils wound around a solid insulating substance or on an insulating coil form. Iron-core transformers serve analogous functions in the audio-frequency range. They are employed for low-frequency currents.

Impedance-matching transformers are used to match the impedance of a source and that of its load, for most efficient transfer of energy. Isolation transformers are usually employed for reasons of safety to isolate a piece of equipment from the source of power.

- **Complete the sentences using the correct variant.**

1. A transformer is applied	a. to store charge; b. to prevent the change of energy; c. to transfer energy; d. to change the voltage and the current value in a circuit.
2. A transformer consists of	a. cores only;

	b. the primary and the secondary windings; c. an iron core and the primary and the secondary windings.
3. The function of the primary winding is	a. to prevent the change of voltage; b. to supply energy; c. to receive energy.
4. The function of the secondary winding is	a. to receive energy; b. to decrease the value of charge; c. to supply energy; d. to transfer energy.
5. A transformer with an air core transfers.	a. high-frequency currents and low frequency currents; b. high-frequency currents only.
6. Iron-core transformers are used	a. for high-frequency currents; b. for low-frequency currents.
7. Impedance-matching transformers are applied	a. to match the impedance of a source and that of its load; b. to step down the secondary voltage.
8. Isolation transformers are employed	a. for stepping up the primary voltage; b. for safety in order to isolate a part of machinery from the power source.

TEXT 6

ELECTRIC POWER CONSUMERS AND POWER SYSTEMS

An electric power consumer is an enterprise utilizing electric power. Its operating characteristics vary during the hours of day, days and nights, days of week and seasons.

All electric power consumers are divided into groups with common load characteristics. To the first group belong municipal consumers with a predominant lightning load: dwelling houses, hospitals, theaters, street lighting systems, mines, etc.

To the second group belong industrial consumers with a predominant power load (electric motors, industrial plants, mines, etc.). To the third group belongs transport, for example, electrified railways. The fourth consists of agricultural consumers, for instance, electrotractors.

The operating load conditions of each group are determined by the load graph. The load graph shows the consumption of power during different periods of day, month, and year. On the load graph the time of the maximum loads and minimum loads is given.

Large industrial areas with cities are supplied from electric networks fed by electric power plants. These plants are interconnected for operation in parallel and

located in different parts of the given area. They may include some large thermal and hydroelectric power plants.

The sum total of the electric power plants, the networks that interconnect them and the power utilizing devices of the consumers, is called a power system. All the components of a power system are interrelated by the common processes of protection, distribution, and consumption of both electric and heat power. In a power system, all the parallely operating plants carry the total load of all the consumers supplied by the given system.

The building up of a power system is of great importance for the national economy. An economical utilization of the power plant installations and of the sources of power is achieved by interconnected operation of a series of power plants in a common power distribution system.

- ***Complete the sentences using correct variant.***

a) An electricity consumer is	1) an enterprise using electric power; 2) an enterprise transforming electrical energy into mechanical energy.
b) All electric power consumers are subdivided into	1) 2 groups; 2) 4 groups with common load characteristics; 3) 5 groups.
c) The load graph demonstrates the power consumption	1) during a year; 2) during a decade; 3) during any period of time of day, month and year.
d) On the load graph	1) the time of average loads is shown; 2) the time of *max* loads and *min* loads is shown.
e) A power system is	1) electric power station – the networks – the power utilizing devices; 2) the total number of the electric power utilizing devices.
f) The components of a power system are interconnected by	1) protection, distribution and power consumption; 2) only distribution; 3) both distribution and consumption.

TEXT 7

ELECTRONIC ELEMENTS

The component at the heart of most amplifiers is the transistor. The main elements in a transistor are semiconductors, materials with varying ability to conduct

electric current. Typically, a semiconductor is made of a poor conductor, such as silicon, that has had impurities (atoms of another material) added to it. The process of adding impurities is called doping. In pure silicon, all of the silicon atoms bond perfectly to their neighbours, leaving no free electrons to conduct electric current. In doped silicon, additional atoms change: tie balance, either adding free electrons or creating holes where electrons can go. Electrical charge moves when electrons move from hole to hole, so either one of these additions will make the material more conductive.

N-type semiconductors are characterized by extra electrons (which have a negative charge). P-type semiconductors have an abundance of extra holes (which have a positive charge).

Let's look at an amplifier built around a basic bipolar-junction transistor. This sort of transistor consists of three semiconductor layers – in this case, a P-type semiconductor sandwiched between two N-type semiconductors. This structure is best represented as a bar, as shown in the diagram below (the actual design of modern transistors is a little different).

The first N-type layer is called the emitter, the P-type layer is called the base and the second N-type layer is called the collector. The output circuit (the circuit that drives the speaker) is connected to electrodes at the transistor's emitter and collector. The input circuit connects to tie emitter and the base.

The free electrons in the N-type layers naturally want to fill the holes in the P-type layer. There are many more free electrons than holes, so the holes fill up very quickly. This creates depletion zones at the boundaries between N-type material and P-type material. In a depletion zone, the semiconductor material is returned to its original insulating state – all the holes are filled in, so there are no free electrons or empty spaces for electrons, and charge can't flow. When the depletion zones are thick, very little charge can move from the emitter to the collector, even though there is a strong voltage difference between the two electrodes.

You can change this situation by boosting the voltage on the base electrode. The voltage at this electrode is directly controlled by the input current. When the input current is flowing, the base electrode has a relative positive charge, so it draws electrons toward it from free emitter. This frees up some of the holes, which shrinks the depletion zones. As the depletion zones are reduced, charge can move from the emitter to the collector more easily – the transistor becomes more conductive. The size of the depletion zones, and therefore the conductivity of the transistor is determined by the voltage at the base electrode. In this way, the fluctuating input current at the base electrode varies the current output at the collector electrode. This output drives the speaker.

A single transistor like this represents one "stage"' of an amplifier. A typical amplifier will have several boosting stages, with the final stage driving the speaker.

In a small amplifier – the amplifier in a speaker phone, for example – the final stage might produce only half a watt of power. In a home stereo amplifier, the final stage might produce hundreds of watts. The amplifiers used in outdoor concerts can produce thousands of watts.

The goal of a good amplifier is to cause ES little distortion as possible. The final signal driving the speakers should mimic the original input signal as closely as possible, even though it has been boosted several times.

This basic approach can be used to amplify all kinds of things, not just audio signals. Anything that can be carried by an electrical current (radio and video signals, for example) can be amplified by similar means. Audio amplifiers seem to catch people's attention more than anything else, though. Sound enthusiasts are fascinated with variations in design that affect power rating, impedance and fidelity, among either specifications.

- **Answer the following questions:**

1. Can you name all the electronic elements which form an amplifier? Do you know the function of each of them?
2. What are semiconductors?
3. How many types of semiconductors are there?
4. What are semiconductors characterized by?
5. How many layers does the transistor consist of? What are they?
6. What is a boosting stage?
7. How many boosting stages does a typical amplifier have?
8. What is the name of the process of adding impurities?
9. Where is insulating state returned to its original? What happened next?
10. How can you change the situation when the depletion zones are thick and very little charge move from emitter to the collector?
11. How is the size of the depletion zone determined by?
12. How many watts might produce on amplifier?
13. What is the goal of an amplifier?
14. What are sound enthusiasts fascinated with?

- ***Match a line in A with a line in B.***

A	B
pure	circuit
input	state
power	zone
bipolar	material
depletion	silicon
insulating	electrode
base	rating
output	transistor
N-type	circuit

TEXT 8

AMPLIFIERS

A system diagram of a record player amplifier, where the small electric signal produced by the player's pick-up cartridge must be amplified to a sufficiently large extent to a speaker, looks quite simple. The symbols for the cartridge, amplifier and speaker are those conventionally used. In practice the amplifier is quite complicated, and can be broken down into two main sections: the preamplifier, which deals with the amplification of the small signal from the cartridge; and the power amplifier which deals with the high-power amplification necessary to drive the speaker.

Although a transistor amplifier circuit has simple configuration and it is satisfactory for demonstrating 'transistor action', it is incapable of amplifying an audio signal.

Consider the effect of amplifying the alternating voltage from the pick-up cartridge to terminal A. Since the transistor conducts only when the base-emitter junction is forward-biased. only the parts of the signal that are positive relative to the emitter will cause the transistor to conduct.

As well as amplifying the input signal, the transistor is rectifying it. Once, in a while this happens in an amplifier under fault conditions, and it sounds terrible. It is also apparent that a proportion of the positive part of the signal is lost as well, since the transistor will not conduct, even with the base-emitter junction forward-biased, until the potential exceeds 0.7 V for a silicon transistor. This is a substantially higher voltage than a magnetic pick-up cartridge producer, so in practice the output of the circuit would be zero.

A solution to the problem is simply to connect a suitable positive potential to the base of the transistor, ensuring that it is always forward-biased so that it operates somewhere about the mid-point of the linear region of the characteristic curve. This is best done with a potential divider network involving two resistors. This does at least produce an output, if the two biased resistors R1 and R2 are exactly the right values; the resistors should be chosen so that the collector is at half the line voltage with no signal applied. This gives approximately equal 'headroom' for the signal in its positive and negative excursions.

Because of the tiny differences in manufacture, it is not possible to specify the gain of a transistor very accurately, a gain variation of +-50 per cent being quite common. Using this circuit would mean careful measurements and a new pair of resistors for each individual transistor used – not an ideal requirement for mass production. The leakage current of the transistor, and thus its operating point, will change the temperature. What is needed is a circuit that will automatically compensate for variations in gain of the transistor, and also for changes in ambient temperature.

In this circuit it is the values of the resistors (only) that determine the operating point. The gain of the transistor, leakage and temperature has practically no effect. The circuit involves a feedback loop. Feedback is a principle that is often used in electronics, and you will find it in many different contexts. In this case negative

feedback is used. Negative feedback consists of a connection from the output of a system back to the input arranged, so that change in output reduces is causing that change.

➢ ***Answer the following questions:***

1. What does the amplifier consist of?
2. What parts of the signal cause the transistor to conduct?
3. What are the functions of its parts?
4. What makes the input signal sound terrible? What is the solution to this problem?
5. Why is it impossible to specify the gain of a transistor very accurately?
6. What is needed for compensation for variations in gain of the transistor?
7. How do resistors work?
8. What does the term 'feedback' mean?
9. What feedback is used in this case? Why is it used here?

➢ **Complete the following. Use the words in the box to help you.**

pick up	cartridge	transistor	pre-amplifier
operating point	power amplifier		

Components of an amplifier system	Function
1. ……	produces an electric signal
2. ……	amplifies the small signal from the cartridge
3. ……	fulfills the high-power amplification
4. ……	rectifies the input signal
5. ……	ensures the change of the temperature

TEXT 9

DIODES

A diode is a semiconductor device which allows current to flow through it in only one direction. So, what does a diode consist of that lets it operate by this general principle that the current is allowed to flow in one direction but not the other? Let's consider the process of creating a typical P-N junction diode. When you put N-type and P-type silicon together as shown in this diagram, you get a very interesting phenomenon that gives a diode its unique properties.

Even though N-type silicon by itself is a conductor, and P-type silicon by itself is also a conductor, the combination shown in the diagram doesn't conduct any electricity. The negative electrons in the N-type silicon are attracts to the positive terminal of the battery. The positive holes in the P-type silicon are attracted to the

negative terminal of the battery. No current flows across the junction because the holes and the electrons one each moving in the wrong direction.

If you slip the battery around, the diode conducts electricity just fine. The free electrons in the N-type silicon are repelled by the negative terminal of the battery. The holes in the P-type silicon are repelled by the positive terminal. At the function between the N-type and P-type silicon, holes and free electrons meet. The electrons fill the holes. Those holes and free electrons cease to exist, and new holes and electrons spring up to take their place.

The effect is that current flows through the junction. A device that blocks the current in one direction while letting the current flow in another direction is called a diode.

Diodes can be used in a number of ways, for example:

– a diode can be used as a rectifier that converts AC (Alternating Current) to DC (Direct Current) for a supply device;

– diodes can be used to separate the signal from radio frequencies;

– diodes can be used as an on/off switch that controls current.

When a small voltage is applied to the diode in a forward direction, current flows easily. Because the diode has a certain amount of resistance, the voltage will drop slightly as the current flows through the diode. When voltage is applied in the reverse direction through a diode, the diode will have a great resistance to the current flow. Different diodes have different characteristics when reversed-biased. This diode should be selected depending on how it'll be used in the circuit.

The limiting voltages and currents permissible must be considered on a case by case basis. For example, when using diodes for rectification, part of the time they will be required to withstand a reverse voltage. If the diodes are not carefully, they will break down.

➢ ***Fill in the correct word from the list below.***

permissible	basis	rectify	resistance
reverse-biased	function	diode	

1. A _____ allows current to flow in one direction but not the other.
2. Diodes can be used to _____ alternating current into direct current.
3. When _____, an ideal diode would block all current.
4. Maximum _____ levels of voltages and currents must be specified on a case by case _____ .
5. About 0.7 volts are needed to start the hole-electron combination process at the _____.
6. One knows that a diode has a certain amounts of _____.

APPENDIX

THE FOUR OPERATIONS

Addition	4 + 5 = 9	We add four to five and get nine. Four and five equals nine Four and five is (are) nine.
Subtraction	9 – 4 = 5	We subtract four from nine and get five. Four from nine is five.
Multiplication	4 x 5 = 20	We multiply four by five and get twenty. Four times five is twenty.
Division	20 : 4 = 5	We divide twenty by four and get five.

FRACTIONAL NUMERALS

Common Fractions

l/2	a (one) half	1/6	a (one) sixth
1/3	a (one) third	1/8	a (one) eighth
1/4	a (one) quarter	1/100	a (one) hundredth
1/5	a (one) fifth	1 1/2 hours	one and a half hours one hour and a half

2/3	two thirds	4 1/3 tons	four and a third tons four tons and a third
2/3 ton	two thirds of a ton	4/9	four ninths
3/4 km	three quarters of a kilometre	5/6	five sixths
3/5	three fifths	9/10	nine tenths

5/8 inch	five eighths of an inch	3/5 foot	three fifths of a foot

Decimal Fractions

0.1	nought [no:t] point one
0.8	point eight nought point eight o [ou] point eight
0.006	point nought nought six nought point two oes [ouz] six o [ou] point two oes six
1.02	one point nought two one point o [ou] two
4.25	four point twenty-five four point two five
0.5 cm	nought point five of a centimetre
5.2 cm	five point two centimetres

KEYS

➢ KEYS to UNIT 1:

Task 1.
1) T; 2) F; 3) T; 4) F; 5) T; 6) F; 7) T; 8)T; 9) F; 10) T

Task 2.
1. Most of us choose engineering as a profession because we like to solve problems and design things.
2. Successful engineers are people who take an early interest in science and engineering.
3. Over time, successful engineers develop a clear intuition for excellence that drives them to produce quality in whatever they do.
4. The success that naturally goes with all that also makes them highly respected in society.
5. Modern engineers can have a profound impact on our community at large.
6. Everyone and everything can be your teacher if you let them.
7. A PhD dissertation is an invaluable vehicle for learning how to be thorough.
8. What you learn in solving specific technical or people problems often enables you to tackle even bigger projects.
9. Success is naturally optimized when you make the best use of available resources.
10. As you develop an understanding and appreciation for what other people do, you will naturally respect them as individuals.

Task 3.
1 – d; 2 – h; 3 – a; 4 – j; 5 – f; 6 – b; 7 – i; 8 – e; 9 – c; 10 – g.

Task 4.
1 – f; 2 – c; 3 – h; 4 – a; 5 – i; 6 – d; 7 – j; 8 – e; 9 – g; 10 – b.

Task 5.
1) solve; 2) broad; 3) quality; 4) interaction; 5) listening; 6) solutions; 7) subject; 8) projects; 9) accomplish; 10) respect

Task 6.
1) information technology; 2) alert minds; 3) knowledge base; 4) develop; 5) solutions; 6) subject; 7) projects; 8) available; 9) reciprocity

➢ KEYS to UNIT 2:

Task 1.
1) T; 2) T; 3) F; 4) F; 5) T; 6) F; 7) T; 8) F; 9) T; 10) T

Task 2.

1. It's an industry that still contributes significantly to the wealth of the UK.
2. Engineering needs them all – women as well as men.
3. In France much of the lecturing is provided by staff from the appropriate industries.
4. The Continental engineering education is a more professionally oriented subject.
5. The engineering industry makes most of the things that are essential and useful.
6. The objective of engineering education and training in any country should be recognized.
7. In recent years, engineering has changed out of all recognition.
8. A graduate will need training in the specific area in which he is working.
9. The Continental technical universities have developed a much closer relationship with industry.
10. Thanks to the introduction of computers and new technologies, people are more in control than ever.

Task 3.

1 – i, 2 – h; 3 – a; 4 –d; 5 – f; 6 – b; 7 – j; 8 – e; 9 – c; 10 – g.

Task 4.

1 – h; 2 – c; 3 – d; 4 – a; 5 – i; 6 –f; 7 – j; 8 – e; 9 – g; 10 – b.

Task 5.

1) manufacturing; 2) key; 3) wider; 4) differently; 5) developed; 6) emphasis; 7) appropriate; 8) educate; 9) partnership; 10) oriented.

Task 6.

1) essential; 2) recognition; 3) contributes; 4) set up; 5) recognized; 6) spend; 7) graduate; 8) sheer; 9) cash; 10) multi-discipline.

- **KEYS to UNIT 3:**

Task 1.

1) T; 2) T; 3) F; 4) T; 5) T; 6) F; 7) T; 8) F; 9) F; 10) T

Task 2.

1. It is impossible to imagine our civilization without electricity.
2. Electrical power has become universal.
3. Other devices are based on specific properties of electricity.
4. These applications have made electricity most widely used.
5. The generator replaced the batteries and other devices that had been used before.
6. Electric lighting came into wide use at the end of the last century.
7. The consumption of electricity has doubled every ten years.

8. Electricity has replaced other sources of energy.
9. One of the greatest advantages of electricity is that it is clean.
10. Truly electricity provides mankind with the energy of the future.

Task 3.
1 – d; 2 – h; 3 – a; 4 – j; 5 – f; 6 – b; 7 – i; 8 – e; 9 – c; 10 – g.

Task 4.
1 – f; 2 – b; 3 – h; 4 – a; 5 – i; 6 – d; 7 – j; 8 – e; 9 – g; 10 – c.

Task 5.
1) universal; 2) appliances; 3) application; 4) generator; 5) lamp; 6) designed; 7) consumption; 8) advantage; 9) source

Task 6.
1) applications; 2) devices; 3) workshops; 4) generator; 5) induction;
6) consumption; 7) generates; 8) electricity; 9) technological

- **KEYS to UNIT 4:**

Task 1.
1) T; 2) F; 3) F; 4) T; 5) F; 6) T; 7) T; 8) F; 9) T; 10) F

Task 2.
1. Every day many people visited Thomas A. Edison's laboratories in Orange, New Jersey.
Some of them were young inventors who went to study, but many more of them were tourists.
3. They came from all parts of the US and from other countries as well.
4. They spent many hours in great workshops, looking at hundreds of useful inventions.
5.Before leaving the laboratories the man went to the office of the main building.
6. The father and his son went into the great inventor's workroom.
7. I brought my young son here to see what the world's greatest citizen has done.
8. I want this day to help him all his life.
9. Mr. Edison took the boy's hand.
10. In 1928 Mr. Edison was eighty-one years old, but he still worked sixteen hours a day.

Task 3.
1 – d; 2 – h; 3 – b; 4 – j; 5 – a; 6 – c; 7 – i; 8 – f; 9 – e; 10 – g.

Task 4.

1 – every day; 2 – young inventors; 3 – spend many hours; 4 – before leaving; 5 – wait a minute; 6 – come this way; 7 – inventor's workroom; 8 – greatest citizen; 9 – shake hands; 10 – watch the clock.

Task 5.
1) visited; 2) inventors; 3) citizen; 4) workshops; 5) card; 6) workroom; 7) done; 8) shoulders; 9) day

Task 6.
1) laboratories; 2) inventors; 3) factories; 4) inventions; 5) office; 6) workroom; 7) citizen; 8) shake; 9) watch

- **KEYS to UNIT 5:**

Task 1.
1) T; 2) F; 3) F; 4) T; 5) F; 6) T; 7) T; 8) T; 9) F; 10) T

Task 2.
1. Most people living in towns consider it a usual thing that streets are lit at night.
2. Many distant places could be lit with solar-powered street lights.
3. The lamps can use the power of the sun which shines by day when the lamps are needed at night.
4. The solar panel produces electricity which charges a battery.
5. When the sun goes down, the battery power is then used for lighting.
6. Each lamp has its own panel so the system can be used for one individual light or a number of them.
7. The solar panels provide power during the day.
8. The generation of electricity by batteries is still expensive.
9. Solar power does not pollute the environment.
10.It is very important to develop devices which make it possible to transform solar power into mechanical or electric forms of power.

Task 3.
1 – c; 2 – g; 3 – j; 4 – f; 5 – b; 6 – i; 7 – a; 8 – d; 9 – e; 10 – h.

Task 4.
1 – f; 2 – j; 3 – c; 4 – h; 5 – a; 6 – i; 7 – e; 8 – b; 9 – g; 10 – d.

Task 5.
1) lights; 2) appliances; 3) battery; 4) accumulated; 5) power; 6) panel; 7) lamps; 8) solar; 9) transform

Task 6.
1) supply; 2) solar-powered; 3) charges; 4) power; 5) panel; 6) light; 7) batteries;

8) accumulated; 9) solar

➢ **KEYS to UNIT 6:**

Task 1.

1) T; 2) F; 3) T; 4) F; 5) T; 6) F; 7) T; 8) T; 9) F; 10) T

Task 2.

1. The effective operating distance of this system increased as the equipment was improved.
2. In 1904, Sir John A. Fleming developed the first vacuum tube, which was able to detect radio waves electronically.
3. In 1913 Edwin H. Armstrong patented the circuit for the regenerative receiver.
4. Generally credited with creating the first modern broadband FM system, Armstrong built and operated the first FM radio station.
5. The radio is probably the only invention which has found universal recognition and application in a comparatively short time.
6. Radios that combine transmitters and receivers are now widely used for communications.
7. Cellular telephones, despite the name, are another popular form of radio used for communication.
8. Advances in radio communication and spectrum management have led to tipping points in technology.
9. Success is naturally optimized when you make the best use of available resources.

Task 3.

1 – d; 2 – h; 3 – a; 4 – j; 5 – f; 6 – b; 7 – i; 8 – e; 9 – c; 10 – g.

Task 4.

1 – f; 2 – c; 3 – h; 4 – a; 5 – j; 6 – d; 7 – i; 8 – e; 9 – g; 10 – b.

Task 5.

2) electromagnetic; 2) transmitter; 3) operating; 4) code; 5) detect; 6) reception; 7) broadband; 8) service; 9) communications; 10) device

Task 6.

2) wireless; 2) vacuum tube; 3) amplified; 4) transmission; 5) receiver; 6) broadcasting; 7) application; 8) communication; 9) transmitters

➢ **KEYS to UNIT 7:**

Task 1.

1) T; 2) F; 3) T; 4) F; 5) F; 6) T; 7) T; 8) F; 9) T; 10) F

Task 2.
1. Benjamin Franklin published his ideas about electricity in 1752.
2. Scientists in many countries became interested in this wonderful form of energy.
3. Experiments proved that electricity could travel instantly over a very long piece of wire.
4. German government worker made up a code system that could be used with an electric needle.
5. Samuel Morse, an American portrait painter, was experimenting with an electric telegraph too.
6. When the electricity came through the wire the pencil made wavy lines.
7. Morse invented a code that used dots and dashes for the letters of the alphabet.
8. Telegraph companies were formed in many cities.
9. Telegraph wires couldn't be hung over an ocean.
10. At last news and business information could be sent instantly to almost every country in the world.

Task 3.
1 – d; 2 – h; 3 – b; 4 – g; 5 – j; 6 – a; 7 – i; 8 – c; 9 – e; 10 – f.

Task 4.
1 – wavy lines; 2 – a piece of paper; 3 – electric needle; 4 – code system; 5 – dots and dashes; 6 – long-distance communication; 7 – telegraph wires; 8 – lay a cable on the floor; 9 – transatlantic message; 10 – transpacific cables.

Task 5.
1) develop; 2) wire; 3) discovered; 4) needle; 5) experimenting; 6) wavy; 7) sent; 8) cable; 9) transatlantic

Task 6.
1) develop; 2) electricity; 3) move; 4) needle; 5) telegraph; 6) wire; 7) code; 8) cable; 9) message

- **KEYS to UNIT 8:**

Task 1.
1) T; 2) F; 3) T; 4) T; 5) F; 6) F; 7) T; 8) T; 9) F; 10) F

Task 2.
1. Alexander Graham Bell wanted to be a musician or a teacher of deaf people.
2. The subjects that he studied at school included music, art, literature, Latin and Greek.
3. When Alexander was only sixteen, he became a teacher in boy's school in Scotland.
4. He read all the books about sound that he could find and started to work on

some of his own experiments.
5. At twenty five Alexander became interested in finding a way to send human voice through an electric wire.
6. For two years Tom and Alexander were working together to build a machine that people could use to talk to one another over long distances.
7. The first telephone line was built in Germany in 1877.
8. Now design bureaus all over the world are conducting experiments to develop video-phone or picture phone.
9. In addition to the usual telephone, the equipment includes a small television screen and, combined with the screen, a television camera.
10. The camera tube will allow the user to switch from a wide view of the room to the face of the person speaking.

Task 3.
1 – g; 2 – d; 3 – b; 4 – i; 5 – e; 6 – j; 7 – a; 8 – f; 9 – h; 10 – c.

Task 4.
1 – deaf people; 2 – electric wire; 3 – all over the world; 4 – video-phone; 5 – telephone line; 6 – dial a number; 7 – face to face; 8 – television camera; 9 – mirror attachment; 10 – lighting conditions.

Task 5.
1) German; 2) teaching; 3) experiments; 4) send; 5) build; 6) transmitter; 7) wire; 8) lifts; 9) conditions.

Task 6.
1) inventor; 2) sound; 3) voice; 4) transmitter; 5) receiver; 6) telephone; 7) dials; 8) attachment; 9) adjusts.

- **KEYS to UNIT 9:**

Task 1.
1) T; 2) F; 3) T; 4) F; 5) T; 6) F; 7) T; 8) T; 9) F; 10) T

Task 2.
1. All homes in developed countries have one or more TV sets.
2. The pictures were only transmitted from one side of the Fair territory to the other.
3. Within a few days the news of television spread throughout the world.
4. A lot of people wanted to have a look at the new invention.
5. In its short history television has had great influence on people's life and way of thinking.
6. At present TV communication is provided with the help of a system of artificial earth satellites.
7. Cable television's next big step forward was made by the mid – 1980s.

8. Recently it was reported that the first pocket-size colour television set had been developed.
9. A digital TV set hangs on the wall like a picture.
10. The engineering problem that has existed almost since the first days of television may be solved now.

Task 3.
1 – f; 2 – c; 3 – h; 4 – a; 5 – j; 6 – b; 7 – e; 8 – d; 9 – g; 10 – i.

Task 4.
1 – full format; 2 – different time zones; 3 – artificial earth satellites; 4 – boundaries of time and space; 5 – liquid-crystal display; 6 – digital system; 7 – high-definition television; 8 – wide-screen film; 9 – plasma display; 10 – engineering problem.

Task 5.
1) transmitted; 2) invention; 3) assembly; 4) occur; 5) communication; 6) cable; 7) replaced; 8) manufacturers; 9) plasma

Task 6.
1) assembly; 2) transmitted; 3) cable; 4) satellite; 5) liquid-crystal; 6) digital; 7) visual; 8) HDTV; 9) plasma.

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