MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

NATIONAL TECHNICAL UNIVERSITY OF UKRAINE
'IGOR SIKORSKY KYIV POLYTECHNIC INSTITUTE'

ENGLISH FOR ELECTRICAL ENGINEERS

Part 2

Study and Practice Book

Recommended by the Methodological Board
of Igor Sikorsky Kyiv Polytechnic Institute
as a study and practice book for students doing Bachelor's degree in
speciality 141 'Electric Power Engineering, Electrical Engineering, and Electromechanics'

Electronic edition

Kyiv
Igor Sikorsky Kyiv Polytechnic Institute
2022

Authors: *Viktoriia Chmel, lecturer*
Galyna Mikhnenko, Ph.D in Ed., Assoc.Prof.
Inna Akhmad, Ph.D in Philology, Assoc.Prof.
Lyudmyla Guryeyeva, Ph.D in Ed., Assoc.Prof.

Reviewers: *Serhii Buryan,* Cand.Sc., Igor Sikorsky Kyiv Polytechnic Institute
Olha Pavlenko, Ph.D in Ed., Assoc.Prof., Igor Sikorsky Kyiv Polytechnic Institute
Iryna Stavytska, Ph.D in Ed., Assoc.Prof., Igor Sikorsky Kyiv Polytechnic Institute

Editor: *Oksana Semyda,* Ph.D in Philology, Assoc.Prof.

Recommended by the Methodological Board
of Igor Sikorsky Kyiv Polytechnic Institute (Minutes No 6 of 23.06.2022 p.)
Approved by the Supervisory Board of the Faculty of Linguistics (Minutes No 11 of 08.06.2022 p.)

English for Electrical Engineers, Part 2 [Electronic resource]: study and practice book for students doing Bachelor's degree in speciality 141 'Electric Power Engineering, Electrical Engineering, and Electromechanics' / Viktoriia Chmel, Galyna Mikhnenko, Inna Akhmad, Lyudmyla Guryeyeva; Igor Sikorsky Kyiv Polytechnic Institute. – Electronic text data (1 file: 3.96 MB). – Kyiv: Igor Sikorsky Kyiv Polytechnic Institute, 2022. – 232 p.

The study and practice book 'English for Electrical Engineers, Part 2' is intended for undergraduates studying 141 'Electric Power Engineering, Electrical Engineering, and Electromechanics'. It aims to help learners improve their competence in all communicative skills: listening, speaking, reading, writing, as well as practice in translation. The exercises on the topics 'Energy Business', 'Transformers in Electrical Engineering' are designed for mixed-ability groups of students with different levels of the English language proficiency and are presented from less challenging to more challenging ones, especially in the Grammar Revision box and Oral and Written Interaction/ Production. The Appendices include the Resource Pack with roleplays and recommendations for various genres/styles of writing, Grammar Reference, Audio Scripts, and Wordlist.

The units are designed both for classroom use and independent studies.

CONTENTS

CONTENTS

Unit 1.5. Successful interviews for engineering jobs	How to prepare for your first engineering job interview	Tell me about yourself – Job Interview	Interviewing for the position of an electrical engineer Role-play 'At the job interview'	Writing a letter of application
Unit 2.1. Transformer basics	Principles of Operation	How does a transformer work?	Describing transformers Game 'Guess the word' Pairwork activity 'Asking about equivalent circuits'	Writing comments on the website
Unit 2.2 Cooling methods of a transformer	Methods of Cooling	Transformer Cooling Fans Intelligent Control MTeC® MR	Discussing the best method of cooling of transformers	Writing a review Describing the scheme
Unit 2.3. Current transformers	Current transformers	How does a current transformer work?	Discussing the types of transformers Presenting the fundamentals of current transformers	Writing a letter of advice
Unit 2.4. Voltage transformers	Voltage transformers	The High Voltage Transformer. How does it work?	Discussing the effectiveness of transformers Pairwork activity 'Asking about voltage transformers' Presenting the fundamentals of voltage transformers	Writing a summary Writing a letter of complaint

PREFACE

English for Electrical Engineers (Part 2) aims to help learners improve their competence in all communicative skills: listening, speaking, reading, writing, as well as practice in translation. This is achieved by a variety of tasks and flexible structure of the book. The study and practice book can be used by the students of technical higher educational institutions studying electrical engineering, esp. the fourth-year-students at the Electric Power Engineering and Automatics Department, Igor Sikorsky Kyiv Polytechnic Institute.

The core of the material is the conviction that students will learn more readily and efficiently if they are actively and personally involved in their language lessons. Teachers should make their classroom learner-centred and accept the axiom that shifting their own perspectives can enable students to take on more active roles as learners. Teachers are becoming facilitators whose role is to empower students to focus more on creation and critical thinking. Throughout the units, learners are encouraged to express their own opinion concerning various aspects of electrical engineering as well as to discuss and evaluate the role it plays in society.

English for Engineers consists of two sections (*Introduction to the Energy Business* and *Transformers in Electrical Engineering*). Each section contains units that provide lead-in activities, reading, speaking, listening and writing tasks, vocabulary and grammar exercises as well as self-check tasks. The exercises are designed for mixed-ability groups with different levels of the English language proficiency and are presented from less challenging to more challenging ones, esp. in Grammar Revision box and Oral and Written Interaction/Production. Appendices include Resource Pack, Grammar Reference, Audio Scripts, and Wordlist.

The units are designed both for classroom use and independent studies. The authentic materials for units have been taken from different electronic sources, and are listed in the references. Unfortunately, in some instances, we have been unable to trace the owners of copyright material and we would appreciate any information that would enable us to do so.

We are sure that the study and practice book will give you the opportunities to develop your professional English. We thank the students, colleagues and friends who helped us with advice and comments and hope that you will share the fun we had while working on this study and practice book.

The Authors

SECTION 1 INTRODUCTION TO THE ENERGY BUSINESS

Unit 1.1. Exhibitions and trade shows

Lead-in

Discuss these questions with your partner.

- *Have you ever attended an exhibition? What was it? Did you like it? Why?*
- *If you haven't visited an exhibition, have you heard of any or seen an advert? Would you like to attend it? Why?*

https://www.industrialexpo.co.in/

Reading Comprehension

1. Complete the collocations with the adjective a-j. Study their Ukrainian translation. Can you notice any patterns?

#	**English collocation**	**Adjective**
1	___ exhibition – міжнародна виставка	a) Horticultural
2	___ site – конкретне місце	b) universal
3	___ body – організація, що надає дозвіл	c) corporate
4	___ Expo – садова виставка	d) Specialised
5	___ exposition – всесвітня виставка	e) potential
6	___ Expo – спеціалізована виставка	f) international
7	___ structure – збірна конструкція	g) sanctioning
8	___ theme – конкретна (точна) тема	h) prefabricated
9	___ participant – корпоративний учасник	i) specific
10	___ expenditure – потенційні витрати	j) precise

2. Match the word with its definition, then choose any five and make sentences of your own.

1. exposition	a) is the extent of the area or subject matter that something deals with or to which it is relevant
2. pavilion	b) is a complete extent or range
3. auspice	c) is the period of time during which something continues
4. gamut	d) is a large public exhibition of art and trade goods
5. scope	e) is a periodic gathering for the sale of goods
6. duration	f) is an agreement between states covering particular matters, especially one less formal than a treaty
7. convention	g) is a temporary building, stand, or other structure in which items are displayed at the trade exhibition
8. fair	h) is patronage or guidance

3. Read the words aloud and find the pairs of them that have the same vowel sound [ɑː], [ɒ], [æ], [ɔː], [iː], [eə], [eɪ], [əʊ]. *Choose any two pairs of words and make two sentences with each of them. Pronounce them and notice the sentence stress.*

1. fair	a) force
2. scope	b) block
3. fee	c) lakh
4. tax	d) care
5. source	e) coast
6. charge	f) week
7. space	g) large
8. body	h) case

4. Read the text about the World's Fair and make three questions about the facts you did not know before.

World's Fair

A world's fair is a large international exhibition designed to showcase achievements of nations. These exhibitions vary in character and are held in different

parts of the world at a specific site for a period of time, ranging usually from three to six months.

Since the 1928 Convention Relating to International Exhibitions came into force, the Bureau International des Expositions has served as an international sanctioning body for international exhibitions. Four types of international exhibition are organised under the auspices of the BIE: World Expos, Specialised Expos, Horticultural Expos (regulated by the International Association of Horticultural Producers) and the Milan Triennial. Depending on their category, international exhibitions may last from three weeks to six months.

At present there are two types of international exhibition: World Expos (formally known as International Registered Exhibitions) and Specialised Expos (formally known as International Recognised Exhibitions). World Expos, previously known as universal expositions, are the biggest category events. At World Expos, participants generally build their own pavilions. They are, therefore, the most extravagant and most expensive expos. Their duration may be between six weeks and six months. Since 1995, the interval between two World Expos has been at least five years.

Specialised Expos are smaller in scope and investments and generally shorter in duration; between three weeks and three months. Previously, these Expos were called Special Exhibitions or International Specialised Exhibitions, but these terms are no longer used officially. Their total surface area must not exceed 25 hectares and organisers must build pavilions for the participating states, free of rent, charges, taxes and expenses. The largest country pavilions may not exceed 1,000 m^2. Only one Specialised Expo can be held between two World Expos.

World Expos (formally known as International Registered Exhibitions) encompass universal themes that affect the full gamut of human experience, and international and corporate participants are required to adhere to the theme in their representations. Registered expositions are held every 5 years because they are more expensive as they require total design of pavilion buildings from the ground up. As a result, nations compete for the most outstanding or memorable structure. Sometimes prefabricated structures are used to minimise costs for developing countries, or for countries from a geographical block to share space (i.e. Plaza of the Americas at Seville '92).

In the 21st century the BIE has moved to sanction World Expos every five years; following the numerous expos of the 1980s and 1990s, some see this as a means to cut down potential expenditure by participating nations. The move was also seen by some as an attempt to avoid conflicting with the Summer Olympics. World Expos are restricted to every five years, with Specialised Expos in the in-between years.

Specialised Expos (formally known as International Recognised Exhibitions) are usually united by a precise theme—such as 'Future Energy' (Expo 2017 Astana), 'The Living Ocean and Coast' (Expo 2012 Yeosu), or 'Leisure in the Age of Technology' (Brisbane, Expo '88). Such themes are more specific than the wider scope of world expositions.

Specialised Expos are usually smaller in scale and cheaper to run for the host committee and participants because the architectural fees are lower and they only have to customise pavilion space provided free of charge from the Organiser, usually with the prefabricated structure already completed. Countries then have the option of 'adding' their own colours, design etc. to the outside of the prefabricated structure and filling in the inside with their own content.

Taken and modified from https://en.wikipedia.org/wiki/World%27s_fair

5. Decide whether the statements are true or false and correct them if necessary.

1. Convention Relating to International Exhibitions was adopted more than a century ago under the guidance of the BIE.

2. World Expos, which are very costly, are held once in half decade.

3. At Specialised Expos, the size of pavilions built by organisers should meet the requirements of the BIE.

4. World Expos, Specialised Expos, Horticultural Expos and the Milan Triennial are held under the guidance of the BIE.

5. There are some techniques to help developing countries participate at World Expos and build the pavilions for them.

6. Specialised Expos are smaller in scope and investments and are generally held every five years.

7. At Specialised Expos the participants do not have to pay any rent, charges, taxes and expenses.

8. At horticultural exhibitions, participants present gardens and garden pavilions as well as art and design expositions.

9. Specialised Expos are usually cheaper for the participants because the design of the pavilions is always made by organisers.

6. a) Work individually. Use the prompts to make questions. Change the form of the verb, add the auxiliary one and the proper prepositions if necessary.

b) Work in pairs. Ask and answer the questions with your partner.

1. When and where / the world exhibitions / hold?
2. What organisation / serve / an international sanctioning body / international exhibitions / since 1928?
3. What international exhibitions / organise / the auspices of the BIE?
4. Why/World Expos the most extravagant and most expensive events /present?
5. What / the interval / two World Expos / be / since 1995?
6. be / Specialised Expos smaller / scope and investments and generally shorter / duration?
7. Why / be / Specialised Expos cheaper than World Expos / participants?
8. What / be / international and corporate participants / require to adhere to / their representations / World Expos?
9. What options / the countries / have / Specialised Expos?
10. How often / be / World and Specialised Expos / hold?

Language in Use

7. Match pairs of synonyms. Then work in pairs. Choose any four and give definitions so that your partner could guess the word.

1. exhibition	a) expense
2. body	b) universal
3. gamut	c) place
4. expenditure	d) scope
5. world	e) structure
6. site	f) charge
7. pavilion	g) range
8. fee	h) exposition
9. scale	i) bureau

8. Fill in the preposition from the box. There are two extra prepositions. Scan the text and check the answers.

between	to	under	by (×2)	in (×2)	of	on	into	as	at

1. to vary _ character
2. to come _ force
3. to be organised _ the auspices
4. to adhere _ the rules
5. to be united _ smb/smth
6. free _ charge
7. to serve _ smth
8. to be smaller _scope
9. to be regulated _ smth
10. to depend _ smth

9. Fill in the gaps with the right words from the list.

event/ stimulation/ suppliers/ objective/ display/ audience/ exploitation/ innovations/ transactions/ artifacts

Exhibitions are public __ (1) of industrial or commercial products or __ (2). There are three major types of exhibitions: industrial, regional and universal. Industrial exhibitions are devoted to the __ (3) and progress of a specific industry or a group of industries in a particular geographical region.

An example is COMDEX, which is an annual American exhibition that showcases __ (4) in the computer, telecommunications and consumer electronics industries from around the world.

An exhibition is essentially a promotional __ (5) that is designed to communicate with the targeted __ (6), some form of information about products or services. The primary __ (7) of an exhibition is to provide a communication opportunity for achieving marketing objectives, mostly involving buyer/seller __ (8). Visitors attend exhibitions for various reasons such as: see new products and developments; obtain product and technical information; talk with and compare potential __ (9); gain new ideas and information; find suppliers for whom they can become distributors; and for social reasons.

Exhibitions serve to maximum __ (10) of events and occasions; reach-out to the desired audience; opportunities to create a dialogue with its target audience on a

personal basis; and achievement of communication objectives for a wide range of organisations.

10. Read the text below and choose the word a), b), c) or d) which best fits the space.

A perfect __ (1) to network, discover clients, and generate new leads, trade shows serve as a specialised marketing __ (2) designed to accelerate relationship building and sales by linking buyers, sellers, and other stakeholders from common industries.

Live shows __ (3) sellers to appeal to buyers' senses when showcasing products or services and highlighting competitive __ (4). The nature of a trade show provides a unique opportunity for the direct __ (5) contact critical for building confidence and closing a sale. Buyers themselves are in an ideal state of __ (6) as they are actively looking to take advantage of having multiple __(7) in one place. They want to pose questions. They want to physically examine and experience both products and the people behind them. Shows can also be an excellent way to impress and attract investors or reconnect __ (8) existing clients and maintain a positive image.

Trade shows are an effective non-mass media tool to market your company and its products, new and existing. The African Global Competitiveness Initiative identifies trade shows as the most accessible best practice for connecting to new markets. Trade shows tend to exhibit higher rates of return than typically __ (9) with direct marketing and advertising which are primarily successful in cases where the industry is small, organised, and scarce in supply, or when the character of the consumer market is well understood. One day spent at an exhibition provides access to more clients from more places than one could ever visit during a __ (10) workday.

1	a) probability	b) opportunity	c) ability	d) possibility
2	a) tool	b) meter	c) instrument	d) device
3	a) let	b) permits	c) allow	d) make
4	a) cons	b) drawbacks	c) disadvantages	d) advantages
5	a) person	b) personnel	c) personal	d) staff
6	a) receptivity	b) reception	c) receipt	d) recipe
7	a) consumers	b) clients	c) customers	d) vendors

8	a) for	b) on	c) with	d) from
9	a) finding	b) founded	c) find	d) found
10	a) type	b) typed	c) typical	d) typically

11. Match the beginning of the sentence with its ending.

1. Participating in international trade shows …
2. Trade shows offer a single, short-term venue to network, market, …
3. The Center for Exhibition Industry Research states …
4. PROMEXICO defines international trade shows as …
5. Simply being present is often a cost-effective way to …
6. It is also common for fairs to include workshops, trainings, …
7. If you're not ready for the investment involved in hosting a full exhibition, …
8. For guidance in choosing the right show, …

a) … consult the resources available to you through your national or local export promotion agency.

b) … perform market research, stay informed on industry trends, and check out the competition up close.

c) … can be an effective channel to access foreign markets.

d) … seminars, trade talks, and other activities geared towards expanding the skills, capacity, and knowledge of participants.

e) … and keep tabs on competitors and innovation.

f) … registering as an attendant will still give you the opportunity to make contacts and gather market intelligence.

g) … that over 14,000 trade shows are held each year in the United States, Canada, and Mexico alone.

h) … large events designed to facilitate commercial transactions between businesses from around the world.

Grammar Revision: Focus on Present Tenses

GRAMMAR FOCUS I	Active	Passive
Simple	write(s)	is (are) written
Continuous	am (is, are) writing	am (is, are) being written
Perfect	have (has) written	have (has) been written
Perfect Continuous	have (has) been writing	----------

1. Use the proper form of the verb given in brackets. Each of the seven forms should be used only once.

1. From ancient times people __ (try) to do several things simultaneously.
2. This site usually __ (highlight) important shows by date and industry.
3. Buyers __ actively __ (look) to take advantage of having multiple vendors in one place.
4. A unique opportunity for the direct contacts with potential customers __ (provide) by the nature of a trade shows.
5. Since 1995, the interval between two World Expos __ (be) at least five years.
6. World Expo __ (hold) in Dubai nowadays.
7. Many photos __ (take) at the exhibition recently.

2. Fill in the gaps with the proper verb form given below.

is growing; fasten; purchase; are crowded; is increasing; are held; have been attained; negotiate; have; include

Many national and international specialised exhibitions __(1) every year in different countries of our world. From year to year the number of companies and countries participating in such exhibitions __(2). The scope of exhibitions__ currently __(3).

The present exhibitions __(4) a wide range of showpieces showing the important achievements that __(5) in different fields of science, industry and agriculture of different countries.

These exhibitions __ usually __(6) with different visitors with their different interests and demands. The participants of these exhibition __(7) with their customers, sell their goods and __(8) the goods they need.

A national or an international exhibition is a way to advertise the products of a company. Such exhibitions usually __(9) their mottoes, for example: people and environment, economic cooperation, technical progress and so on. The international exhibitions __(10) the friendship among different nations and countries.

3. Make the sentences passive.

1. Each world expo gathers people from all over the world to showcase their products and craftsmanship.
2. The guests are staying at a new hotel in the city centre at the moment.
3. The British have in fact always imported food from abroad.
4. Do they still exhibit their goods at world expo?
5. They are providing information and help at the main desk.
6. Do you know if they have completed the pavilion?
7. They have organised a yearly exhibition in Paris.
8. Why do visitors attend exhibitions?

4. Study about Present Tenses (see the Grammar Reference, p.204) and write 15 sentences of your own for each rule using the vocabulary of the unit.

Translation Practice: Ukrainian into English

12. Translate the following sentences into English. Pay attention to the use of Present tenses either in Active or Passive Voice and identify them.

1. Міжнародні виставки проводяться щорічно в усьому світі, щоб виробники могли спілкуватись з цільовою аудиторією та інформувати про досягнення своєї країни.

2. Щоб скоротити потенційні витрати учасників, організатори проводять Всесвітні виставки щонайменше один раз на 5 років з 1995 року.

3. Спеціалізовані виставки проводяться в період між всесвітніми виставками, вони зазвичай менші за масштабом, і їх дешевше проводити.

4. Організатори спеціалізованих виставок надають збірні конструкції для павільйонів, а учасникам потрібно лише заповнити їх своєю власною продукцією.

5. Протягом 170 років, всесвітні виставки надавали платформу для того, щоб показати найвидатніші інновації, які сформували світ, в якому ми живемо сьогодні.

6. Один день, проведений на міжнародній виставці, надає доступ до великої кількості клієнтів, дозволяє вразити та привернути увагу багатьох інвесторів та скористатись перевагою мати численних покупців в одному місці.

Listening Comprehension

*13. Watch the video 'Highlights of Engiexpo Vadodara 2020 Mega Industrial Exhibition' (*https://www.youtube.com/watch?v=5PDYn9QPofI*) and do the following tasks.*

Before watching the video:

a) Discuss the following questions with your partner:

1. Why are exhibitions organised?
2. What kinds of exhibitions do you know?
3. When did people start holding exhibitions?

b) Match words and collocations with their meanings.

1	Rigorous planning	a) a place giving capability or ability for some task
2	Dedicated team	b) a hundred thousand
3	Enabling platform	c) ten million
4	Lakh	d) connection of one business with other business
5	Prestigious brand	e) the highest stage of development
6	Crore	f) connection of business with customers
7	Market leader	g) respected, recognisable name given to a product or service
8	B2B	h) a group of people devoted to a cause or ideal or purpose
9	B2C	i) rigidly accurate formulating of a course of action
10	Ample height	j) a person or a company that rules or guides others in the world of commercial activity where goods and services are bought and sold

https://online-teacher.ru/blog/national-exhibitions

14. Watch the video and state whether the statements are true or false, and correct the false ones.

1. Engiexpo is an Indian company that has organised 10 annual events in the last 5 years.
2. Engiexpo has become an international event converging innovations and latest developments.
3. All the customers are completely satisfied with Engiexpo.
4. Engiexpo brings together manufacturers and big suppliers.
5. Utilities and infrastructure at Engiexpo meet all the necessary demands of participants.

15. Watch the video and complete the sentences with necessary information.

1. Dedicated team of Engiexpo rolled up their hard work in one mission ….
2. Engiexpo enables traders, manufacturers and service providers to compete and grow in ….
3. Engiexpo has tremendous support and response from ….
4. Two-way advertising is a well-known name since ….
5. Engiexpo brings together top manufacturers, suppliers and traders to source from all levels of engineering supply chain supported by ….
6. Engiexpo helps create a competent image for their ….

16. Using the facts you have learnt from the video, complete the summary about Engiexpo. Fill in the blanks with 10 words that fit the meaning and use 6 verbs in brackets in the correct present tense form.

Engiexpo is one of the largest industrial __ (1) organising company in India.

We __ successfully __ (complete) six exhibitions. Behind the six successful exhibitions, there are days, month, and years of hard work of our __ (2) team. We Engiexpo are an __ (3) platform for the growth of India's MSME (Ministry of Micro, Small and Medium Enterprises in India) Sectors.

We __ (provide) an opportunity to small __ (4) and medium scale industries to grow their business at national as well as international level.

We … (organise) industrial exhibition for the last five years with:

• more than 3000 __ (5),

• more than 12 lakh visitors,

• more than 4000 crores worth of trade activity,

• more than 20,000 product display,

• and participants from all over India.

We are the most prestigious company engaged in organising __ (6) exhibitions at the national level.

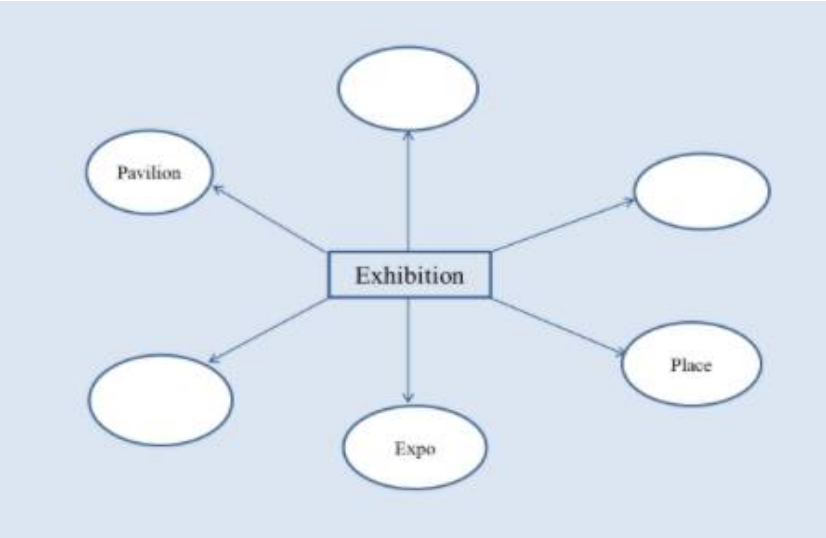
The main aim behind organising this industrial expo is to showcase the latest innovations and latest developments. Engiexpo exhibition __ (enable) manufacturers, traders, and suppliers, to compete with each other and grow their business in the __ (7) market.

Engiexpo organises annual events in Ahmedabad, Rajkot, Vadodara, and Surat. In addition, we __ (plan) for upcoming expos in Delhi and Mumbai nowadays.

We receive __ (8) from various industries, various trade bodies, and different government agencies.

Engiexpo __ (provide) a platform for industries to grow and achieve the heights of_... (9). The best part of Engiexpo is that we have a 100% customer __ (10) ratio and a 90% renewal ratio. Moreover, we are India's leading Subjective expo organisers.

17. Work in groups. Look at the mind map and write the words you associate with the word ***Exhibition****. Then put down as many sentences as possible using the words and grammar of the lesson.*



Oral Interaction

18. Work in groups of three.

a) Each student chooses one link (A, B or C), reads the informaiton to fill in the table (A, B or C) with the facts. Then students exchange the information and complete the tables with the facts they learnt from the partners.

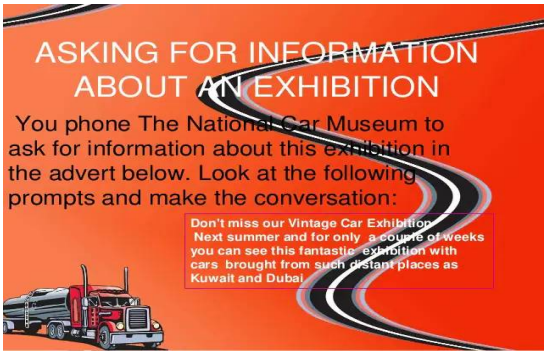
ir **World Expos** **Expo 2020 Dubai** https://cutt.ly/hFjf96a	EXPO 2017 ASTANA **Specialised Expos** https://cutt.ly/CFjfGO6	EXPO 2023 DOHA QATAR **International Horticultural Expos** https://cutt.ly/bFkc8UM
A	**B**	**C**

b) Discuss the events you read about and decide which you would like to attend.

19. Work in pairs.

a) You phone the National Car Museum to ask for information about the exhibition mentioned in the advert below. Use the prompts to complete the dialogue in the Resource Pack, p.182.

b) You phone the exhibition centre to ask for information about the nearest exhibition in electrical engineering. Use the prompts from a) and make the conversation.



https://www.slideshare.net/cristinaca/exhibition-31815577

20. John Brown is at the exhibition which is being held in London. The stand of one of the British companies has attracted his attention. At the moment he is talking to Mrs. Smith, the Sales Manager of the company.

1. *Arrange the following sentences (a-j) in order to make up a dialogue between Mrs. Smith and Mr. Brown.*
2. *Answer the questions that follow.*
3. *Act out a similar dialogue.*

a. Does our new processing equipment interest you?

b. Yes. We are looking for new machinery for our factory in Liverpool. We need to decide what equipment to buy.

c. You're right. We have been often considered as a second-tier player behind some well-known companies like 'GENCOA Ltd' and 'PROLINE Corporation Limited'. However, that's changed. We're now a respected company as capable as 'GENCOA Ltd' in our field.

d. Good afternoon, Mrs. Smith. I'm the Commercial Director of a British company. Here's my card.

e. But, as far as I know, your company has not been well-known until recently.

f. I was impressed by the performance of your equipment. I've seen a lot of similar systems at the exhibition, but your equipment outperforms them.

g. Yes. Your stand attendant gave them to me.

h. Thank you, Mr. Brown. We've worked hard, and we've achieved great success.

i. Good afternoon, Mr. Brown. Have you seen our advertising materials?

j. Our equipment is not a bad choice, Mr. Brown. It corresponds to the highest technical level and the highest standards existing in the world today.

Questions:

1. Why is Mr. Brown attending the exhibition?
2. Why has the stand of one of the British companies attracted his attention?
3. How has the company Mrs. Smith works for changed? Why?
4. What was Mr. Brown impressed by?

21. Work in groups. Use the tips below to organise the exhibition (see the task 17). Share the responsibilities within your group and then present the results of your work.

Exhibition planning tips

Getting Started on an Exhibition (basic steps):

- What is **the main idea** you want to communicate to the viewers? Make your viewers curious and eager to explore.
- Decide on **the central themes** of the exhibition. What do viewers really need to know?
- Decide what **objects to include**. How do they contribute to the central idea? The label should be short and tell the viewer something interesting about the object on display.
- Develop **the exhibition narrative**. Everything in the exhibition should relate to the main idea.

What You Need:

- **Title** for the exhibition.
- **Brief description** of the exhibition (3 or 4 sentences that sum up the exhibition).

- **Exhibition checklist** (a list of the objects – photos, videos, books, etc..) that will be in the exhibition.
- **Exhibition outline** (a summary of the exhibition: title, brief description, the main themes, and the objects grouped by theme).

When planning a trade show exhibition be sure to:

- Create measurable goal outcomes from the event
- Find out what competitors will be present
- Create a visual concept for your exhibition stand
- Make sure your branding is unique
- Decide which products you want to exhibit
- Make sure exhibit staff are familiar with every product
- Offer signup incentives to guests

Oral production

22. After organising the exhibition (task 21) think how you can present it.

a) Create a presentation (a couple of slides) on the exhibition you would like to invite your groupmates.

b) Present the venue/type of exhibition and persuade your friends to go there/buy tickets. Use the following words and phrases.

Useful Language for Presentations

Beginning a presentation

Hello everyone, and welcome. / Good morning, ladies and gentlemen. /
It's great to see you all here today.
Today I'm going to talk to you about / In this presentation I want to show you…

Outline

This presentation is in three/four/several parts.
I'll begin by talking about … / First, I'll show you …
Secondly, we'll look at …
Then I'll explain … / After that, let me introduce …
Finally, I'll tell you about …

Main part

Let's look at the first type of …

To give another example … / Now, let's move on to the next point …

As you can see on this chart/diagram …

Well, that's all about …

Conclusion, Q&A

To sum up, I'd like to say that … / That brings me to the end of my presentation.

I hope you have found the talk useful.

Thanks for listening/coming.

Are there any questions?

Written Production: Writing a report

23. Underline the key words in the rubric. Read the report and write the headings (A-E) in the gaps (1-5).

You work as an academic coach at one of the engineering departments of 'Igor Sikorsky Kyiv Polytechnic Institute' and have received an e-mail from the Dean.

We need to find suitable places to bring the 4th year students for career guidance trip, so I want you to visit Kyiv Technical Fair. Write a report about the fair including information about things to see and do there, its facilities, working hours and admission costs.

To: Taras Gubar (Dean)

From: Andriy Holub (Academic coach)

Subject: Kyiv Technical Fair

Date: 20th October 20…

As requested, the purpose of this report is to describe and assess the suitability of excursion to Kyiv Technical Fair for career guidance trip.

1) **Firstly**, the exhibition provides a platform to showcase the latest innovations and developments in more than 10 topics in engineering supply chain, most of which are closely connected with students' future profession.

2) **Secondly**, the fair has excellent facilities. Industrial automation topic is 3) **especially** important for engineering students. Many exhibits are interactive allowing visitors to see how the equipment works, 4) **although** some pieces of equipment have only technical specifications. The fair has a café which serves a variety of sandwiches and refreshments.

5) **Lastly**, the exhibition is open from 10:00 to 18:00 on weekdays. The entrance is free. 6) **However**, on-line registration is recommended.

7) **In conclusion**, Kyiv Technical Fair has a number of fascinating exhibits and excellent facilities. 8) **I would strongly suggest** that our department organises a day trip to this exhibition.

A Exhibits for career guidance
B Introduction
C Other features
D Recommendations
E Prices & Booking

24. Replace the words and phrases in bold in the model report in exercise 23 with appropriate ones from the Useful Language box. Then add the words and phrases in bold from the model report to the Useful Language box to appropriate section.

Useful Language
Introducing The purpose of this report is to … As requested, this is my report on …
Listing points In the first place, … / To begin with, … / _____ Furthermore, … / _____ Finally, … / _____

Expressing concession _____ /Though … / While … Despite of the fact that … / _____
Adding emphasis _____ / particularly / in particular
Expressing cause and effect By doing this, we could/would … / In this way … / As a result … / If we (did this) …
Expressing opinion I believe/feel (that) … / I am convinced/confident that …
Making suggestions/recommendations _____ / …would be a very suitable for … / … would suit the needs of …
Concluding In short, … / _____ / On the whole, … / To sum up, … / All in all, …

25. Surf the Internet to find and study the programme of a recent exhibition devoted to the achievements in science and technology. Write a report (140-190 words) using WRITING FOCUS and words/phrases from the Useful Language box.

WRITING FOCUS
Outline for reports
Purpose or introduction Clearly state the purpose of the report and what it contains.
Main body Divide into sections each with its own subheading. Each main bode paragraph should present a separate idea. Use appropriate linking words/phrases to join these ideas.
Conclusion Summarise all the points of the main body; make recommendations and/or offer a personal opinion.

Self-Check 1.1

Choose the appropriate word to fill in the gaps in the sentences below.

Vocabulary

1. CeBIT was the largest trade … held each year in Hanover, Germany from 1970 to 2018.

a) exhibition b) fair c) exposition d) expo

2. At World Expos, participants generally build their own ….

a) expositions b) buildings c) pavilions d) sites

3. Expo calendar is separated into … weeks.

a) theme b) topic c) subject d) object

4. International exhibitions help companies meet new … or grow existing businesses all over the world.

a) participants b) visitors c) clients d) customers

5. The main aim of industrial expos is to showcase the latest … and latest developments.

a) inventions b) innovations c) expositions d) exhibits

Grammar

1. Exhibitions … every 5 years according to the decision of Bureau International des Expositions.

a) have run b) are running c) have been run d) are run

2. For more than 170 years World Expos … the platform for innovations.

a) have been b) are c) were d) has been

3. Participating countries always … the best innovative products at World Expos.

a) are demonstrating b) have demonstrated c) have been demonstrating d) demonstrate

4. World Expos … every 5 years since 1995.

a) have held b) are holding c) have been held d) are held

5. Many industrial exhibitions … all over Europe nowadays.

a) have organised b) are being organised c) are organising d) organise

Correcting mistakes

Work in pairs. Do the task and discuss the result with your partner.

Read the text about Expo 2020 in Dubai. Find the following mistakes and correct them: wrong preposition – 4, wrong verb form – 3, wrong singular/plural – 3, wrong articles – 2.

https://cutt.ly/ATuy0vN

Expo 2020 will be held in Dubai, UAE. The country has won the voting in 2013. The hosting country represents the event as a biggest and most expensive throughout 100-year history of Expo. The area of exhibition is 432 hectares (compare: World Expo in Milan occupied only 110 hectares); it took 6 months of construction work; there will be 190 participating countries; UAE expenses after COVID-19 pandemic was more than $44 billion.

Expo 2020 is an outstanding exhibition events where participating countries demonstrate the best innovative products. Each month is devoted for a separate theme which is coherent to the main theme – Connecting the minds, Creating the future and key sub-topics: Mobility, Opportunities and Sustainability.

The core of Expo 2020 is a intensive program involving all participating countries and international organisations. Expo events cover almost all directions about modern society development, they tend to unfold the most sensible global problems: tolerance, equality, accessible innovative health care, global dialogue of nations through development of culture, art, business etc.

Expo calendar are separated into theme weeks, each of which is devoted to a separate topic: climate and biodiversity, energy efficiency, space exploration, urban and country development, tolerance and inclusiveness, educations, tourism, global objectives of development, agriculture, trade and investment, farming and animal husbandry, development of waters recourses etc. Within the program of theme weeks, the hosting country and participating countries host various events.

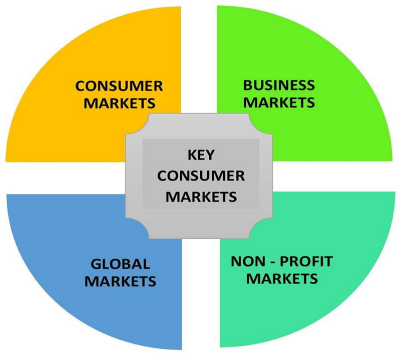
Unit 1.2. Energy markets

Lead-in

Discuss these questions with your partner.

- *What kinds of markets can you think of?*
- *What can be sold in these markets?*
- *Can energy be sold in these markets?*

Look at the diagram below and match the goods and services with the markets they are sold in.

1. Sell mass consumer goods and services 2. Sell business goods and services 3. Sell goods and services in global market 4. Sell goods to nonprofit organisations	

https://cutt.ly/aTups7T

Reading Comperhension

1. Match the expressions with their translation a-j. Pay attention to Noun+Noun constructions.

	English	***Ukrainian***
1	energy market	a) конкурентне середовище
2	cross-border trade	b) річна вартість
3	natural monopoly	c) постачальник енергії
4	liberalisation process	d) ринок енергії
5	price regulation	e) транскордонна торгівля
6	consumer protection	f) природна монополія
7	energy provider	g) змінні тарифи
8	competitive environment	h) захист споживачів
9	switching rates	i) процес лібералізації
10	annual cost	j) регулювання цін

2. Match the word with its definition. Then choose any five and make sentences of your own.

1	milestone	a) selling of goods to consumers, usually in small quantities
2	integration	b) any condition that makes it difficult to make progress or to achieve an objective
3	monopoly	c) a significant event, a landmark
4	consumer	d) the ability to move or changing easily
5	assessment	e) combining of two or more things so that they work together effectively
6	retail	f) a market in which there are many buyers but only one seller
7	barrier	g) a calculation about the cost or value of something
8	mobility	h) a person or company who uses goods or services

3. Put the main stress in the multisyllable words given below. Read the sentences with these words (highlighted) in the text and translate them.

a) monopoly
b) liberalisation
c) applicable
d) regulatory
e) monitoring
f) internal
g) fragmented
h) underdeveloped

4. Read the text about liberalisation of the energy market. Write down two interesting facts you consider to be most important. Compare your notes with the other students in your group.

Liberalisation of the energy market (electricity and gas)

One of the main objectives of the EU energy policy is to ensure the functioning of the internal energy market. The milestones for the integration of the EU energy market were three liberalisation packages applicable to the electricity and gas markets, of which the latest was adopted in 2009. Despite this, the EU energy market remains rather fragmented into sub-markets with limited cross-border trade and competition, all coming as disadvantages for consumers.

Originally, energy supply was a natural monopoly comprising production, distribution and trading. Liberalisation separated these components and created regulation schemes for activities where the monopoly had to stay (typically for

transmission and distribution) and a competitive market for energy trading. The liberalisation process was typically gradual starting with large consumers. In spite of this, this process of liberalisation of the energy market is still not completed in the EU.

Also, there is still a big difference in the regulation of energy markets among Member States. The 2014 Market Monitoring Report provides an assessment of the progress achieved by European countries with reference to the competition in electricity and gas markets. According to the report, European countries still have widely different retail regulatory frameworks, in particular with regard to price regulation and consumer protection. This in turn leads to different levels of market competition.

The EU energy market for electricity and natural gas is liberalised in most countries since 2008. The liberalisation created the conditions for the entry of new energy providers in the market. This established a competitive environment which was supposed to lead to a reduction of energy prices and improve the quality of the provided services.

Also, the Energy Efficiency Directive includes targets to remove national technical or administrative barriers to the proper functioning of the internal energy market or of the underdeveloped labour markets, in order to match the low-carbon economy challenge, as many of those barriers are still relevant.

The important factor is the duration of the liberalised market since that time. For the electricity market, it is almost 9 years on average in the EU (ACER, 2014). Another indicator is the mobility of consumers regarding their energy providers or tariffs, which is expressed by the so called 'switching rates', that has the objective of optimising the service conditions and reducing the annual cost of energy. All these indicators are gathered and published separately for electricity and natural gas.

The following indicators show the final stage taking into account the market conditions in force for all end-consumers.

Taken from https://ec.europa.eu/energy/content/liberalisation-energy-market-electricity-and-gas_en

5. Decide whether the statements are true or false and correct them if necessary.

1. The EU energy policy is aimed at ensuring the functioning of the internal energy market.

2. The drawbacks for consumers in the EU energy market are cross-border trade and competition.

3. Liberalisation separated transmission and distribution.

4. Liberalisation of the energy market in the EU is still in progress.

5. Retail regulatory frameworks in European countries still have big differences.

6. The EU energy market for electricity and natural gas is liberalised, which substantially reduced energy providers in the market.

7. National technical or administrative barriers prevent the proper functioning of the internal energy market.

8. In the EU, the liberalisation process in the electricity market started almost nine years ago.

6. a) Work individually. Use the prompts to make questions. Change the form of the verb, add the auxiliary one and the proper prepositions if necessary.

b) Work in pairs. Ask and answer the questions with your partner.

1. What / one of the main objectives / the EU energy policy?
2. What / the milestones / the integration of the EU energy market?
3. What / the EU energy market / fragment / into?
4. What / the natural monopoly / energy supply / comprise?
5. How / liberalisation / influence / production, distribution and trading?
6. What / the liberalisation process / start with?
7. What / lead / to different levels / market competition among European countries?
8. When / the EU energy market / electricity and natural gas / liberalise?
9. What / a competitive environment / suppose / to lead to?
10. What targets / the Energy Efficiency Directive / include?

Language in Use

7. Fill in the table with the corresponding part of speech and make your own sentences with any ten.

Noun	Verb	Adjective
integration		

		competitive
	to liberalise	
transmission		
	to regulate	
		applicable
protection		
	to reduce	
duration	----------	
		administrative

8. Form the corresponding part of speech from the words in brackets.

The EU Energy Markets and Energy Prices

A well-functioning EU energy market delivers high-quality energy services and products to all (Europe) countries. An integrated market with cross-border infrastructure provides a shield against price and supply (fluctuate), and a better deal for consumers. It allows Member States to exchange electricity with their neighbours in the most economically and (environment) efficient way.

The internal energy market allows for the cheapest energy to be (deployment) first, with more expensive sources added depending on demand. This model provides (efficient), transparency and incentives to keep costs as low as possible. There is general consensus that the (margin) model is the best for liberalised electricity markets. Only the wholesale price is set at EU level based on this marginal price model.

When there is (sufficiency) supply of renewables to meet demand, prices are at their lowest as other power sources don't need to be (switch) on.

When more energy is needed, more (expenses) power plants need to be switched on, and they set the price which all suppliers receive. At the moment, gas-powered plants are still needed to (generation) electricity across Europe, and they are setting the price.

9. Read the text below and choose the word a), b), c) or d) which best fits the space.

Supplying energy to homes … (1) the UK involves three key elements: making electricity through generation, transporting gas and electricity and selling it to the

customer. Energy … (2) can work in any of these different areas, and some operate in all of three of them. The electricity and … (3) markets in the UK are privatised. This means that private companies make sure we have the energy that we need. It also means that customers can choose which companies supply their energy.

Most electricity is generated at large power stations connected to the national … (4) network. However, electricity can also be generated in smaller scale power stations which are … (5) to the regional distribution networks. The number and type of power station built is the decision of each individual company based on market signals and government … (6) on issues such as the environment. There are many companies in the electricity ... (7) sector, from large multinationals to small, family-owned businesses running a single site.

There are two types of electricity network: transmission and distribution. Transmission networks carry electricity long distances around the country at high voltages. Distribution networks run at lower voltages and take electricity from the transmission system into homes and businesses.

The transmission system is run by National Grid, which is … (8) for balancing the system and making sure that the supply of electricity meets the demand on a second-by-second basis. Similar infrastructure exists for the transmission and distribution of gas.

Suppliers buy energy in the wholesale market and sell it on to customers. Suppliers work in a … (9) market and customers can choose any supplier to provide them with gas and electricity.

The electricity and gas markets are regulated by the Gas and Electricity Markets Authority, operating through the Office of Gas and Electricity Markets (Ofgem). Ofgem's role is to protect the interest of consumers by promoting competition where appropriate. Ofgem issues companies with … (10) to carry out activities in the electricity and gas sectors, sets the levels of return which the monopoly networks companies can make, and decides on changes to market rules.

1	a) among	b) across	c) through	d) during
2	a) firms	b) campaigns	c) companies	d) offices
3	a) gas	b) gasoline	c) petrol	d) fuel
4	a) devolution	b) transition	c) transportation	d) transmission
5	a) linked	b) connected	c) tied	d) knitted

6	a) pole	b) politics	c) police	d) policy
7	a) generation	b) production	c) manufacturing	d) creation
8	a) accountable	b) responsible	c) in charge	d) response
9	a) competitive	b) competitor	c) competition	d) compeer
10	a) agreement	b) consent	c) permissions	d) licences

10. Match the beginning of the sentence with its ending.

1. Consumers can choose …
2. Switching suppliers should be free of …
3. A consumer's electricity bill in Europe is made up of three elements, …
4. The exact composition of the bill varies …
5. Electricity produced …
6. The current gas price rise results primarily from supply shortages and higher demand for …
7. The EU Emissions Trading System does not levy any fees directly from consumers, …
8. The rising carbon prices over the last year have affected wholesale electricity prices, but the effect of the higher gas price is currently 9 times …

a) … each accounting usually for roughly one third of the price: electricity generation (the cost of making power), network charges (the cost of delivering power), and taxes and levies.

b) … but the cost of buying emission allowances is usually passed on to consumers by energy companies.

c) … among different suppliers and contracts.

d) … gas in global markets due to the economic recovery in the aftermath of COVID-19.

e) … stronger than that of the ETS price.

f) … from one Member State to another.

g) … charge for households and small businesses and take no longer than three weeks – and even 24 hours if smart meters are rolled out.

h) … from gas usually sets the price in European markets.

Grammar Revision: Focus on Past Tenses

GRAMMAR FOCUS	Active	Passive
Simple	took	was (were) taken
Continuous	was (were) taking	was (were) being taken
Perfect	had taken	had been taken
Perfect Continuous	had been taking	----------

1. Use the proper form of the verb given in brackets. Each of the seven forms should be used only once.

1. By the time I came back from my business trip, a lot of things … (changed).
2. The tariff for gas and electricity … (increase) by 10% in September 2021.
3. Gas reserves … (estimate) at 35 900 bcm before they started declining rapidly.
4. They … (suffer) from power cuts for years before a new power plant was put into operation.
5. Gas prices … (increase) these days.
6. The number of suppliers in the UK … (level off) in 2018.
7. While they … (deliver) fuel to a gasoline station the truck broke.

2. Fill in the gaps with the proper verb form given below.

continued; were prohibited; precipitated; occurred; was made; prompted; decided; had eroded; was lifted; consumed

In the post-World War II period there have been two major oil crises. The first … (1) in 1973, when Arab members of OPEC (Organization of the Petroleum Exporting Countries) … (2) to quadruple the price of oil to almost $12 a barrel. Oil exports to the United States, Japan, and western Europe, which together … (3) more than half the world's energy, … also … (4). OPEC's decision … (5) in retaliation for Western support of Israel against Egypt and Syria during the Yom Kippur War (1973) and in response to a persistent decline in the value of the U.S. dollar (the denominated currency for oil sales), which … (6) the export earnings of OPEC states. With the global capitalist economy already experiencing difficulties, these actions … (7) a steep recession accompanied by rising inflation. This forced capitalist countries

to embark on a process of economic restructuring in order to reduce their dependency on oil and … (8) fears that the United States might take military action in order to secure free access to its energy supplies. Although the oil embargo … (9) in 1974, oil prices remained high, and the capitalist world economy … (10) to stagnate throughout the 1970s.

3. Study about Past Tenses (see the Grammar Reference, p.205) and write 11 sentences of your own for each rule using the vocabulary of the unit.

4. Make the sentences passive.

1. We started gas supply company 5 years ago.
2. The U.K.'s departure from the EU had disrupted supply chains before the problems in the energy market started.
3. During the global financial crisis in 2008 the energy suppliers were decreasing consumer prices.
4. Nuclear power plants of Ukraine generated more than 50% of electric energy last year.
5. This company was supplying electricity while their competitor was repairing transmission line.
6. The government had protected consumers from higher bills before the market collapsed.
7. A heavy snowfall disrupted supply to production facilities in Ukraine last winter.
8. A terrible accident caused sudden and complete breakdown in electricity supply after the customers had signed the purchase contract with supplier.

Translation Practice: Ukrainian into English

11. Translate the sentences using Past Tenses. Pay attention to the use of either Active or Passive Voice and identify them.

1. Він написав багато наукових статей про відновлювані джерела енергії, коли був студентом.
2. Коли викладач пояснював принцип роботи трансформатора, студенти робили лабораторну роботу.
3. Як тільки студенти закінчили експеримент, продзвенів дзвоник.

4. Поки працювала підстанція, всім споживачам постачали достатньо електроенергії.

5. Ця компанія постачала електроенергію на ринок протягом багатьох років коли розпочалась криза.

6. На початку 1970-х років в Америці споживання бензину та інших нафтопродуктів зростало, тоді як внутрішнє виробництво нафтопродуктів знижувалось.

7. Коли він створив свою власну газову компанію, ринок газу вже був лібералізований.

8. Він сказав, що вже зробив презентацію і зараз пише доповідь.

9. Поки будували підстанцію, ми змушені були економити електроенергію.

10. Після того, як обладнання було встановлене, станція була введена в дію.

https://www.energy-uk.org.uk/energy-industry/the-energy-market.html

Listening Comprehension

12. Watch the video 'Understanding Basics of the Power Market' (https://www.youtube.com/watch?v=dYvEG3uQzsQ) and do the following tasks.

Before watching the video:

a) Discuss the following questions with your partner:

1. What is energy market? What does it comprise?
2. What sources do we get energy from?
3. What influences the price of electricity?

b) Match words and collocations with their Ukrainian equivalents a-j.

	English term	Ukrainian equivalent
1	Completely fungible	a) Інструкції щодо розподілу
2	Prohibitively expensive	b) Додаткові послуги
3	Power grid	c) Гранична ціна
4	Dispatch instructions	d) Ринок день наперед
5	Marginal price	e) Повністю взаємозамінний
6	Ancillary service	f) Ринок реального часу
7	Day ahead market	g) Стійкість енергосистеми
8	Grid stability	h) Неймовірно дорогий
9	Real-time market	i) Обмеження в передачі енергії
10	Power transmission constraints	j) Єдина енергосистема

13. You will hear these expressions in the video. Read them and their Ukrainian equivalents and fill in the missing words.

	English term	Ukrainian translation
1.	____ of commodity	a) Виробництво та споживання протягом дня
2.	Capital investments in _____ resources	b) Тип товару, предмету споживання
3.	_____ of electricity	c) Періоди пікового попиту
4.	Futures and options _____ for electricity day ahead	d) Зміни у виробництві та споживанні
5.	_____ of consumption	e) Капіталовкладення в ресурси виробництва
6.	Production and consumption thoughout a _____	f) Споживання електрики
7.	Periods of _____ demands	g) Ф'ючерсні та опціонні контракти день наперед
8.	_____ in production and consumption	h) Рівень споживання

14. Watch the video and state whether the statements are true or false, and correct the false ones.

1. Crude oil and natural gas are completely fungible tradable commodities.
2. Electricity must be generated and consumed simultaneously.
3. Industrial battery storage is used to meet peak levels of consumption.
4. Uneconomic generation resources are dispatched during periods of peak demand.
5. Balance between generation and load in the power grid is ensured by ISO and RTO.
6. ISO and RTO are commercial players in the energy market.
7. Energy market is managed via the day-ahead and the real-time markets.
8. In the day-ahead market, the costs of received and offered electricity to the power grid vary for each next operating day.
9. Cost security and transmission constraints are considered in the generation dispatch schedule.
10. In the real-time market, each generator receives instructions based on actual operating conditions from the operators.
11. Capacity market stimulates long term capital investment in generation resources.
12. Revenues are paid to capacity providers when energy is produced.

15. Using the facts you have learnt from the video, put the sentences in the correct order to summarise the information about electricity market.

1. Several characteristics differentiate electricity from other commodities such as crude oil and natural gas.
2. Independent electricity system operators are responsible for keeping the power grid balanced.
3. Electricity is a relatively new type of tradable commodity.
4. This allows the ISO to ensure a reliable supply of electricity to consumers.
5. The generators of electricity come to the market with the amount of energy they can offer at their best price.
6. That demand varies throughout the day.
7. Various electricity generators use this forecast to plan how much electricity they can provide and at what price.

8. It is completely fungible and must be produced and used simultaneously.

9. They forecast the consumption of electricity in any given hour.

10. Energy is delivered to us from electricity generators.

11. Independent electricity system operators optimize the generation dispatch schedule considering cost, security and transmission constraints.

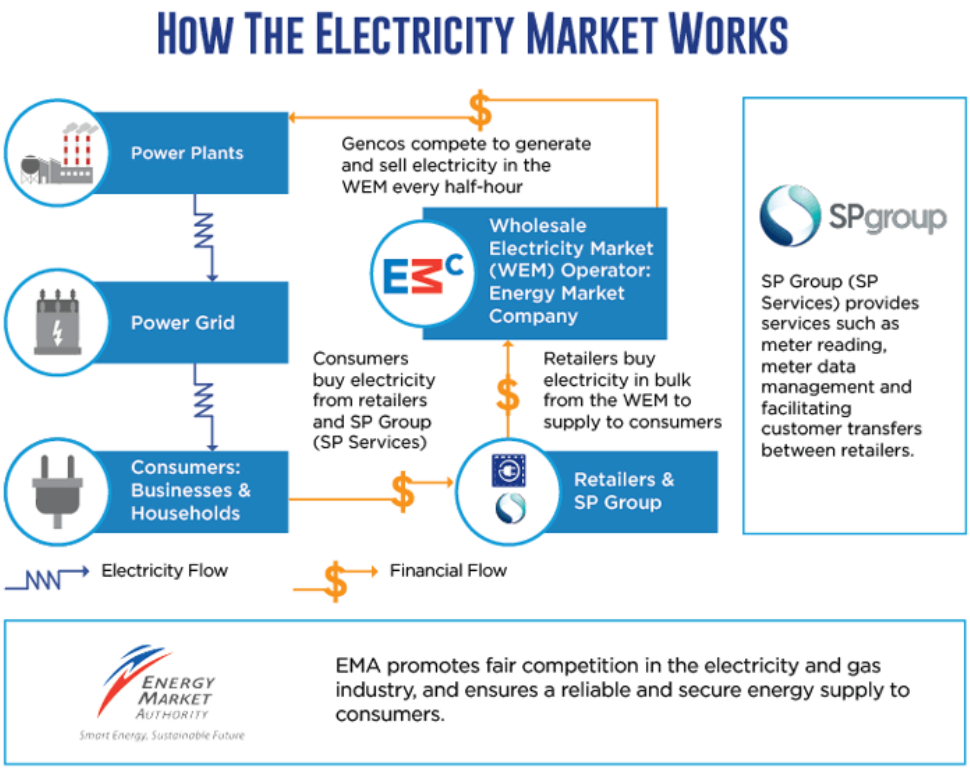
12. The supply must meet the demand exactly in the power grid.

Oral Interaction

16. Work in pairs. The ability to prepare, plan and think ahead is crucial in successful negotiations. Practise in trade negotiations in the role-play (See the Resource Pack, p. 183)

17. Work in pairs. Study the picture below that shows the principle of electicity market operation. Describe to your partner how electricity market works using the following expressions in the given order.

Electricity is produced –- fed to the power grid - independent electricity system operator is responsible for - sold in the wholesale market - two types of electricity network - transmission networks – distribution networks - retailers buy energy in - suppliers work in – customers can choose – energy market ensures



https://cutt.ly/bTjk5A7

18. Work in groups of four. Role-play 'Sources of Energy'.

In this role-play an environmentalist will be discussing the carbon problem with the university students. The students will share their thoughts regarding advantages and disadvantages of renewable and non-renewable sources of energy and their influence on the world around us (See the Resource Pack, p. 188).

19. Work in groups. Analyse pros and cons of electricity deregulation below and discuss them using words/phrases from the Useful language box.

Electricity Deregulation

Pros	Cons
▪ More energy companies to choose from	▪ Prices may not drop as expected
▪ Competition may lead to lower energy prices	▪ Significant administrative costs
▪ Service quality may become better	▪ Lack of energy supply security
▪ Private companies can enter the market	▪ Price rigging to increase energy companies' profits
▪ Monopolies can be avoided	▪ Planning issues
▪ Bigger variety of individual packages	▪ Effectiveness depends on the respective region
▪ Technological progress may be fostered	▪ Competition is not always good for customers
▪ Increasing speed in the energy transition process	▪ Private electricity companies may use loopholes in regulations
▪ Awareness and critical thinking of customers tends to increase	▪ Crucial services should be fully controlled by governments
▪ Faster overall processes	▪ Energy deregulation may pose a problem for poor families
▪ Switch of energy company is easy	▪ Energy companies may have to be rescued with taxpayers' money
▪ Customers can support green energies	▪ People in rural areas may suffer from energy shortages
▪ Free market forces can work properly	▪ Environmental problems

https://environmental-conscience.com/electricity-deregulation-pros-cons

Useful Language

Introduce the advantages:

There are many benefits to / arguments in favour of …

To present viewpoints:

To begin with …./ Firstly, ….Secondly, …. Thirdly, …. etc.

To add viewpoints:

Then …. In addition, …. Furthermore, ….

Moreover, …. Besides, ….

What is more …. Not only … but also….

To present the other point of view:

Some people argue that ….

Contrary to what most people believe ….

As opposed to the mentioned ideas ….

To express opinion:

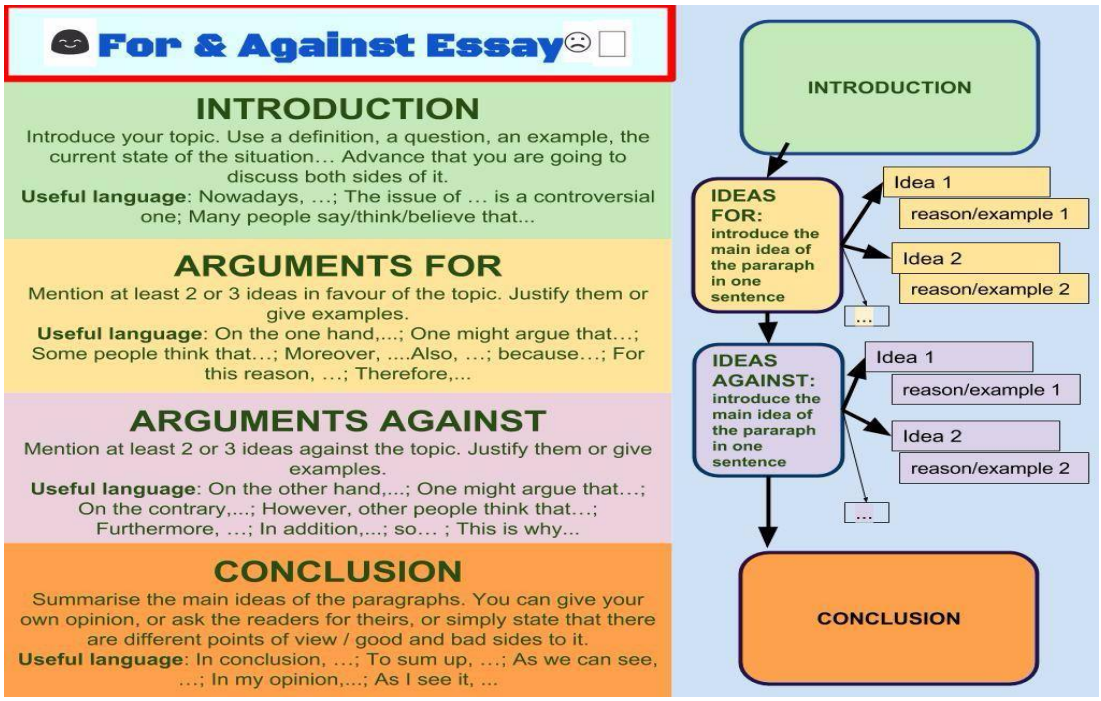
I think …. I believe …. In my opinion ….

It seems to me that …As far as I know …. etc.

Written Production

20. Write a post for a professional networking platform/site summarising your ideas on electricity deregulation from ex. 19. In addition, share your opinion on how electicity deregulation can affect Ukrainian energy market.

21. Write a for-and-against essay (120-180 words) on advantages and disadvantages of energy market liberalisation. Follow the structure and use the linking phrases given below.



https://cutt.ly/xTlpBsj

Self-Check 1.2

Choose the appropriate word to fill in the gaps in the sentences below.

Vocabulary

1. … created the conditions for the entry of new energy providers in the market.

a) Competition b) Transmission c) Liberalisation d)Administration

2. European countries still have different levels of market ….

a) competition b) condition c) environmen d) development

3. In Ukraine energy supply has been a(n) … monopoly comprising production, distribution and trading for a long time.

a) regulated b) administrative c) environmental d) natural

4. A competitive environment in the energy … for electricity and natural gas leads to reduction of energy prices and improves the quality of the provided services.

a) market b) trade c) barter d) exchange

5. The electrical power industry comprises …, transmission and distribution of energy.

a) generation b) manufacture c) liberalisation d) production

Grammar

1. The latest liberalisation package … in the EU energy market in 2009.

a) adopted b) was adopting c) was adopted d) adopted

2. The first oil crisis … in 1973.

a) had been occurred b) was occurred c) was occurring d) occurred

3. A sudden breakdown in electricity supply happened just one week after the purchase contract ….

a) had been signed b) signed c) was signed d) was signing

4. The engineer assured consumers that his team … day and night to remedy the situation.

a) had been working b) was working c) had worked d) worked

5. One of the power plants … severely … during heavy snowfall last winter.

a) was damaged b) had damaged c) was being damaged d) had been damaged

Correcting mistakes

Work in pairs. Do the tasks and discuss the results with your partner.

a) Find 10 mistakes in the passage below and correct them.

There are three traditional bundles in the electrical power industry generations: transfer, distribution, and retail. The power sector has always been a nationalised one and remains so in most parts of the word. However, much countries have liberalised the power sector to allowed inefficiencies that ultimately benefits electric consumers in the form of lower tariffs. Essential, the main power net has been the same directly from power generators thrugh a transmission and distribution system to your bussiness or home.

b) Tell each other about the drawbacks of decentralisation of the energy market and correct vocabulary and grammar mistakes if necessary. Try to use all the following words/expressions. The beginning is given.

However, the decentralisation of the energy market gives rise to …

supplementary commercial markets
wholesale market
retailers
the same source
quality of electricity
consumers
maximum added value
bill payment

Unit 1.3. Energy and the environment

Lead-in

Discuss these questions with your partner.

- *Have you ever thought about protecting the environment?*
- *How does the energy industry affect the environment?*
- *What is the greatest danger?*
- *Do we have enough power to save the Earth?*

https://www.ravifans.com/blog/blogdetail/saveenergy

Reading Comprehension

1. Complete the collocations with the noun a-g. Study their Ukrainian translation. Can you notice any patterns?

	English collocation	**Noun**
1	Oil __ – нафтовий сланець	a) peat
2	open-pit coal __ – видобуток вугілля відкритим способом	b) spawning
3	__ extraction – видобуток торфу	c) exacerbation
4	__ area - нерестилище	d) floods
5	catastrophic __ – катастрофічні повені	e) precipitation
6	__ of problems – загострення проблем	f) shale
7	acid __ – кислотні опади	g) mining

2. Match the adjective with its definition, then choose any five and make sentences of your own.

1. inherent	a) needing someone or something in order to exist
2. unprecedented	b) involving risk or danger
3. dependent	c) able to produce good crops
4. insurmountable	d) associated with or requiring the use of the mind
5. fertile	e) too large or difficult to deal with
6. hazardous	f) existing as an essential constituent or characteristic
7. rational	g) never having happened before

3. Skim the text about the impact of electricity production on the environment and answer the following questions.

1) What are the main sources of energy available today?

2) What negative consequences is the use of renewable energy sources associated with?

Impact on the environment caused by the production of electrical energy

Energy consumption is inherent in almost all types of human activity, namely, home heating, cooking, moving vehicles, industry, agricultural production, etc. The development of diverse types of energy on a global scale has led to an unprecedented increase in living standards.

Today's people are very energy dependent. We do not think about where the energy comes from, until we turn off the light or the heating. If this happens, we cannot fully live or work.

The main sources of energy available now to humans can be classified as follows:

- fossil fuel (coal and oil shale, oil, natural gas);
- nuclear and thermonuclear energy;
- renewable energy resources (energy of water, wind, sun, thermal waters, wood, peat, etc.).

Energy production significantly affects the state of environment.

Combustion of fossil solid and liquid fuels is accompanied by the release of sulphur, carbon dioxide and carbon monoxide, as well as nitrogen oxides, dust, soot, and other pollutants.

Open-pit coal mining and peat extraction lead to changes in natural landscapes and sometimes – to their destruction. Oil and oil product spills during production and transportation can destroy all living things in huge areas (water areas).

Very bad impact on the landscape, flora and fauna is produced by the infrastructure necessary for coal, oil, and gas production.

Construction and operation of large hydroelectric power plants leads to: resettlement of people from the flooding zone, destruction of valuable fish species, for which dams become insurmountable obstacles on the way to spawning area, loss of forests and high-fertile lands, increased risk of destructive earthquakes in the foothills and mountain areas, increased risk of catastrophic floods in areas downstream, change of landscapes and their destruction.

Nuclear power is potentially dangerous because of possible accidents at power plants, accompanied by the release of radioactive materials into the environment. In addition, there are problems of nuclear waste processing and disposal, which are very expensive and do not have a reliable engineering solution. Nuclear waste remains hazardous for hundreds and thousands of years. This topic is especially relevant for Ukraine, which suffered from the consequences of the Chernobyl nuclear power plant explosion.

Despite the obvious advantages, renewable energy sources can also have a negative impact on the environment. The operation of plants producing energy from renewable energy sources is associated with the withdrawal from circulation of significant land plots and is likely to be accompanied by some negative consequences for the environment in the future: landscape changes (windmills, solar panels), increased noise (wind turbines), soil pollution (geothermal power plants and biomass plants), harmful effects on other natural resources (tidal power plants).

In recent years, global politicians and people have expressed concerns about the exacerbation of global environmental problems – such as acid precipitation, climate change and the impact of these processes on the environment.

Considering the above situation, energy saving can be considered a rational decision. It should become a priority in the development strategy of any country because the reserves of traditional energy sources are limited.

Taken from http://energopostachalnyk.com/en/electricity/environmental-impact/

4. Work in pairs. Read the text and explain the meaning of highlighted words/expressions so that your partner could guess them.

5. Read the text again and decide whether the statements are true or false and correct them if necessary.

1. Living standards are directly proportional to energy consumption.
2. Extraction, mining and combustion of fossil fuels destroy the surface of the earth.
3. Surrounding area of hydroelectric power plants is destructed.
4. There are no reliable technologies of nuclear waste storage.
5. The use of renewables has negative consequences for the environment.
6. Lack of traditional energy sources is a matter of concern for people globally.

6. a) Work individually. Use the prompts to make questions. Change the form of the verb, add the auxiliary one and the proper prepositions if necessary.

b) Work in pairs. Ask and answer the questions with your partner.

1. In what types / human activities / to be / energy / consume?
2. How / energy production influence / the environment?
3. What / open-pit coal mining, peat extraction, oil and oil product spills lead /?
4. How / construction and operation / hydroelectric power plants affect the surrounding area?
5. Why / to be / the topic / nuclear power especially relevant / Ukraine?
7. What environmental problems / to be / to be / solve / in the near future?

Language in Use

7. Different forms of these words appeared in the text above. Practise word formation:

a) form nouns from verbs: to consume, to produce, to act, to classify, to depend, to extract, to dispose, to express, to precipitate, to circulate.

b) form adjectives from nouns: globe, agriculture, significance, value, hazard, destruction, catastrophe, explosion, advantage, harm.

8. Form a different part of speech of the words in bold by changing only <u>one</u> letter in them and complete the sentences.

1. We are all … on nature like a child is his mother's **dependant**.

2. Scientists **advise** us to start saving our planet. Unless we follow their …, we'll completely destroy it.

3. We won't be able to … fresh air or take at least one deep **breath** without harm for our health.

4. All types of human activity **affect** harmfully on our health. Hazardous … of pollutants leads to early death.

5. We should … saving technologies and apply rational decisions in **practice**.

9. Read the text about the impact on the atmosphere of thermal power plants and choose the word a), b), c) or d) which best fits the space to complete the information.

Thermal power plants are known to pump out a lot of … (1) gases and ash, which are by-products of burning the fossil fuels. Whilst some … (2) power plants do use solar or nuclear energy; they are heavily reliant on fossil fuels.

Carbon dioxide is one of the main gases that is released from the burning of the fossil fuels and is known to be a greenhouse gas and a … (3) of global warming. Out of all the gases released from a thermal power plant, carbon dioxide is the main one, and thermal power plants are the main contributors to the increased carbon dioxide levels … (4) the world.

Sulphur dioxide is another gas that is … (5) from power plants. Whilst it is technically not a greenhouse gas, it is known to have indirect effects on the atmosphere because it can … (6) the scattering of incoming sunlight, the formation of clouds and precipitation patterns. So, in many cases, it is considered an indirect greenhouse gas. Sulphur dioxide forms sulphuric acid in the atmosphere. This can then return to Earth as acid rain and impact various ecosystems. The level of sulphur dioxide released from thermal power plants depends on the … (7) of sulphur in the coal that is used - where the coal used has … (8) average between 0.1 and 3.5% sulphur depending on which type is used. Thermal power plants are also the largest emitters of sulphur dioxide worldwide.

Nitrogen oxides are another set of gases that are released to the atmosphere by thermal power plants. Thermal power plants are also one of the biggest contributors

to the global nitrogen oxide levels. Unlike nitrous oxides, nitrogen oxides are again not technically greenhouse gases, but they do have an indirect effect on the atmosphere. Nitrogen oxides are known … (9) visibility and respiratory issues, and they can also combine with other atmospheric gases and … (10) to form acid rain and smog.

1	a) greenhome	b) green house	c) greenhouse	d) hotbed
2	a) warmth	b) thermal	c) thermic	d) heat
3	a) contribute	b) contributory	c) contribution	d) contributor
4	a) though	b) throughout	c) through	d) across
5	a) released	b) issued	c) vented	d) ejected
6	a) act	b) result	c) effect	d) affect
7	a) magnitude	b) quantity	c) amount	d) volume
8	a) on	b) in	c) at	d) as
9	a) present	b) to present	c) presenting	d) presented
10	a) moisture	b) wetness	c) humidity	d) dampness

9. Read the text below and choose (from A to G) the option which best fits the space. There are two options you do not need.

Environmental Problems

Our environment is constantly changing. There is no denying that fact. However, as our environment changes, … (1) of the problems that surround it. With a massive influx of natural disasters, warming and cooling periods, different types of weather patterns and much more, people need to be aware of … (2).

Global warming has become an … (3) our planet is warming up and we are definitely part of the problem. However, this isn't the only environmental problem that we should be concerned about. All across the world, people are facing a … (4) every day. Some of them are small and only affect a few ecosystems, but the others are drastically changing the landscape of what we already know.

Our planet is poised on the brink of a severe environmental crisis. Current environmental problems make us … (5) now and in the future.

A … vulnerable to disasters and tragedies, …

B … undisputed fact about our current livelihoods; …

C … we address the various issues …

D … so does the need to become increasingly aware …

E … wealth of new and challenging environmental problems …

F … require urgent attention.

G … what types of environmental problems our planet is facing.

Grammar Revision

FUTURE FORMS:

Use **the Future Continuous** to talk about unfinished action in progress at a time in the future. It often refers to future events that are fixed or expected.

The form is: *will* + ... + ...

Use **the Future Perfect Simple** to talk about an action that will be completed before a certain time in the future.

The form is: *will* + ... + ...

Use **the Future Perfect Continuous** to talk about how long an action will have been in progress before a certain time in the future.

The form is: *will* + ... + ... + ...

1. Read the sentences below paying attention to the future verb forms in bold.

a. Rewrite the sentences in the negative. Think about the state of the environment ten years from now and decide which alternative is more likely.

In ten years' time:

1. People **will have solved** the problem of CO_2 emission.
2. We **will be using** only green energy.
3. Under an enhanced transparency framework (starting in 2024) countries **will have been reporting** on actions taken and progress in climate change mitigation, adaptation measures and support provided or received for 8 years.
4. Plants and factories **will still be reducing** combustion of fossil fuels.
5. Natural resource depletion **will have led** to an energy crisis.
6. The average global temperature **will have been rising** by approximately 0.1 to 0.3 Celsius degrees each year for a decade.

b. Decide which sentences refer to each of the future form. Complete the forms in the box above.

2. Study about Future Tenses (p.205) and write 9 sentences of your own for each rule using the vocabulary of the unit.

3. Complete the text with the Future Continuous, Future Perfect and Future Perfect Continuous forms of the verbs in brackets.

The Bridgestone Group's long-term (2050 and beyond) vision is to contribute towards carbon neutral. One of the representatives told us, 'The Group … (work) with customers and partners to reduce CO_2 emissions based on scientific modelling of climate trends, emission reduction called for in the Paris Agreement, and other expectations of global society in the next 10 years. Therefore, we … continually … (improve) energy efficiency in operations to reduce total energy consumption. As a result, by 2030 we … (reduce) our absolute CO_2 emissions by 50%. Moreover, the lifecycle and value chain of our products and services … (exceed) 5 times our operation's CO_2 emissions by 2030. In 2050 we … (promote) manufacturing and engineering innovation for more than 30 years to achieve our goals.'

QUANTIFIERS: all, whole, each, every and both			
	+ noun	+ of + my/the, etc. + noun	+ pronoun
all	all the countries	all (of) the countries	all of them
whole	the whole country	the whole (of) my country	the whole of it
each	each country	each (one) of the EU countries	each (one) of them
every	every country	every one of the countries	every one of them
both	both countries	both of these two countries	both of them

DETERMINERS: *Other /another*
Another means additional, an extra one.
Other/another means different, besides this/these.
Other countries means 'different countries'.
Another country means 'an additional or a different' country.

The other refers to a thing/person that has already been mentioned.
The others refer to things/people that have already been mentioned.
Others can also be used to mean (the) other people/things.

4. Read about some quantifiers and determiners and choose the correct option in each sentence.

1. Out of **all the/the whole** gases released from a thermal power plant, carbon dioxide is the main one.

2. Nitrogen oxides are known to present visibility and respiratory issues, and they can also combine with **another/other** atmospheric gases.

3. Some of environmental problems are small and only affect a few ecosystems, but the **other/others** are drastically changing the landscape of what we already know.

4. **Each/every** of the EU countries signed the Paris Agreement.

5. More than 500 species of land animals are on the brink of extinction and are likely to be lost within 20 years; the same number were lost over **the whole/all** of the last century.

Translation Practice: Ukrainian into English

10. Translate the sentences using Future forms and determiners from the unit.

1. Те, що США вийшли з Паризької угоди означає, що країна збільшить викиди вуглекислого газу щонайменше на 3% до 2030 року.

2. В цей час наступного року Україна буде скорочувати споживання енергії з викопних видів палива.

3. В 2050 році вітряна та сонячна енергія будуть забезпечувати 56% світового енергетичного балансу.

4. Країни-лідери досягнуть 80% використаня альтернитивних джерел в балансі кожної з країн до 2050 року.

5. Енергетична криза все ще буде поглиблюватись в наступні кілька років в усьому світі.

6. В 2030 вже буде більше 20 років як Україна розвиває свою «зелену» енергетику.

7. Весь світ сподівається, що цілі, визначені Паризькою угодою, будуть досягнуті до 2030 року.

8. В цей час наступного місяця ми обидва будемо виступати на конференції з проблем довкілля зі спільною доповіддю.

Listening Comprehension

11. Watch the video 'Green Growth Indicators' (https://www.youtube.com/watch?v=cKkFV6i57ac) and do the following tasks.

Before watching the video:

a) Discuss the following questions with your partner:

1. Why is it necessary to protect the environment?

2. Who should protect it?

3. What is the most urgent problem today?

b) Match words and collocations with their meanings.

1	to align	a) a hypothetical description of a complex entity or process
2	policymaker	b) promote the growth of
3	framework	c) a connected series or group
4	to decouple	d) things that a company owns, that can be sold to pay debts
5	to foster	e) be or come into adjustment with
6	asset	f) separate one from another
7	accountability	g) responsibility to someone or for some activity
8	nexus	h) someone who decides what an organisation's or government's policies will be

12. Watch the beginning of the video (00.00-01.08) and mark the intonation in the questions (up or down), mark the stressed words.

1. How can we know that our growth is green?

2. Are we becoming more efficient in using natural resources and environmental services?

3. Is the natural asset base of our economies being maintained?

4. Does the green growth generate benefits for people?

5. How does green growth generate economic opportunities?

13. Continue watching (01.08-02.18) and state if the following sentences are true or false. Correct the false ones.

1. The measurement framework has been spread all over Europe and beyond it.

2. The set of green growth indicators helps policymakers stimulate economic growth and well-being.

3. The six countries of Eastern Europe have also developed their green growth indicators.

4. The indicator for CO_2 productivity demonstrates the decrease of carbon dioxide emissions in the EAP region.

5. This indicator shows that the economy depends on CO_2 emissions.

14. Watch the video up to the end (02.18-03.50) and complete the sentences with necessary information.

1. Azerbaijan, Moldova and Ukraine demonstrate progress in ….
2. Out well-being relies upon the resources and ….
3. Informed decisions increase public awareness about the links between ….
4. The EU supports the EAP countries to monitor progress at ….
5. Today's green growth indicators … tomorrow.

Oral Interaction

15. Work in pairs. Choose two quotations below and say to what extent you agree with them. Search for the information about the author of the quotation on the Internet and start your talk with it.

We need to stop using fossil fuels as soon as possible. Unfortunately, the two leading replacements of wind and solar have emerging health and environmental problems.

Steven Magee

All of our current environmental problems are unanticipated harmful consequences of our existing technology. There is no basis for believing that technology will miraculously stop causing new and unanticipated problems while it is solving the problems that it previously produced.

Jared Diamond

The environmental problems of developing countries are not the side effects of excessive industrialisation but reflect the inadequacy of development.

Indira Gandhi

Reliable and affordable energy is essential for meeting basic human needs and fueling economic growth, but many of the most difficult and dangerous environmental problems at every level of economic development arise from the harvesting, transport, processing, and conversion of energy.

John Holdren

16. Work in pairs. Role-play '<u>Buying and Selling a Solar Panel</u>'.

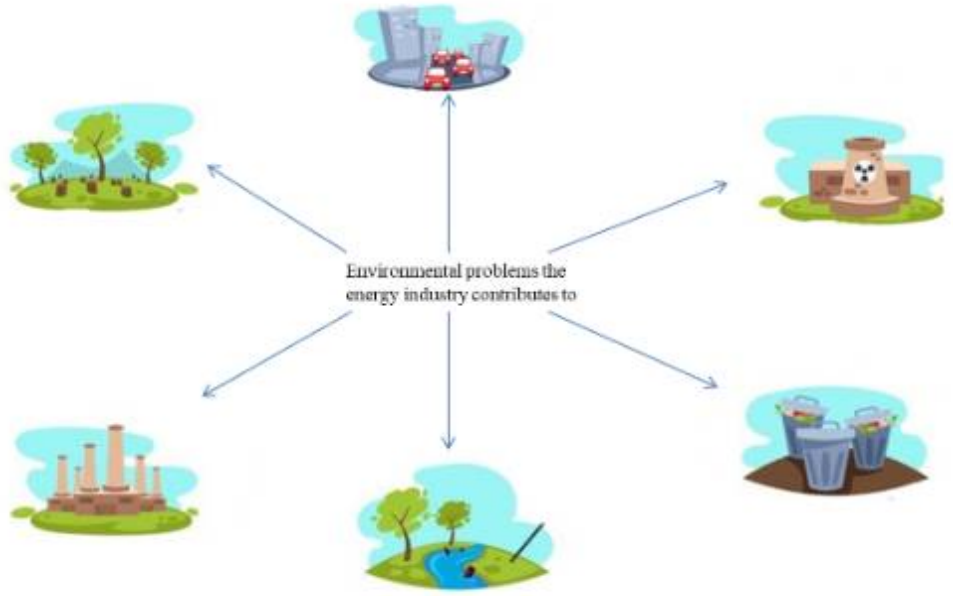
You are a Seller working for the company 'Solar World' and your partner is a Buyer. Your primary goal is to persuade the Buyer to sign the contract and purchase your product – solar panels (See the Resource Pack, p. 184).

17. Environmental problems map. Follow the instructions:

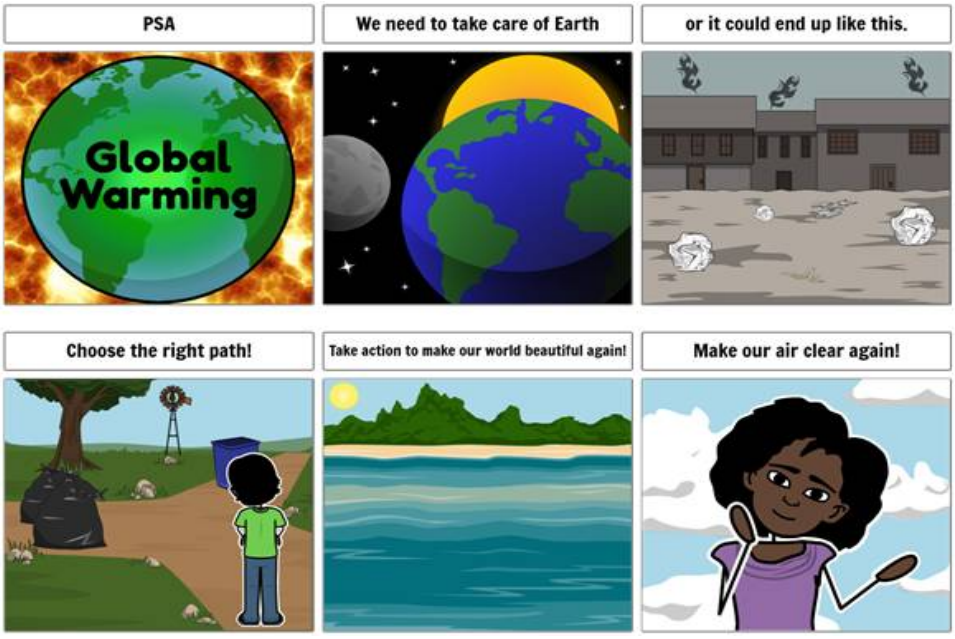
1. You are going to work in pairs. Complete the mind map with environmental problems the energy industry contributes to. You can add more if you like. The main requirement is to explain the problems in terms of energy industry impact.

2. Compare your mind-map with another pair of students.

3. In groups of four, discuss which of the problems are the most urgent and what people can do to solve them.



18. Work in groups. PSA stands for public service announcement. Look at the pictures and create your story (3-min talk) to attract people's attention to the problem of global warming.



https://cutt.ly/4IZ4Huz

Useful Language
Introducing the topic Have you ever thought about/considered/wondered/how/why/what …? The major/key/most urgent problem is …. You may be wondering why I've chosen to talk about … today. Well, let me explain …
Introducing familiar information You are (probably) all familiar with … You may be aware that … You may already know that … Perhaps you have heard of/about …
Introducing surprising information Most people/of you aren't aware of/don't realise … … but did you know that …? You might not know that …
Expressing your opinion to summarise the topic I believe/think, … In my opinion/view, … I strongly believe… I feel that… As far as I am concerned, … It seems to me that…etc.

Written Production

19. Use this text as a prompt for writing an email to the authorities to attract their attention to the problem of natural resources depletion. Use the expression from the Useful Language box above.

Another crucial current environmental problem is the depletion of natural resources. We humans use so many natural resources that it would need almost 1.5 earths to cover all our needs. Increased use of natural resources leads to a number of other environmental issues such as industrialisation, population growth, and air pollution. Overtime natural resource depletion will lead to an energy crisis. The chemicals emitted from many natural resources contribute to climate change. Fossil

fuel consumption results in the emission of green house gases which is primarily responsible for global warming and climate change.

Globally, people are making efforts to shift to renewable sources of energy like solar, wind, biogas, and geothermal energy. Hence, the cost of installing the infrastructure and maintaining these sources has plummeted in recent years.

20. Watch the TED lecture 'How wind energy could power Earth 18 times over' (https://cutt.ly/tOLJYew) and write a summary of the information given by the speaker. Do not insert any of your own opinions, interpretations, deductions or comments into a summary.

Note: There are many ways to end your summary: 1) to point toward the future; 2) to say why the infomation was so important; 3) to repeat what you said earlier.

21. You are invited to take part at the international students' conference 'Emerging of climate-friendly technologies for the energy sector'. Study the modern research into the issue of climate-friendly technologies in Ukraine.

Prepare the report and write a paper for this conference (1-2 pages, Times New Roman 14, single spacing). Comply with the requirements/advice given in the Resource Pack (p. 191).

WRITING FOCUS

Structure of a conference paper:

- Introduction
- Objectives
- Materials and methods
- Results and discussion
- Conclusions

Self-Check 1.3

Choose the appropriate word to fill in the gaps in the sentences below.

Vocabulary

1. Renewable energy sources can also have a negative … on the environment.

a) pressure b) impact c) affect d) reaction

2. Keeping the rise in global temperature below 2 degrees Celsius requires carbon … economy in the second half of the century.

a) dependent b) rational c) inherent d) neutral

3. Although the need to prevent dangerous … was globally recognised, some nations failed to reach any legally binding agreements.

a) warming b) heating c) burning d) heat

4. Climate experts strongly suggest that all industrial countries need a global push for action to reduce greenhouse gas ….

a) exhaustion b) radiation c) release d) emissions

5. Earth's climate change is modifying … levels and exacerbating disaster risks.

a) catastrophe b) disaster c) hazard d) trouble

Grammar

1. Experts expect that our environment … from human activity in the next 5 years.

a) will suffer b) will still be suffering c) will have suffered d) will have been suffering

2. Putting economies on a path towards carbon neutrality … greatly to progress towards sustainable development by 2030.

a) will have contributed b) will be contributed c) will contribute d) will be contributing

3. The participants of climate change meeting are urged to carefully consider … the economic impact of passing environmental legislation as well as the potential cost of not acting on this issue.

a) each of b) both c) every d) all

4. At the environmental conference a group of young participants made a strong effort to question other groups and used good reasoning in debating with ….

a) another b) other c) the others d) others

5. Achieving the transformation to energy-smart system … better policy coordination and a global partnership.

a) will have been required b) will be requiring c) will require d) will have required

Correcting mistakes

Work in pairs. Do the tasks and discuss the results with your partner.

a) Put down the answers to the questions given below.

b) Exchange your answers, identify both vocabulary and grammar mistakes and correct them.

1. How many natural resources do humans use?
2. What will natural resource depletion lead to over time?
3. Why has the cost of switching to renewable sources of energy plummeted in recent years?

Unit 1.4. Writing an engineering CV

Lead-in

Discuss these questions with your partner.

- What is a CV? Why is it essential when you apply for the job?
- What parts does a typical CV comprise?
- What is the difference between a CV and a resume?

https://the-steppe.com/razvitie/pravila-idealnogo-rezyume-7-sovetov-professionala

Reading Comprehension

1. Match the words 1-10 and a-j to make collocations. Find their Ukrainian equivalents in column B.

A		B
1. memorable	a) environment	професійна фотографія
2. potential	b) points	професійна кваліфікація
3. professional-looking	c) effect	супроводжувальний лист
4. working	d) CV	досвід роботи
5. professional	e) search	позитивний вплив
6. work	f) employer	робоче середовище
7. relevant	g) letter	пошук роботи
8. positive	h) experience	резюме, що запам’ятовується
9. cover	i) photo	важливі моменти
10. job	j) qualifications	потенційний роботодавець

2. Match the word with its definition, then choose any five and make sentences of your own.

1. skills	a) in a simple and tidy way
2. responsibilities	b) printed symbols, usually small black circles, used in a text to separate items in a list
3. neatly	c) to bring attention to something interesting or most important
4. selective	d) abilities that have been acquired by training
5. to highlight	e) to persuade someone to do something
6. to exaggerate	f) characterised by careful choice
7. bullet points	g) something that you must do as part of your job or duty
8. to encourage	h) to make something seem better, larger, worse, etc. than it really is

3. Pronounce the words and arrange them according to the sound you hear. You can use one word in two sections.

search, impression. change, information, attach, encourage, qualifications, project, check, application, exaggerate, achievements, professional, children, manage

[ʃ]	[ʧ]	[ʤ]

4. Read the text about writing a good CV. Which tips do you think are the most important?

Writing a good CV

When you're looking for work, you need an attractive, clear and memorable CV (curriculum vitae) that shows your potential employer all the skills and experience you have for the job.

What should you include in a CV?

This article mainly focuses on writing a UK-style CV. If you're applying for a job internationally, be aware that the standard length, format and tone can vary from country to country. It's a good idea to check the expected format in the country or company you're applying to.

Contact details

Make sure the potential employer has a way of contacting you. Include your full name, telephone number and email address.

Photo

In many countries, employers expect to see a professional-looking photo on a CV. In others, like the UK, Canada and the USA, the law prohibits employers from asking for a photo, and it is better not to include one. Try to find out if it is usual to include a photo in the working environment you're applying to.

Education

List and date the most important qualifications you have obtained, starting with the most recent. You can also include any professional qualifications you have.

Work experience

List and date the jobs you've had and the companies you've worked for, starting with the most recent. It's usually enough to cover the last ten years of your work history. Include your job title, responsibilities and achievements in the job.

If you have a lot of work experience, give the job titles but be selective about which responsibilities and achievements you highlight. Reduce the detail about jobs that are less relevant to the role you're applying for and draw attention to the most important experience you bring.

Skills

These could include the languages you speak, the computer programs you can use well, the class type of your driving licence and any other professional skills you might have that are relevant to the job you're applying for.

Eight useful tips

Before you start getting ready to list your qualifications and work experience, here are eight useful tips to think about.

1. Keep it short … but not too short!

Your CV should be one to two sides of A4 paper. If you find you've got too much information, summarise and select the most relevant points. If it's shorter than

a page, consider including more information about your skills and the responsibilities you had in your previous roles.

2. Use active verbs.

When you describe what you have achieved in previous jobs, use active verbs for a strong positive effect on the reader. For example, to make a change from *was responsible for*, use verbs like *led* or *managed (a team / a project)*, *created* or *developed (a product / a positive atmosphere)*, *delivered (results / training)*, and *provided (support / training)*.

3. Fill in the gaps.

Avoid leaving gaps in your employment history. If you were travelling the world, on maternity leave or looking after small children, include that in your CV.

4. Make sure it's up to date.

Always ensure your CV is up to date. Include your most recent experience at the top of each section.

5. Don't exaggerate or lie.

Your potential employer can easily check information about where you have studied and worked. Don't be tempted to lie or exaggerate about your expertise, because sooner or later this will be discovered and may result in you losing the job.

6. Spend time on the layout.

Make sure your CV is clear and easy to read. Use bullet points and appropriate spacing, keep your sentences short, line up your lists neatly and use a professional-looking font (e.g. Arial font size 12).

7. Check for mistakes.

Mistakes on a CV create a bad impression. Use spell check, reread your CV and ask someone else to check it for you too before you send it.

8. Include a cover letter.

When you send your CV to apply for a job, you should send it with a cover letter or email to introduce your application. The cover letter should show your personal interest in the role, highlight the skills and experience you bring and encourage the employer to read the attached CV.

Writing a good CV takes time and is hard work, but these tips and your effort will help you get the best possible start in your job search. Good luck!

Taken and modified from
https://learnenglish.britishcouncil.org/business-english/business-magazine/writing-a-good-cv

5. Decide whether the statements are true or false and correct them if necessary.

1. It is better to focus on writing a UK-style CV when you apply for work.
2. It is necessary to include a professional-looking photo.
3. When you describe your work experience, you should always start with your first job.
4. You should write as long CV as possible to present all your skills and qualifications.
5. When writing about your achievements it is better to use active verbs rather than passive structures to create a good impression.
6. If you have a lot of work experience, write about all the jobs you had in detail.
7. If you were not paid at work, it is better not to mention it.
8. You can exaggerate a bit about your expertise to create a better impression.
9. Your CV should be easy to read and well-written, without spelling or grammar mistakes.
10. A cover letter is not entirely necessary.

6. a) Work individually. Use the prompts to make questions. Change the form of the verb, add the auxiliary one and the proper prepositions if necessary.

b) Work in pairs. Ask and answer the questions with your partner.

1. What / a good CV show your potential employer?
2. What CV style / be / it better to focus /, if you / be /apply / for a job internationally?
3. What contact details / be / it necessary to include?
4. Where / the law prohibit employers / asking / a photo?
5. What should you start / when listing the jobs and the companies you / work / for?
6. How / be /responsibilities and achievements / highlight?
7. What skills could be / include / into your CV?
8. How long / be / a good CV?
9. What grammar structures / be / use / to describe your achievements?
10. be / it possible to lie or make mistakes / your CV?

Language in Use

7. Fill in the preposition from the box and translate the collocations. There are two extra prepositions. Then choose any five and make sentences of your own.

to (×2) / about / with /through/ at / up /on (×2) / for

	Collocation	Translation
1.	To look … work	
2.	To focus … writing	
3.	Mistakes … CV	
4.	To be relevant … the role	
5.	Information … your skills	
6.	… the top of each section	
7.	Easy … read	
8.	Line … your lists neatly	

8. There are three basic CV formats to choose from:

- *The reverse-chronological CV format*
- *The functional (skill-based) CV format*
- *The combination CV format*

Read the text below and choose the word a), b), c) or d) which best fits the space to complete the information about each of three basic CV formats.

The __ (1)-chronological CV format is the most popular and universal. It's suitable for those who'd like to __ (2) their relevant work experience and education on a CV. Your latest job is the first one to be listed.

Yet, this format for CV exposes all career __ (3). So, it might not be suitable for you if you've had some and would __ (4) the recruiter didn't pay attention to them. It's also not the best for career changers as its primary focus is on the relevant job experience.

The functional CV format is the go-to format of CV for those who'd like to bring their skills to the fore. Also, it __ (5) the recruiter's attention from your work history, which is especially useful if you want to blur __ (6) gaps in employment.

The recruiters *know* that a candidate chooses the functional CV to hide something. So, use this *curriculum vitae* format only if you have a good reason not to choose any other. Plus, making the functional CV format is quite laborious and time-consuming as you need to come __ (7) with a perfect skill set for a particular job.

The combination CV format is ideal for __ (8) changers and experienced professionals. It brings together the best elements of the functional CV format (i.e. focus on __ (9) skills), and the reverse-chronological CV format (i.e. focus on experience and achievements).

On the downside, this *curriculum vitae* format isn't suitable for everybody. To make the most of it, you have to be __ (10) a highly experienced specialist in your field or a changer with a strong skill set. Plus, just like the least advisable functional CV format, this one takes a lot of time to prepare as you need to think of how to best link your skills to your professional experience.

1	a) inverse	b) invert	c) reverse	d) opposite
2	a) highlight	b) pint out	c) list	d) distinguish
3	a) clearances	b) gaps	c) intervals	d) space
4	a) love	b) better	c) like	d) rather
5	a) detracts	b) attracts	c) diminishes	d) draws
6	a) up	b) over	c) out	d) down
7	a) in	b) up	c) back	d) on
8	a) occupation	b) work	c) job	d) career
9	a) transferable	b) transferring	c) transformation	d) transfer
10	a) or	b) both	c) either	d) neither

9. Define the basic CV formats according to their overviews and the text above. Discuss what similarities and differences they have.

1		• Focuses on your relevant skills • Presents your work history in the reverse-chronological order • Great for career changers and seasoned pros alike
2		• Focuses on your transferable CV skills • Helps you hide employment gaps • Good for creatives and career changers
3		• Has a recognisable and easy-to-follow layout • Highlights your work experience and professional achievements • Works great for all experience levels

Grammar Revision: Focus on Gerund vs Infinitive

GRAMMAR FOCUS I
1. Verb + -ing: ____ 2. Verb + to-infinitive: ___ 3. Verb + object + to-infinitive: ___ 4. Verb + object + infinitive without to: ___ 5. Modal verb + infinitive without to: ___

1. Read the sentences and complete the table above with the verb patterns in bold.

1. Students of our University **tend to choose** engineering professions.
2. You **should use** active verbs for a strong positive effect on the reader.
3. John **considers including** more information about your skills and the responsibilities because his CV is too short.
4. The cover letter **enables the applicant to show** his interest in the role.
5. A good CV will **let you get** the best possible start in your job search.

2. Match the verbs in the box with verb patterns 1-5 in GRAMMAR FOCUS I. Check the list in the Resource Pack, p. 206 if you are not sure.

refuse ☐	make ☐	admit ☐	can't afford ☐	should ☐
can't help ☐	arrange ☐	allow ☐	can ☐	avoid ☐
encourage ☐	must ☐	keep ☐	let ☐	warn ☐

GRAMMAR FOCUS II	Infinitive	Gerund
Indefinite (Active)	to do	doing
Indefinite (Passive)	to be + done	being + done
Continuous (Active)	to be + doing	----------
Perfect (Active)	to have + done	having + done
Perfect (Passive)	to have + been + done	having + been + done
Perfect Continuous (Active)	to have + been + doing	----------

3. Use the proper form of either the Gerund or the Infinitive given in brackets. Look at the GRAMMAR FOCUS II above if you are not sure. Each of the ten forms should be used only once. Translate the sentences.

1. We didn't know about his … (obtain) so good qualifications.
2. The cover letter should … (send) together with your CV.
3. … (write) a good CV is hard and time-consuming work.
4. Sometimes employers expect … (see) a professional-looking photo on a CV.
5. Before … (send) your CV should be checked by someone else.
6. After …(ask) so many questions about his soft skills, he was offered the job.
7. ABB company is known … (work) in Ukrainian market for many years.
8. The student seems … (work) hard on his project to finish it on time.
9. You should … (check) your CV twice before sending it to the employer.
10. He is known … (offer) a job.

GRAMMAR FOCUS III

Verb patterns – change in meaning

You can use *remember, forget, regret, stop* and *try* with the –ing form or to-infinitive, but with a change in meaning.

I remember writing my CV. Sadly, I didn't remember to send it.

Tom will never forget being invited to his first interview. However, he forgot to take his CV.

Jane stopped writing her CV because it was late. She stopped to drink a cup of coffee.

She regretted sending her CV without checking. We regret to inform you that we do not have vacancies.

If you can't write a CV, try reading some tips on the Internet. Tom tried to help Jane, but she didn't need his advice.

Verb pattern – without change in meaning

You can use *begin, start, continue, propose, bother and intend* with the –ing form or to-infinitive without a change in meaning.

He intends using/to use tips for writing his CV. They continued discussing/to discuss it.

4. Complete the sentences with the correct form of the verb in brackets. Then tick the sentences where both forms are possible. Which sentences are true for you?

1. I often forget … (return) the books to the library.
2. I will never forget … (write) my first cover letter.
3. I always stop … (talk) when the lecturer enters the classroom.
4. I usually stop … (greet) my neighbours.
5. If I don't know how to mend the device, I try … (read) the instruction.
6. When my fan broke down, I tried … (read) the instruction but it didn't help.
7. I began … (study) English when I was at school.
8. Our teacher always proposes … (discuss) some interesting questions.

Translation Practice: Ukrainian into English

10. Translate the following sentences into English paying attention to the forms of the Gerund or Infinitive.

1. Написання резюме дозволило мені подивитись на мої професійні навички з іншого боку.

2. Потенційний роботодавець повинен мати спосіб з тобою зв'язатись.

3. Не варто брехати, коли ти подаєш заяву на працевлаштування тому, що рано чи пізно це відкриється.

4. Найкращим початком для пошуку роботи є написання успішного резюме.

5. Наш викладач завжди заохочує студентів вивчати англійську.

6. Мій друг почав працювати на цю компанію два роки тому.

7. Я перестав ходити на вечірки тому, що мені потрібно добре вчитись.

8. Я забув надіслати супроводжувальний лист разом з резюме, коли подавав заяву на працевлаштування.

9. Після того як ти вибрав всі свої навички та досягнення для резюме, тобі необхідно скоротити деталі, які не стосуються обраної посади.

10. Мої батьки хочуть, щоб я став інженером після закінчення університету.

Listening Comprehension

11. Watch the video 'How to write CV with no experience' (https://www.youtube.com/watch?v=7xMI_leue1I) and do the following tasks.

Before watching the video:

a) Discuss the following questions with your partner:

1. Is it possible to write a good CV if you do not have any experience?
2. Which format is it better for the applicant without experience?
3. Are hobbies and interests worth including into your CV and why?

b) Match words and collocations with their meanings.

1	Career ladder	a) they are not part of the course that a student is doing at school or college
2	Transferable skills	b) a carefully planned piece of work to get information about or to improve smth relating to

		education at college or university level
3	Volunteering	c) knowledge or skill that you get from doing av activity just for pleasure, not as your job
4	Extracurricular activities	d) a series of levels which someone moves up and down within an organisation, profession, or society.
5	Academic project	e) knowledge or understanding of issues related to business
6	Amateur experience	f) ability to adapt to the cultural environment fast and easily
7	Commercial awareness	g) abilities which can be transferred from one context to another
8	A good cultural fit	h) doing something without expecting any reward or payment

12. Watch the first half of the video (00.00-01.23) and state whether the statements are true or false. Correct the false ones.

1. Such skills as communication, leadership and research can be transferred from one context to another.

2. Technical skills are gained from extracurricular activities or volunteering.

3. Technical skills are more important than transferable skills for the employer.

4. If you don't have much or any relevant work experience, a functional CV may suit you.

5. Recruiters usually study each CV rather carefully.

13. Continue watching the video (01.24-02.45)

a) Complete the sentences with necessary information.

b) Underline the examples of Gerund and Infinitive in the sentences. Explain their usage.

1. Don't compensate for lack of experience by … your CV.

2. Keep your CV concise by … one-line bullet points.

3. Remember … key words from the job description and a hobbies and interests section towards your CV.

4. Employers expect you … well informed about the industry news.

5. Don't forget … publications and podcasts you subscribe to.

6. Avoid …, as you can be asked industry news-specific questions at the interview.

Oral and Written Interaction

14. Choose the best CV format depending on your professional situation (use information from exercises 8 and 9).

a) Start with asking yourself these questions:

- How much experience do you have?
- Are you planning to pursue your current career?
- Do you want to change your career?
- Have you had any gaps in your employment?

b) Decide which format of CV best suits your needs.

	Experienced	*Inexperienced*	*Career changer*	*Employment gaps*
Reverse-chronological				
Functional (skill-based)				
Combination (hybrid)				

15. Put the details in the correct groups in the box.

Developed 50+ electrical circuits for scientific instruments. Achieve 25% efficiency increase	High levels of critical thinking, creativity and problem-solving skills	MSc Electrical Engineering, Manchester University (2013–2014)
Perfect communicator who brings friendliness, confidence and empathy to leadership skills	Programmed 50+ assembly-line machine processes with PLC	Proficient with Microsoft Office, Programming Languages (C, Java)
BSc Mechanical	BA in Philosophy,	Used CAD to plan,

Engineering, Toledo University (2016*)*	Politics and Economics, University of Oxford (June 1998)	design, and develop 60+ electrical systems for broadcast equipment
Skills	**Education**	**Work experience**

16. a) Work in pairs. Arrange Electrical Engineer CV skills from the box into hard (technical) and soft (transferable) skills (8 in each column.). Add two more skills appropriate for you to each category.

microcontrollers (PIC, 8051, etc.), organisation, reverse engineering, programming languages (C, Java), precision, circuit design, collaboration, NFPA Standards, decision-making, PCB design, communication, active learning, programmable logic controllers (PLC), leadership, problem-solving, CAD	
Hard (technical) skills	**Soft (transferable) skills**

b) In pairs, tell each other what transferable skills from exercise 16a you have developed at university and which ones at work. Give examples which demonstrate the development of these skills.

17. Work in groups. Read the job advertisement below.

a) Discuss which hard and soft skills are necessary for the successful candidate. Look at the skills in exercise 16.

Graduate Electrical/Mechanical Engineers
Re&M
23 Main Road
Surrey
£25,000 a year – Permanent

This is an outstanding opportunity to join one of the UK's leading Energy/Environmental Consultancies. They are seeking a number of high calibre, recent Graduates in Electrical or Mechanical disciplines. A minimum of a 2.1 is required and Engineers with 1/2 years' experience will also be considered. Although no previous commercial experience is required, candidates should be self-motivated, effective team players with the ability to work without supervision.

Taken from https://cutt.ly/6U3U3FP

b) Look through the Mechanical Engineering CV personal statement below and find out if the candidate suits the position above. What other skills are necessary? Rewrite the personal statement in the best possible way.

Hard-working, highly motivated BSc in Mechanical Engineering. Seeking to join Re&M to help improve consultancy on major energy and environmental issues. Completed a 6-month long internship with ABC Company, regularly using AutoCAD, Suretrak, and Primavera.

18. Find the job advertisement you would like to apply for. Write an impressive personal statement highlighting the key points that the employer is looking for. For example, highly motivated, results-focused recent graduate with deep knowledge of ... and excellent communication skills.

19. As virtual interviews became a new standard in the recruiting process, it is not a secret for anyone that video resumes are the future.

a) Study the video resume script and fill in the information from the job advertisement you would like to apply for in exercise 18.

b) Record yourself and share your video resume with your groupmates or in your professional profile.

Video Resume Script

Hi Team! My name is (Name), and I would love to take some time of your busy schedule to tell you how I can help you (Job Role).

I am currently working as a (Current Designation) at (Company Name). In my last two years at (Company Name), I have been assigned the responsibility of (Responsibility1) and (Responsibility2). I have successfully managed to scale our (Department) process by 100%. This includes (Task1), (Task2), and (Task3). In addition to this, I have played an active role in designing/developing (Task4) and (Task5). I have also contributed equally towards documenting (Task6). My team leads have always praised me for the work I do. They have seen a (Number) % increase in the (Overall Task Name) ever since I joined this organisation.

Finally, I simply love (Job Name). (Job Role) excites me and I look forward to (Activity Related to Job Role). I'm passionate about my work and can ensure you that you will not regret hiring me. I thank you for your time and look forward to meeting you.

Taken from https://www.jobsoid.com/video-resume/

20. You are going to write your CV. Think of the job you would like to apply for. Study the sample CV for the position of Electrical Engineer and use it to organise yours.

Before you start, prioritise your experience, technical and transferrable skills that are relevant for the position you are applying for. Think what you can include in your personal statement.

Find a relevant positon online and write your CV to apply for it.

DEVIN CALLAHAN

Electrical Engineer

DETAILS

4800 Avocard Street, Los Angeles, CA 90041,
United States
devin_cvs_allahan@gmail.com
(310) 745-2134

PROFILE

Innovative Electrical Engineer with a proven track record of evaluating electrical systems and applying knowledge of electricity and materials in a beneficial way. Adept in carefully diagnosing and assessing issues, and offering real viable solutions. Skilled in design, prototyping, and testing. Committed to working as a collaborative and positive team member, striving to utilize my knowledge and expertise for optimal engineering results.

EMPLOYMENT HISTORY

Electrical Engineer, Central Vico Systems, Los Angeles
APRIL 2011 — AUGUST 2019

- Oversaw and planned electrical specifications for new systems.
- Created and implemented test plans.
- Worked to create improvements that optimized production.
- Accurately diagnosed and directed system issues.
- Managed the diagnosis and repair of electrical circuits and wiring.

Electrical Engineer, Gonan International, San Francisco
MARCH 2008 — JULY 2011

- Collaborated with other engineers to ensure safe production processes.
- Performed preventative maintenance and tested equipment.
- Utilized my knowledge of power and distribution systems, circuit calculations, and instrumentation.
- Routinely used tools such as oscilloscopes, function generators, and LCR meters.
- Worked with other engineers to solve problems and enhance processes.

EDUCATION

Master of Electrical Engineering, Georgia Institute of Technology, Atlanta
AUGUST 2005 — MAY 2008

Bachelor of Electrical Engineering , University of Michigan, Ann Arbor
AUGUST 2000 — MAY 2004

SKILLS

Taken from https://resume.io/resume-examples/electrical-engineer

Self-Check 1.4

Choose the appropriate word to fill in the gaps in the sentences below.

Vocabulary

1. First of all, CV tells the … about the person and his qualifications.

a) interviewee b) employee c) interviewer d) candidate

2. Your CV should be …, easy to read and well-written.

a) concise b) short c) brief d) compact

3. The interviewer mostly wants to know about your … skills rather than just the straightforward qualifications that you have on your CV.

a) transfer b) transferal c) transitional d) transferable

4. … CV helps the applicants hide employment gaps.

a) Hybrid b) Functional c) Reverse-chronological d) Combination

5. Your resume should … your skills and achievements.

a) present b) reflect c) depict d) highlight

Grammar

1. It is vital to ensure the script is relevant to each job application, rather than … the same generic CV

a) sending b) being sent c) to send d) to be sent

2. To showcase achievements it is worth … evidence of how targets were exceeded, and ideas created, but always be honest.

a) being offered b) to be offered c) offering d) to offer

3. Jack is supposed … on his CV for a fortnight.

a) to have been working b) to be working c) to have worked d) to work

4. After … the interview, the applicant realised that he hadn't sent his cover letter to the potential employer.

a) being left b) having been left c) leaving d) having left

5. He couldn't … the job of electrical engineer. He didn't have enough qualifications.

a) offer b) have been offered c) be offered d) have offered

Correcting mistakes

Work in pairs. Do the tasks and discuss the results with your partner.

a) Find 10 grammar mistakes in the passage below and correct them.

What is Video Resume?

Video resume is a candidate resume in the form of a video clip of one or two minutes. It is sometimes also refer to as a visume. Video resumes are like an elevator pitch or an add-on to job applications.

They helps your prospective candidates to market their skills and their capabilities to you and your hiring team. It helps you understand your candidates better as video resumes are often used talk about something that is not mentioned in the resumes.

Video resume is the best medium to evaluate your candidates at the time of shortlist. It is as good as videotaping for interviews except for have interview questions. With the help of video resumes you can see and to hear your applicants. It also helps you understand how your candidates present youself. Furthermore, it can be also termed as a mini remote interview. Video resumes help you learn more about your candidates. They could use the same to talking about their skills, their achievements, their career aspirations or simply let you to know why they are the best fit for your roles. Know your candidates a bit more closely will help you shortlist the best-fit candidates faster.

b) Tell each other about the advantages of a video resume and correct vocabulary and grammar mistakes if necessary. Use the words/expressions from Unit 1.4.

Unit 1.5. Successful interviews for engineering jobs

Lead-in

Discuss these questions with your partner.

- Have you ever been interviewed?
- What position did you apply for?
- What is necessary to get ready for the interview?
- Are there any specific features of an engineering job interview?

https://cutt.ly/bUlL6nm

Reading Comprehension

1. Complete the collocations with the nouns a-h. Study their Ukrainian translation. Can you notice any patterns?

	English collocation		Noun
1	the ___ to acing – ключ до успіху	a)	parts
2	a bit of a ___ – невелика паніка	b)	process
3	to meld ___ together – поєднати частини	c)	lies
4	an exhaustive ___ – вичерпне пояснення	d)	key
5	absolute ___ – абсолютна пристрасть	e)	explanation
6	reflective ___ – мисленнєвий процес	f)	prospect
7	to tell outright ___ – казати відверту брехню	g)	panic
8	daunting ___ – перспектива, що лякає	h)	passion

2. Read the text about preparing for your first engineering job interview and choose the proper title to each paragraph. There are two extra options.

1. Be yourself
2. Research the company's big issues

3. Line up examples of your engineering achievements
4. Skills description
5. Learn how to deal with unfamiliar scenarios
6. Revise your university work – all of it
7. Body language

How to prepare for your first engineering job interview

Engineers face particular challenges when applying for their first job. The key to acing any job interview is being prepared: researching the company, practising model answers, working out what you're going to wear. But if you're applying for your first engineering job, you're likely to face some particular challenges that other applicants in other professions may not encounter.

Here are the key things you should remember to do when getting ready for your first engineering interview.

1. _____

What sets engineers apart from many other professionals is their specific technical knowledge. Even if you've completed your degree already, a prospective employer will want to know your level of ability so be prepared for technical questions that assess your understanding of engineering concepts.

'Remember that the questions could relate to subject areas from any point of degree, not just most recent work,' says Elspeth Farrar, director of the careers service at Imperial College London, the UK's biggest engineering university. 'Be familiar with and able to talk about the concepts and the knowledge you've gained at all stages of your degree.'

2. _____

An interview isn't an exam: your questioner isn't just trying to find out what you know about specific topics but whether you can apply that knowledge to real-world problems.

They may ask you how you would address problems that are way more complex than anything you've dealt with at university. They're not looking for a perfect solution, just at how you deal with the question.

'Often students get in a bit of a panic if they can't come up with solution they regard as the correct one,' says Farrar. 'But there isn't necessarily one right answer.'

‘You need to think about the various parts of your expertise, meld them together and adapt them to come up with practical solution … Be brave enough to come up with ideas and recommendations even if you don’t know the actual answer.’

Simon Stoker, head of graduate recruitment for Arup, agrees that your answers don’t need to provide an exhaustive explanation. ‘We just want you to give us a feel for how you think,’ he says.

3. _____

If you’re applying for a job with a firm, it’s essential to understand and be ready to discuss what they do and the challenges you would face if you worked for them. For engineers this, of course, includes the technological issues: what kind of engineering problems would you be expected to solve?

But don’t forget to research the wider challenges facing the company, whether they’re political, economic, social or environmental. ‘You have to think slightly more commercially,’ says Farrar. ‘Think about what else is important to a company, whether it’s their clients, suppliers or competitors. Have some knowledge of how that company fits into its industrial sector.’

Lorna Bullet, head of GE’s early talent recruitment team in the UK, says lack of knowledge about the company is easy to spot ‘Some people are able to demonstrate an absolute passion for the job but can’t articulate anything about why they’d want to come and work for GE,’ she says.

‘Those sorts of things are very easy for people to do before an interview: basic Google searches on the company, understand who we are. You can never do too much preparation for it but that’s where we often see people fall down.’

4. _____

Interviewers will expect you to give examples of where you’ve put your engineering skills into action, whether in a degree project, during work experience or even in extracurricular activities.

Preparing specific examples and being able to articulate them in a succinct way are vital. But it’s also key to remember that just saying you’ve taken part in something isn’t enough: you have to show what you achieved and what you learnt from it.

‘Students spend so long talking about the task, but they forget to say what they did and what the end result was,’ says Farrar. ‘The other aspect is what did they learn,

what would they do differently next time, and being able to show that reflective process goes down quite well.'

5. _____

Companies want to find out who you really are, not what you can recite from memory. This means you shouldn't try to pretend to be something you're not and also you should try to relax.

'Try to be as natural as possible,' says Farrar. 'If you've had to pretend to be someone else to get a job, it's quite likely the job isn't suited to you.'

Also be careful not to exaggerate your achievements – or tell outright lies. 'If you do, you will get found out in early stages of the job,' says Farrar. 'Companies are pretty hot on things like integrity. If you lie in an interview or application, they will not want you.'

If you do suffer from excessive nerves, try to remember that interviewers aren't trying to catch you out: they want the interview to go well too. 'We all remember our first interviews and we know it can be a daunting prospect,' says Miranda Davies, director of emerging talent at Thales. 'We don't want people to fail; we want you to be the best you can be.'

Taken from https://www.theengineer.co.uk/prepare-engineering-job-interview/

3. Decide whether the statements are true or false and correct them if necessary.

1. To prepare for your first engineering job interview you should find out about the job, find out what the dress code is and practice model answers.

2. What distinguishes engineers from other specialists is their specific technical knowledge.

3. The interviewer can ask you questions which relate to subject areas from any point of your degree.

4. A prospective employer always wants to get a perfect solution of the problem.

5. When applying for the job, engineers should be ready to discuss the technological issues and the challenges they would face if they worked for the company.

6. At the interview the applicant should mention as many projects or events he took part in as possible. The results are not very important.

7. If you exaggerate your achievements, nobody will ever learn about it.

8. The interviewers always try to catch you out by asking many questions.

4. a) Work individually. Use the prompts to make questions. Change the form of the verb, add the auxiliary one and the proper prepositions if necessary.

b) Work in pairs. Ask and answer the questions with your partner.

1. What / engineers face when applying / their first job?

2. What / a prospective employer want to know / asking technical questions?

3. What / Elspeth Farrar, director / the careers service / Imperial College, London recommend?

4. What / be / your questioner trying to find / at the interview?

5. Why / some students often get / a bit / a panic?

6. What / be / it essential to understand and be ready to discuss if you / be / apply / for a job / a firm?

7. What / the engineering candidate need to research / the company?

8. What sort / information / your skills / interviewers expect you to give?

9. Why / be / not it recommended to tell lies / the interview?

10. How / Miranda Davies try to calm / the applicants?

Language in Use

5. Fill in the preposition from the box. There are two extra prepositions. Scan the text and check the answers.

in	down	to	for	from (×2)	on	into	apart from	with (×2)	up

a) to get ready … the interview

b) to set smb … others

c) to relate … smth

d) to be familiar … smth/smb

e) to dealt … smth

f) to come … with solution

g) to fit …

h) to put … action

i) to recite … memory

j) to suffer … smth

6. Match pairs of synonyms. Then work in pairs. Choose any four and give definitions so that your partner could guess the word.

1. work

2. particular

a) candidate

b) get ready

3. applicant	c) honesty
4. prepare	d) concise
5. articulate	e) intimidate
6. succinct	f) job
7. integrity	g) explain
8. daunt	h) specific

7. Replace the words in bold with their synonyms from the box to learn how to avoid etiquette mistakes at the job interview.

candidates / person / to brush up / ruin / rude / aim / etiquette / ignoring / professional / qualified

Poor etiquette in a job interview can **destroy** your chances of landing a position, even if you're highly **skilled**. It is important to find the right balance between coming across as a confident **specialist** while remaining humble and polite. Avoid these common interview **decorum** mistakes.

When it comes to arriving at the right time, most interview **applicants** are worried about being late. However, arriving too early is poor etiquette, too. **Target** to arrive no more than 10 minutes early – if you need to hang out in the lobby for a few minutes, that's OK. Use the time **to refresh your memory** on your notes or practise your introductory speech.

Many interviews have two or more interviewers in the room and **disregarding** certain people in the interview committee can ruin your chance of landing the job. Be sure to address every **individual** conducting the interview, making eye contact and speaking directly to them in turn. Many job candidates tend to only address the highest-ranking person in the room, which comes across as **discourteous**.

8. *Read the text about the importance of communication and body language at the job interview and choose the word a), b), c) or d) which best fits the space to complete the information.*

Poor communication and body language

However valuable or __ (1) your answers are during an interview, poor communication or body __ (2) can discredit you.

Focus on being a polite and clear __ (3) during your interview. Don't __ (4), no matter how eager you may be to answer the question. If you accidentally talk before the interviewer has finished, quickly __ (5) and let them continue speaking.

Speak clearly when it is your turn; __ (6) comes across as inconsiderate, and it diminishes your confidence.

Be aware __ (7) your body language. Nervous behaviours like __ (8) or tapping your knee are common in stressful situations, but in an interview setting, you run the risk of appearing rude or impatient. Sit up straight and avoid fidgeting as much as possible and maintain appropriate __ (9) contact.

The goal is to be __ (10) and interactive. Looking someone in the eye when they speak to you and while you're responding indicates respect for the person and that you are present in the moment. Frequently looking away or over your shoulder while talking to them conveys disinterest.

1	a) sight	b) sighted	c) insightful	d) insight
2	a) language	b) talk	c) speech	d) speaking
3	a) commutator	b) speaker	c) communicator	d) reporter
4	a) interrupt	b) break	c) intercept	d) intervene
5	a) excuse	b) apologise	c) beg pardon	d) apologies
6	a) grumbling	b) muttering	c) mumbling	d) rumbling
7	a) to	b) of	c) in	d) to
8	a) irritation	b) fidget	c) loach	d) fidgeting
9	a) eye	b) eyes	c) ice	d) eye’s
10	a) engagement	b) engage	c) engaging	d) engaged

9. Match the beginning of the sentences with their endings to work out the sample of creating a good first impression at the job interview.

1. Thank you for giving me …
2. Having studied the job description, I am confident I have the skills, …
3. I am a fast learner; I possess excellent problem-solving …
4. I have an impressive track …
5. For example, in my previous role I was praised by …
6. The type of person I am means I always act as …

7. And I will make sure I take responsibility …

8. If you hire me in this position, I believe you will quickly …

a) … my supervisor for helping the company find ways to increase sales by improving customer service standards.

b) … capabilities, and I can manage a significant workload.

c) … see a positive return on your investment.

d) … a positive role model for the company.

e) … the opportunity to be interviewed for this position today.

f) … record of achievement.

g) … for my ongoing professional development.

h) … the qualities, and the qualifications needed to excel in the role.

*10. To answer the question **'What are your strengths?'** it is advised to give 3 strengths that are going to appeal to the hiring manager.*

a) Match the strengths with their meanings and fill in gaps 1)-8) with one word only.

1. Disciplined and focused	a) you are ___1) innovative problem-solver, you always seek ways to overcome difficult challenges.
2. Flexible and versatile	b) you will require little supervision or monitoring moving forward, you are going to take ownership ___2) your own professional development.
3. Resourceful	c) you understand the importance of effective teamwork and that you are required to support your co-workers when carrying ___3) difficult team tasks.
4. Loyal and trustworthy	d) you will think outside of ___4) box when overcoming difficult challenges.
5. Collaborative	e) you are the type of person ___5) will always focus on the details and you will carry out your duties to a very high standard.
6. Detail orientated and attentive	f) you are prepared to take on duties and responsibilities which are outside of your job description that you are available to help out the organisation ___6) short notice whenever required
7. Creative and	g) you can be relied upon to complete tasks on time

innovative	___7) to the necessary standard.
8. Fast learner	h) you always act as a positive ___8) model for the company and can be relied upon to carry out your duties in line with organisational policies and procedures.

b) Read the example of presenting your strengths provided by Richard McMunn from 'The Interview Training' website and fill in gaps 1)-9) with one word only.

My strengths include the fact that I … 1) commercially aware.

This means I will always work … 2) to help your business grow, and the work I do for you will always be efficient and effective.

Other … 3) include my collaborative approach to working.

I strongly believe that a team can achieve brilliant things when they support … 4) other, when they are respectful of everyone's opinions and contributions, and when they are all focused … 5) the same goal.

Finally, perhaps my greatest strength is my … 6) and trustworthiness.

You can rely … 7) me to always be a positive role … 8) when representing your company, and if you hire me, I will be committed … 9) the business for many years to come.

c) Choose any 3 strengths which are appropriate for you and get ready to tell your partner about them.

11. Do the following tasks to be good at answering the question ***'What's your biggest weakness?'***

Avoid 3 weaknesses:

1. I am not very good at working with other people.
2. I am not very good at time keeping.
3. I am not very good at managing multiple tasks or projects.

However, here are 3 tips for structuring your answer:

1. Give an honest weakness.
2. Do not say you are a perfectionist! Everyone uses this!
3. Explain what you are doing to improve on the weakness.

https://cutt.ly/3Is91Q6

a) Match the weaknesses you can use at your job interview with the way how to speak about them and fill in gaps 1)-8) with one word only.

1. I focus too much ___1) detail during projects or tasks.	a) I currently lack experience in taking the lead on projects, but this is something I am keen to improve on now. If I am to reach my full potential, this is an area I need to gain experience in.
2. I find it difficult to ___2) other people for help.	b) However, I am learning to remain calm in difficult situations and to focus on what I can do to help that the project finish on time and to the necessary standard.
3. I find ___3) hard saying 'no' to people.	c) I always try to figure things out for myself. However, I do understand it would be more beneficial to seek advice from other more experienced people in my team and I am taking steps to improve in this area.
4. I lack experience ___4) leading project work.	d) If you asked now to take the lead on something, I wouldn't feel confident in doing so. However, to improve in this area I would seek to observe how managers and team leaders tackle projects and tasks so I can then learn how to do it myself when the opportunity presents itself.
5. I ___5) too sensitive at times.	e) I would genuinely love to have the confidence to stand up in front of a group of people and give a talk. However, I am trying to improve in this area and I recently purchased a book from Amazon on how to improve confidence when public speaking.
6. I don't yet have ___6) leadership experience.	f) I am a detail orientated person, but I am trying to be more mindful and I am learning to focus more on the end goal of the project or task that I am responsible for.
7. I get stressed ___7) a project runs over the deadline.	g) I always say 'yes' to everything even if I don't have the capacity to do so. I have sometimes become overwhelmed by taking on too many responsibilities. Now I take my time to assess my own workload to make sure I do have the capacity to commit to the extra work responsibilities.
8. I am not very good	h) In the past, I would take criticism personally.

___8) presenting to large groups of people.	However, I do understand that for me to continually improve professionally I need to view other people's comments as constructive and productive. So, I am learning to be more mindful when people are simply trying to help me improve and develop.

b) Read about two more weaknesses provided by Richard McMunn from 'The Interview Training' website and fill in gaps 1)-8) with one word only.

I'm not very good … 1) giving people feedback. If someone asks me … 2) feedback, I would rather avoid it as I don't want to hurt their feelings. However, I do appreciate feedback is … 3) important part of self-development and I have … 4) trying to improve in this area by forcing myself to give people feedback when it is requested.

I can … 5) too judgemental of others. In my last role I would automatically judge people if they … 6) either late finishing a project or if their standard of work … 6) not up to scratch. However, I have been trying to improve in this area and I no longer jump to conclusions relating … 7) other people's performance. Instead I try to offer my help or support so they can improve which ultimately serves to help the team move … 8).

c) Choose any 3 weaknesses which are appropriate for you and get ready to tell your partner about your weaknesses.

Grammar Revision: Focus on Conditional Sentences

GRAMMAR FOCUS I	
0 Type General truth	If + present simple, … simple
I Type Real present/	If + present simple/present …/present …, will/ can/may/might/must/should/could + bare infinitive
II Type Unreal present	If + past …/past continuous, …/could/might + bare infinitive *Note:* Use **were (more formal)** instead of **was (more informal)** after he, she, it and I in the subordinate clause
III Type Unreal past	If + past perfect (simple/…), would/could/might + … + past participle

1. Read the sentences below paying attention to the verbs in bold, find out which type of conditionals each sentence refers to and complete the table above with necessary information.

1. If I **have** to reach my full potential, I **need** to gain experience.
2. If I strongly **believe** that a team can achieve brilliant things, I **will support** my colleagues.
3. If you **asked** me to take the lead on something, I **wouldn't feel** confident in doing so.
4. If you **have written** your CV properly, you **will have** successful interview next week.
5. If I **had prepared** for the interview better, I **wouldn't have failed**.
6. If she **had been wearing** glasses, she **wouldn't have made** so many spelling mistakes in her CV.
7. If she **is** still **writing** her CV, she **won't send** it to the potential employer on time.
8. If you **were getting** ready for the interview, **would** you **make** notes?

2. Read the story. What excuse did the applicant use for missing the interview? Did he get the job? Why?

The Interview Question

Imagine you were having a job interview on Monday, what would you do the weekend before? You almost certainly wouldn't do what the student from the other group did. He went to a different city with his friends and partied all weekend. He had a great time, but he knew that **unless he got back in time for the interview**, he wouldn't get the job. So, he drove through the night and got back home in the early hours of Monday morning. Sadly, he overslept and missed his job interview. When he got to the company afterwards, he decided to invent a story. He told the interviewer that he would have got in time for the interview **had he not stuck in a traffic jam**. The interviewer thought about this for a moment and then agreed that, **provided he arrived before 10 a.m.**, he could have the interview the next day.

The first interview question was 'What's your biggest weakness?' But he was unprepared for the question and answered, 'I am not very good at time keeping.'

*3. Read GRAMMAR FOCUS II. Then rewrite the conditional clauses in bold in the story using **if**.*

GRAMMAR FOCUS II Conditional Clauses – alternative to *if*

Use **unless** to mean 'if + not'.
*She wouldn't tell the truth at the interview **unless it was necessary.** (= ... if it wasn't necessary.*

Use **imagine** or **suppose/supposing** to ask questions.
***Imagine you were going to the interview**, what would you wear? (= if you were going to t interview, ...)*

Use **provided/providing** to create a condition.
*I'll help you write your CV, **provided you help me do** the project. (= if you help me do t project.)*

Use **inversion** in formal contexts: mostly with the auxiliary verbs *were, had* or *should.*
***Had she followed** my advice, she wouldn't have failed the interview. (=If she had followed ...)*
Note: Do not contract negative forms in inversion.
... had she not informed us, we wouldn't have known. (NOT ~~... hadn't she informed ...)~~

4. Put the verbs in brackets in appropriate form so that conditional sentences are correct. Define the type of conditional sentences and explain its use.

1. If he … (get) his bachelor's degree, he can apply for the position of an engineer.
2. If she came on time for the interview, she … (get) the job.
3. I … always … (work) hard to help your business grow if you hire me.
4. I … (succeed) in the interview provided I had not told lies.
5. If I … (be) you, I would read all the tips before the interview.
6. If she … (write) her CV for hours, she would not have made so many mistakes.
7. If he studies hard, he always … (get) good results.
8. Had they prepared for the interview, they … (know) answers to all the questions.

GRAMMAR FOCUS III

Unreal past (talking about imaginary situation)

- Use **wish/if only + sb + a past tense** to say that somebody really wants a present or future

situation to be different.

- Use **it's (high) time + sb + a past tense** to say that somebody should do something (now or in the future).
- Use **would rather + sb + a past tense** to say what somebody would prefer somebody else to do (now or in the future).

5. Read the sentences below and answer the questions.

- Do these sentences refer to the present or to the future?
- Which tense is used?

1. I think it's time **we started** looking for a job.
2. If only **I could get** that job.
3. My English teacher would rather **I didn't miss** my classes.
4. I wish **I knew** more about the importance of the job interview.

6. Complete the sentences so that they have similar meanings to the first ones. Then tick the sentences that are true for you.

1. I don't study English well. I wish I ….
2. We should get some experience in electrical engineering. It's high time we…
3. I am late for the engineering job interview, If only I ….
4. We are learning how to write a good engineering CV. I'd rather we ….
5. I don't know how to tell about my strengths / weaknesses. It's time I ….
6. We don't have much practice in electrical or mechanical engineering. We wish we ….

7. Study GRAMMAR FOCUS IV and complete the examples with the necessary verb forms.

GRAMMAR FOCUS IV

Past regrets (expressing a wish or regret about the past)

Use **wish/if only + sb + Past Perfect** to talk about past regrets.

I didn't take part in the conference last week.

If only I ... part in that conference.

He talked to his groupmate all the lesson.

He wishes he ... to his groupmate all the lesson.

Note: If only is stronger than **I wish.**

8. Read what the true situation is and express a wish or regret.

1. My friend Mike made many spelling mistakes in his CV.
2. Mike didn't do anything to get ready for the interview.
3. Mike overslept and was late for the interview.
4. He didn't know how to speak about himself.
5. He suffered from excessive nerves.
6. Mike exaggerated his achievements and even told some outright lies.
7. He didn't feel confident at the interview.
8. He failed his first engineering interview.

Translation Practice: Ukrainian into English

12. Translate the following sentences into English paying attention to the use of Conditional sentences. Identify the type of the Conditional sentences.

1. Якби мене тільки спитали про мої слабкі сторони, я б зазначив відсутність досвіду.

2. Якщо він успішно пройде співбесіду, він отримає посаду інженера-механіка.

3. Шкода, що вони не підтримали один одного працюючи над проєктом, команда завершила б роботу вчасно. Проте вони не встигли.

4. Якщо б я був на вашому місці, я б перечитав всі можливі питання та відповіді готуючись до співбесіди.

5. Якби мене попросили виступити на конференції перед великою групою людей, я б не відчував себе достатньо впевненим.

6. Шкода, що ти не витратив більше часу на підготовку до співбесіди, ти б міг би отримати цю посаду. Проте ти не підготувався.

7. Якщо її візьмуть на цю посаду, вона буде найщасливішою людиною в світі.

8. Що б ти відповів, якщо б тебе спитали про твої сильні сторони?

9. Якщо б я тільки знав як писати резюме, але я ще не знаю.

10. Вже час тобі підготуватись до обговорення викликів, з якими тобі доведеться зустрітись.

Listening Comprehension

13. Watch the video 'Tell me about yourself – Job Interview' (https://www.youtube.com/watch?v=HMQlA-TIAsk) and do the following tasks.

Before watching the video:

a) Discuss the following questions with your partner:

1. What is the best time to come to a job interview?
2. What should you wear?
3. What information should you find out before the interview?
4. What can you be asked about at the interview?

b) Match words and collocations with their meanings.

1. hear about	a) a written statement about the qualities of a product or service
2. it makes sense	b) authorised
3. testimonial	c) find out about
4. cut out for	d) I do all I can
5. take apart	e) do the work of someone not there
6. endorsed	f) the right type of person for
7. I give my all	g) in the interest of
8. cover for	h) I see/I get it
9. for the sake of	i) separate into pieces

14. Watch the beginning of the interview (00.00-00.50) and find out if the intonation is going up or down, mark the stressed words.

Receptionist: Mr Davis is ready to interview you now.

Mr Torres: Thank you.

Mr Davis: Hello Mr Torres, nice to meet you.

Mr Torres: Hello.

Mr Davis: I'm Tom Davis, the Manager of LCI Software.

Mr Torres: Nice to meet you Mr Davis.

Mr Davis: First I'd like to congratulate you on passing our aptitude test. You did very well.

Mr Torres: Thank you.

15. Watch the first half of the video (00:00-04.05) and find out whether the statements are true or false, correct the false ones.

1. Mr. Torres passed the aptitude test quite well before the interview.
2. The announcement online brought Mr. Torres to the company's Facebook page where he applied for the job.
3. From the pictures and client testimonials Mr. Torres understood that LCI Software did great, quality work.
4. Mr. Torres completed both Bachelor's and Master's Degrees in Environmental Informatics.
5. Mr. Torres realized very fast that he was not the right type of person for environmental engineering industry.
6. Mr. Torres has always loved to disassemble household devices.
7. Mr. Torres took online courses, studied how to write computer programmes but got few official software certificates.
8. Mr. Torres built his portfolio of projects by creating sites for his friends and acquaintances.
9. Mr. Torres got experience in teamworking, time management and quick decision making while working for Soft Solutions.
10. Mr. Torres wants to take the new step in his career because he wants to earn more.

16. a) Match pairs of synonyms.

b) Fill in the gaps with the words/expressions that fit the best. Then watch the video (04.05-05.10) and check your answers.

1)	improve	a)	perseverance
2)	sort things out	b)	difficulties
3)	hardships	c)	meet
4)	complete	d)	become better
5)	persistence	e)	finish
6)	encounter	f)	anything necessary
7)	achieve	g)	find a solution
8)	whatever it takes	h)	reach

Mark's strengths are … and courage. He gives his all to … his goals in spite of any … he might … along the way. He has a hard-working nature. He is always looking for ways to … and grow. He's also a great team player. He always tried to help his teammates … their tasks if he had completed his. Whenever someone needed to leave earlier, he would offer to cover for them. He is willing to do … for the team or company to succeed.

If he didn't get on with someone on his team, he would try to … in a calm and rational manner. He would do his best to get on with that person for the sake of the team.

17. Watch the video up to the end (05.11-07.40) and fill in the gaps with missing words.

One of Mark's weaknesses is that he can be a bit too … 1) at times. But he tries to stop himself from being … 2) direct.

In five years, he'd like to become an … 3) in software development. He hopes to … 4) some projects.

Usually he works well… 5), doesn't panic and manage to … 6)**.**

His recent … 7) was the Louis Kitchen app. With this app, it's easy to order your favourites, even when you're … 8).

18. Discuss in groups and put down the questions the interviewer asked Mr. Torres and what he answered.

Oral Interaction

19. Work with your partner / individually and arrange the following sentences in the correct order to make up a dialogue. Then act out the dialogue.

Mr. A: Yes, our company is large and there is plenty of room for advancement.

Mr. A: I see from your CV that you are very experienced.

Mr. A: Welcome to our company.

Mr. A: Why did you leave your former company?

Mr. A: What specific job are you applying for?

Mr. B: So, you'll give me the job?

Mr. B: I am glad for the chance to be interviewed.

Mr. B: I am an electrical engineer and I would like to get the job you advertised on the internet last week.

Mr. B: It lacked opportunities.

Mr. B: Yes, I've worked as an electrical engineer for 10 years now. But I think it is a good career move to join your company.

20. Look at the dialogue in Exercise 19. Improve it by adding an introduction telling about yourself, your strengths and weaknesses. Use information from exercises 9, 10 and 11 to create a stronger impression. Roleplay your improved version.

21. Look at the job advertisement in Exercise 17a of the previous unit. Imagine you are at the interview for the position of an electrical engineer. Choose the information that is true for you, draft the possible dialogue and roleplay it.

22. Game: Roleplay '<u>At the job interview</u>'. Work in two big groups: applicants and HR managers recruiting for their companies. The winner is the one who takes the most positions. Follow the instructions given in the Resource Pack, p. 192.

Written Production

23. Complete the Letter of Application for the job advertised in Exercise 17a of the previous unit with appropriate information about you.

Your address Re&M 23 Main Road Surrey Date Dear Sir or Madam,

As a long-term admirer of the impressive work being done by the team at Re&M, I am delighted to submit my application for the … position posted on Searchforwork.com. As a recent graduate from … with a Bachelor's Degree in …, I am confident that my knowledge of …, experience in …, and precise attention to detail would make me an asset of the team at Re&M.

In my former role as a student worker at …, I was responsible for …, assisting with …, and installing …. While employed there, I assisted in the development of …, and helped improve …. I am sure that this experience will help me hit the ground running at Re&M.

I also understand that Re&M is seeking to expand their …. While at the University, I specialised in and completed my thesis on …. The … position would be an exciting opportunity for me to bring my educational background to the company and learn more about ….

I have attached my CV, which further details my skills and educational background. Please, do not hesitate to reach me out if you have any questions.

I look forward to meeting you in the near future; thank you for your time and consideration.

Yours faithfully,
Signature
Name Surname (Mr/Ms)

Taken and modified from https://www.hashmicro.com/blog/how-to-write-application-letter/

24. Choose one job advertisement from the given below and write the Letter of Application (at least 120 words). Remember to include all necessary information to write a good letter.

Lead Electrical Engineer
EDF Group
Bristol, United Kingdom

The Role

- Technical review of drawings, reports, schematics of electrical and building services surveillance on 10kV HV, 400V LV, and backup power technologies for the HPC Ancillary Buildings
- Support the delivery of the 10KV ring electrical design package activities to ensure systems are delivered safely on time, to budget, meeting business and technical requirements
- Address technical queries raised by team members, contractors, and suppliers
- Interface coordination with key stakeholders

The Skills

- Track record of delivering projects within a technically complex and dynamic environment whilst ensuring high levels of safety, security, and environmental responsibility
- Good knowledge and experience of electrical equipment; switchgear, transformers, distribution boards, UPS and Diesel Generator technologies
- Technical writing ability with experience in the preparation of reports, specifications & presentations
- Degree qualified or equivalent experience in relevant engineering discipline

https://www.euroengineerjobs.com

Self-Check 1.5

Choose the appropriate word to fill in the gaps in the sentences below.

Vocabulary

1. Getting ready for the interview, try to … nervousness and shortness of breath.

a) cope b) overcome c) get rid d) manage

2. The interviewer always tries to find out whether you can apply your knowledge to … with real-word problems.

a) deal b) solve c) fulfill d) accomplish

3. The applicant should be ready to give specific examples to show what you … and what you learnt from it.

a) received b) got c) obtained d) achieved

4. Poor communication and … language can discredit you at the interview.

a) sign b) common c) body d) foreign

5. Use the time before the interview to practise your introductory speech, but don't … from memory, be as natural as possible,

a) retell b) recite c) tell d) report

Grammar

1. Had he read the job description earlier, he … about the qualifications required.

a) would have known b) would know c) won't know d) must have known

2. If only she … much experience in engineering but still, she doesn't have any.

a) has b) has had c) had d) has got

3. It's high time the 4th year students … working on their diploma projects.

a) had started b) have started c) start d) started

4. I couldn't remember any of my weaknesses at the interview. I wish I … at least one.

a) mention b) had mentioned c) have mentioned d) mentioned

5. Original solutions and ideas were required to solve the problem. If only we … inventive enough to solve it.

a) have been b) could be c) had been d) were

Written Production

Use this text as a sample, study it and write your own short statement answering the same question.

Why should we hire you?

You should hire me for several reasons. I am a very positive person who enjoys the challenge of working on difficult tasks and projects over the last ten years. I have built up numerous transferable skills and qualities that I believe are a solid match to this job description.

I have experience working alone and collaborating as part of a team. I am a solid communicator who will take good care of your customers and clients and I will always go above and beyond what is expected in this role. You should also hire me because I appreciate you have worked hard to build your business and being someone who is adaptable to change. I can be relied upon to support you in your long term commercial goals. Moreover, you won't have to spend your valuable time closely monitoring and supervising me because I am a fast learner.

SECTION 2 TRANSFORMERS IN ELECTRICAL ENGINEERING

Unit 2.1. Transformer basics

Lead-in

Discuss these questions with your partner.

- *What is a transformer?*
- *What are transformers used for?*
- *What are the principal parts of a transformer?*

https://cutt.ly/WPi98z1

Reading Comprehension

1. Complete the collocations with the adjective a-h. Study their Ukrainian translation. Can you notice any patterns?

English terms	Missing words
1. _____ e.m.f.– індукована електрорушійна сила	a) insulating
2. _____ voltage– прикладена напруга	b) alternating
3. _____ bushings – ізоляційні втулки	c) balanced
4. _____ winding– розімкнена обмотка	d) applied
5. _____ flux – змінний потік	e) moving
6. _____ current – змінний струм	f) induced
7. _____ parts - деталі, що рухаються	g) open-circuited
8. _____ condition – збалансований стан	h) changing

2. Match Ukrainian equivalents with English technical terms.

1. a piece of apparatus	a) співвідношення витків
2. turns ratio	b) сталеве осердя
3. no-load current	c) падіння напруги
4. paper insulation	d) електромагнітна індукція
5. voltage drops	e) окремий прилад
6. load current	f) струм навантаження
7. steel core	g) струм холостого ходу
8. electromagnetic induction	h) паперова ізоляція

3. Read the text about the principles of transformer operation. Choose from the sentences (A-E) the one which fits each gap. There is one extra sentence.

A. During the instant of switch closing, buildup of current and magnetic field occurs.
B. This reduces the back voltage (back EMF) of the primary and causes the primary current to increase.
C. The cores of transformers are usually built up with laminations of silicon-steel.
D. Note that the primary is always connected to the source of power, and the secondary is always connected to the load.
E. When current is reduced, the magnetic field shrinks.
F. Alternating magnetic lines of force, called 'flux', circulate through the core.

Principles of Operation

A transformer is a piece of apparatus which has no internal moving parts, and it transfers energy from one circuit to another by electromagnetic induction. When one winding of a transformer is energised from an alternating current (AC) source, an alternating magnetic field is established in the transformer core. 1_____ With a second winding around the same core, a voltage is induced by the alternating flux lines. A circuit, connected to the terminals of the second winding, results in current flow.

Each phase of a transformer is composed of two separate coil windings wound on a common core. The low-voltage winding is placed nearest the core;

the high-voltage winding is then placed around both the low voltage winding and core. See Figure 1 which shows internal construction of one phase.

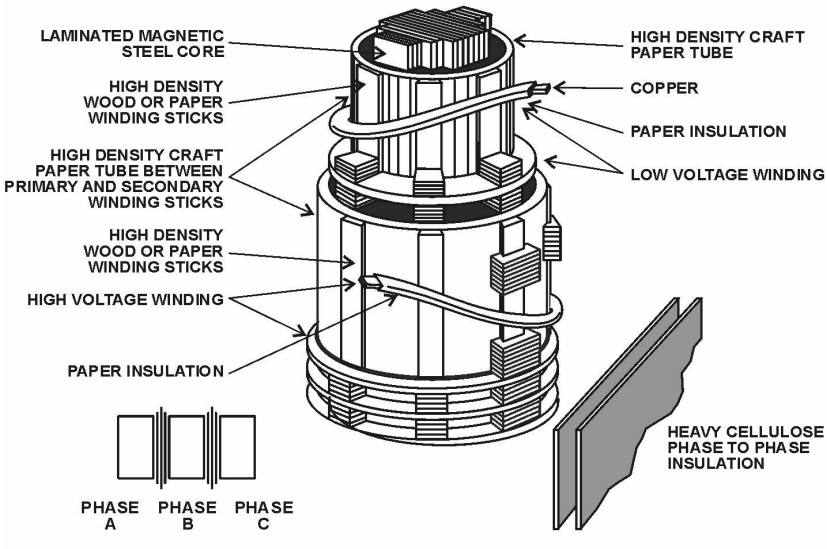


Figure 1. Transformer construction.

The core is typically made from very thin steel laminations, each coated with insulation. By insulating between individual laminations, losses are reduced. The steel core provides a low resistance path for magnetic flux. Both high- and low-voltage windings are insulated from the core and from each other, and leads are brought out through insulating bushings. A three-phase transformer typically has a core with three legs and has both high voltage and low-voltage windings around each leg. Special paper and wood are used for insulation and internal structural support.

Transformer Action

Transformer action depends upon magnetic lines of force (flux) mentioned above. At the instant a transformer primary is energised with AC, a flow of electrons (current) begins. 2_____ As current begins the positive portion of the sine wave, lines of magnetic force (flux) develop outward from the coil and continue to expand until the current is at its positive peak. The magnetic field is also at its positive peak. The current sine wave then begins to decrease, crosses zero, and goes negative until it reaches its negative peak. The magnetic flux switches direction and also reaches its peak in the opposite direction. With an AC power circuit, the current changes continually 60 times per second, which is standard in the United States. Other countries may use other frequencies. In Europe, 50 cycles per second is common.

Strength of a magnetic field depends on the amount of current and number of turns in the winding. 3_____ When the current is switched off, the magnetic field collapses.

When a coil is placed in an AC circuit, as shown in figure 2, current in the primary coil will be accompanied by a constantly rising and collapsing magnetic field. When another coil is placed within the alternating magnetic field of the first coil, the rising and collapsing flux will induce voltage in the second coil.

When an external circuit is connected to the second coil, the induced voltage in the coil will cause a current in the second coil. The coils are said to be magnetically coupled; they are, however, electrically isolated from each other.

Many transformers have separate coils, as shown in Figure 2, and contain many turns of wire and a magnetic core, which forms a path for and concentrates the magnetic flux. The winding receiving electrical energy from the source is called the primary winding. The winding which receives energy from the primary winding, via the magnetic field, is called the 'secondary' winding.

The amount of voltage induced in each turn of the secondary winding will be the same as the voltage across each turn of the primary winding. The total amount of voltage induced will be equal to the sum of the voltages induced in each turn. Therefore, if the secondary winding has more turns than the primary, a greater voltage will be induced in the secondary; and the transformer is known as a step-up transformer. If the secondary winding has fewer turns than the primary, a lower voltage will be induced in the secondary; and the transformer is a step-down transformer. 4_____

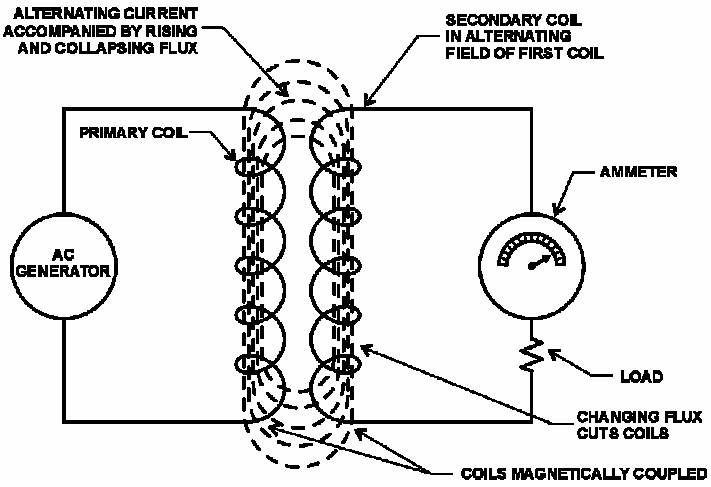


Figure 2. Transformer action

In actual practice, the amount of power available from the secondary will be slightly less than the amount supplied to the primary because of losses in the transformer itself.

The voltage induced in the primary circuit opposes the applied voltage and is known as back voltage or back electro-motive-force (back EMF). When the secondary circuit is open, back EMF, along with the primary circuit resistance, acts to limit the primary current. Primary current must be sufficient to maintain enough magnetic field to produce the required back EMF.

When the secondary circuit is closed and a load is applied, current appears in the secondary due to induced voltage, resulting from flux created by the primary current. This secondary current sets up a second magnetic field in the transformer in the opposite direction of the primary field. Thus, the two fields oppose each other and result in a combined magnetic field of less strength than the single field produced by the primary with the secondary open. 5_____ The primary current increases until it reestablishes the total magnetic field at its original strength.

In transformers, a balanced condition must always exist between the primary and secondary magnetic fields. Volts times amperes must also be balanced on both primary and secondary.

The required primary voltage and current must be supplied to maintain the transformer losses and secondary load.

Taken from https://www.usbr.gov/tsc/techreferences/mands/mands-pdfs/Trnsfrmr.pdf

4. Decide whether the statements are true or false and correct them if necessary.

1. A transformer usually comprises an iron core, two windings and some continuously moving parts.

2. Alternating magnetic flux induces voltage in both the first and second windings.

3. Each transformer phase has two cores with windings wound on them.

4. Three-limbed core is used in three-phase transformers, each limb carrying both the primary and secondary winding.

5. The magnetic field and the current sine waves are similar.

6. When coils are magnetically coupled, a current is induced in the second coil by the voltage.

7. The turns ratio in the primary and secondary windings is directly proportional to the current ratio in the primary and secondary windings.

8. In actual practice, the applied voltage is slightly greater than the induced EMF in the secondary windings.

9. Back voltage and resistance in the primary circuit reduce the primary current if the secondary circuit is closed.

10. A combined magnetic field increases the primary current by reducing the primary back EMF.

5. a) Work individually. Use the prompts to make questions. Change the form of the verb, add the auxiliary one and the proper prepositions if necessary.

b) Work in pairs. Ask and answer the questions with your partner.

Part I Principles of operation.

1. How / can a transformer / define?
2. What / happen / when an alternating voltage / apply / the core?
3. What / the alternating magnetic flux induce?
4. What / the essential constituents / a transformer?
5. What insulation / be / use / a transformer?

Part II Transformer Action

1. How / a transformer work?
2. How / the current change influence / the magnetic flux sine wave?
3. What / the strength / a magnetic field depend /?
4. What / the current / the primary coil be / accompany / when a coil / be / place / an AC circuit?
5. When / the coils / say / to be magnetically coupled?
6. What windings / call / the primary and the secondary?
7. How / the number / turns influence the voltage induced?

Language in Use

6. Match pairs of synonyms. Then work in pairs. Choose any four and give definitions so that your partner could guess the word.

1. voltage	a) action
2. wire	b) opposition
3. terminal	c) limb
4. proportion	d) lead
5. flux	e) tension
6. resistance	f) device
7. load	g) end
8. leg	h) flow
9. operation	i) burden
10. apparatus	j) ratio

7. Choose the proper adverb to complete the English sentences. There is one extra adverb.

slightly – respectively – continuously – essentially – ideally – similarly – greatly – exactly – usually

1. A transformer consists … of a steel core on which the primary and the secondary winding are wound.

2. Voltage and current … have different values in different windings.

3. The secondary terminal voltage is … greater than the induced e.m.f. in the secondary winding.

4. The induced back e.m.f. in the primary winding … neutralises the applied e.m.f.

5. … moving parts are not used in a transformer.

6. The voltage ratio does not … differ from the turns ratio.

7. … to the voltage, the current can either be increased or reduced by the transformer.

8. The resistance in the primary and secondary windings are R_1 and R_2 ….

8. Read the text below and choose the word a), b), c) or d) which best fits the space.

Equivalent Circuit

In 1) … engineering and science, an equivalent circuit refers to a 2) … circuit that retains all of the electrical characteristics of a given circuit. Often, an equivalent circuit is sought that simplifies calculation, and more broadly, that is the simplest form of a more complex circuit in order to aid analysis. In its most common form, an equivalent circuit is made up of linear, 3) … elements. However, more 4) … equivalent circuits are used that approximate the 5) … behaviour of the original circuit as well. These more complex circuits are often called macro models of the original circuit. An example of a macro model is the Boyle circuit for the 741 operational amplifier.

Equivalent circuits can also be used to electrically describe and model either a) 6) … materials or biological systems in which current does not actually flow in defined circuits, or, b) distributed reactances, such as found in electrical 7) … or windings, that do not represent actual discrete components. For example, a 8) ... membrane can be modelled as a capacitance (i.e. the lipid bilayer) in 9) … with resistance-DC voltage source combinations (i.e. ion channels powered by an ion 10) … across the membrane).

1	a) mechanical	b) electrical	c) physical	d) chemical
2	a) electrical	b) practical	c) theoretical	d) empirical
3	a) passive	b) active	c) enthusiastic	d) unable
4	a) compound	b) primitive	c) simple	d) complex
5	a) straight	b) curved	c) nonlinear	d) linear
6	a) continuous	b) constant	c) permanent	d) stable
7	a) components	b) conductor	c) lines	d) wires
8	a) pigeonhole	b) cell	c) battery	d) cage
9	a) line	b) succession	c) parallel	d) series
10	a) change	b) gradient	c) shift	d) slide

9. Put the words in the correct order to make sentences about transformer operation. The first and the last words are in the right places.

1. The main, between, of, transformer, mutual, two, principle, is, operation, a, inductance, circuits.

2. A basic, coils, that transformer, of, two, electrically, are, and, separate, consists, inductive.

3. Mutual, two, or, energy, windings, induction, between, allows, electrical, to be, between, transferred, more, circuits.

4. The alternating, continually, the, that, current, surrounds, flowing, the, flux, produces, winding, a, and, changing, alternating, through, winding.

5. If another, second, is, winding, to, brought, some, close, winding, this, this, portion, of, link, will, alternating, with, flux, the, winding.

6. According, be, electromagnetic, in, Faraday's, to, the, law, of, an, induction, there, second, will, induced, EMF, winding.

7. If the circuit, is, this, will, secondary, of, closed, then, winding, a, flow, current, through it.

Grammar Revision: Focus on Participle

GRAMMAR FOCUS I

Participle	**Active**	**Passive**
Present (Participle I)	showing (V + ing)	being + shown (V + ed/V_3)
Perfect Participle	having + shown (V + ed/V_3)	having + been + shown (V + ed/V_3)
Past (Participle II)	----------	shown (V + ed/V_3)

1. Use the proper form of the verb given in brackets. Each of the five forms should be used only once.

1. … (study) Faraday's Law, the students were able to cope with the lab work.

2. … (discuss) for several months, the engineering problem was finally solved.

3. Not … (know) the law of electromagnetic inductance, you won't understand the principle of transformer operation.

4. The data … (obtain) could be used for designing the new model.

5. … (perform) carefully, the experiment demonstrated positive results.

2. Study Grammar Focus II and write 8 sentences of your own for each rule using vocabulary of the unit.

GRAMMAR FOCUS II

Use **Present Participles** to describe what sb or sth is and **Past Participles** to describe how sb feels as adjectives.

Use **Present** and **Perfect Participles** to explain the reason for something (Participle Construction).

Use **Present Participles** to talk about actions happening at the same time (Participle Construction).

Use **Present** and **Past Participles** instead of some Relative Clauses.

Use **Perfect Participles** to talk about past actions happening in sequence (Participle Construction).

3. Complete the table and fill in the gaps in the sentences below with proper Participle.

Verb	Participle I **-ing**	Participle II **-ed**
define	**…**	…
…	…	moved
apply	…	…
…	neglecting	…
provide	…	…
…	neutralising	….
…	…	induced
…	…	magnetised

1. Transformer can be … as a piece of apparatus which transforms alternating voltage or current from one value to another.

2. … a current transformer, we can't but mention that it is also called an instrument transformer.

3. It is well-known that … parts are not usually used in a transformer.

4. Two electric circuits are wound on a core, so they can't be … from one place to another.

5. … an alternating voltage to the terminals of the primary winding, when

the secondary winding is open-circuited, we should remember that the apparatus will behave like a choking coil.

6. The primary … voltage is slightly larger than the back induced EMF on the account of the voltage drops.

7. The stress on the insulation can't be … as it is the greatest between the first and the second turns counting from the end of the high-voltage winding.

8. … losses or magnetising current, the students will not be able to learn the efficiency of the transformer.

9. … adequate insulation in the meter, we can avoid accidents in measuring practice.

10. Clearances between conductors or other live parts cannot always be … in voltage transformers.

11. The applied EMF is exactly … by the back EMF.

12. … the temperature variations in the spring, the second control spring is fitted at the other end of the moving-coil instrument and wound in the opposite direction.

13. The … secondary EMF is slightly greater than the secondary terminal voltage.

14. … an EMF in the circuit linked with the flux, we should know that the number of flux linkages changes.

15. The moving iron type of mechanism consists of a fixed coil of wire … a small piece of iron on the spindle of the instrument.

16. If the iron is … in the reverse direction, the process is repeated.

Translation Practice: Ukrainian into English

10. Translate the following sentences into English using the verbs from the box. Pay attention to the use of Participles.

to wind	***to transform***	***to behave***	***to induce***	***to be***	***to allow***
to connect	***to cause***	***to increase***	***to decrease***		

1. Трансформатор це саме той прилад, що складається з залізного осердя, на якому намотані первинна та вторинна обмотки.

2. Вище згаданий трансформатор це прилад, який за допомогою електромагнітної індукції перетворює змінні напругу та струм в одній обмотці в альтернативні напругу та струм в іншій або інших обмотках.

3. Вчені вважають, що прилад поводить себе як дросельна котушка, коли до клем первинної обмотки подається змінний струм, при цьому коло вторинної обмотки – розімкнене.

4. Коли змінний електромагнітний потік встановлений в первинній обмотці, а також у витках воринної обмотки, то індукується зворотна електрорушійна сила, при цьому кількість вольт на один виток однакова в обох обмотках.

5. В той час коли індукована електрорушійна сила в первинній обмотці трохи менша, ніж прикладена напруга, вторинна обмотка має трохи більшу напругу, ніж напруга на клемах вторинної обмотки через падіння напруги в колі.

6. Ідеальний трансформатор, не маючи додаткового обладнання, не допускає втрат або струму намагнічування.

7. Оскільки первинні опір та реактивний опір під'єднані послідовно до первинної обмотки, то і вторинні опір та реактивний опір під'єднані послідовно, проте до вторинної обмотки.

8. Тоді як реактивна складова струму холостого ходу є струмом намагнічування залізного осердя, активна складова спричиняє втрати заліза в цьому ж осерді.

9. Відомо, що кількість витків у первинній та вторинній обмотках зворотно пропорційна первинному та вторинному струмам.

10. Коли первинна прикладена напруга збільшується, зворотна індукована електрорушійна сила зменшується за рахунок падіння наруги, яку спричиняють первинні опір та реактивний опір.

Listening Comprehension

11. Watch the video 'How does a transformer work?' (*https://www.youtube.com/watch?v=vh_aCAHThTQ) and do the following tasks.*

Before watching the video:

a) Answer the following questions:

1. Is transformer an electrical device or instrument?
2. What is a transformer construction?
3. What is the basic working principle of a transformer?

b) Match the expressions with their definitions.

1	working principle	a) the production of an electric or magnetic state by the proximity (without contact) of an electrified or magnetised body
2	electromagnetic induction	b) a body or substance having a high susceptibility to magnetisation, the strength of which depends on that of the applied magnetising field, and which may persist after removal of the applied field
3	magnetic flux	c) an unstable, varying region around a magnetic material or a moving electric charge within which the force of magnetism acts
4	electromotive force	d) an arrangement of parts or elements in a particular form in an electrical device consisting of coiled wire
5	ferromagnetic material	e) a natural law forming the basis for the construction or working of a machine
6	fluctuating magnetic field	f) a difference in potential that tends to give rise to an electric current
7	coil configuration	g) a set of steel plates forming the core of an electric transformer
8	steel laminations	h) a measure of the strength of a magnetic field over a given area perpendicular to it

12. Watch the video and state whether the statements are true or false. Correct the false ones.

1. Transformer's work is based on a varying magnetic flux.
2. A magnetic flux is produced around a current-carrying conductor.
3. Alternating current has the fluctuating nature.
4. The EMF in the primary coil is induced due to electromagnetic induction.
5. If there are fewer turns in the secondary than in the primary winding, we can lower the voltage.
6. The low voltage windings are usually connected in a star configuration.
7. Thin insulated steel laminations are used to reduce energy loss.

8. For cooling purposes, the transformer is immersed into oil which absorbs the heat.

13. Complete the sentences with missing words/expressions from the video.

1. According to the principle of electromagnetic induction, a varying magnetic flux associated with the loop will induce ….
2. A current-carrying conductor produces ….
3. The fluctuating magnetic field will induce ….
4. Since the turns are arranged in a series, the net EMF induced across the winding will be ….
5. The EMF per turn for both the primary and secondary coils will be ….
6. In three-phase transformer the primary and secondary coils sit ….
7. The core of the transformer is made of ….
8. Usually, the transformer is immersed in cooling oil to ….

Oral Interaction

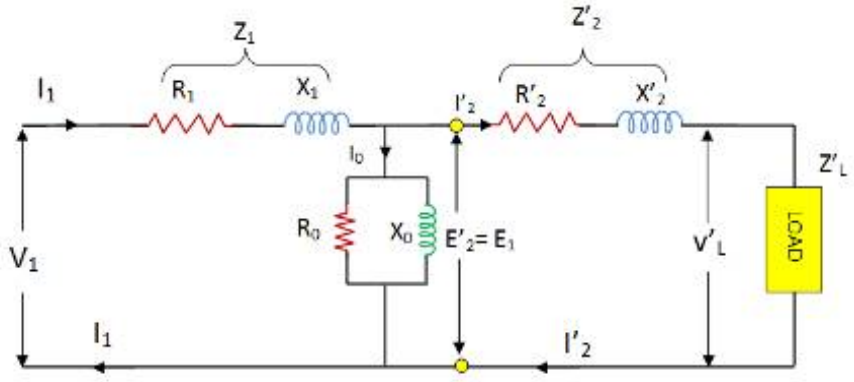
14. Work in pairs. Play the game 'Guess the word'.

Student A: turn to Resource Pack p.194.

You are Student B. Look at the words below and explain what they mean without using the word itself. Students A must guess the word. Then you will guess the word the explanation of which you hear from Student A.

equivalent circuit / induction / clearance / flux / potential

15. Work in pairs. Study the equivalent circuits of a transformer shown in figure below and match the formulae and mathematical expressions. Discuss and add three other formulae and their mathematical expressions to the table.

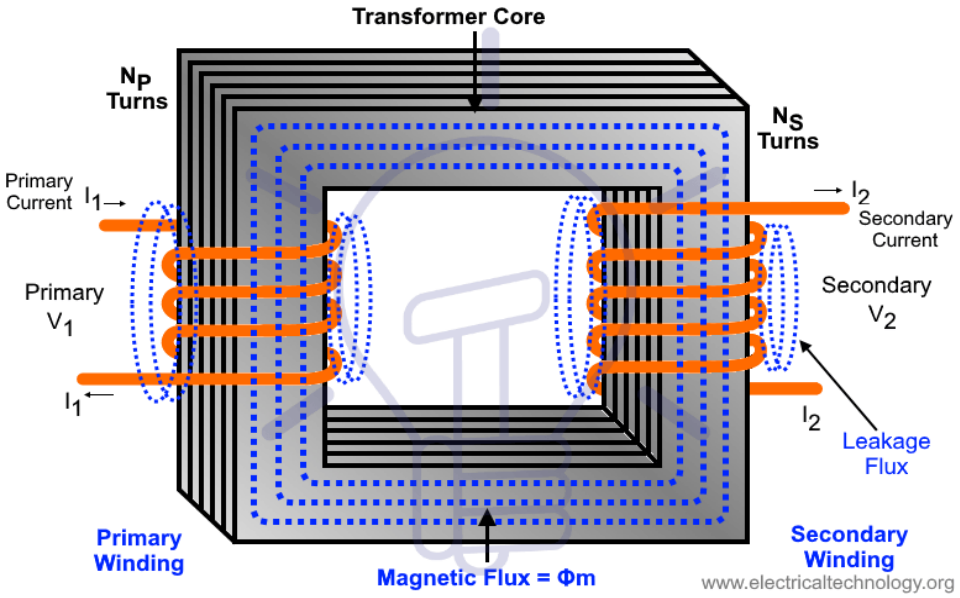


http://www.electricalunits.com/equivalent-circuit-diagram-of-transformer/

	Formula	Mathematical Expressions
1	$\frac{V1}{V2} > \frac{T1}{T2}$	The back induced EMF is related to the induced secondary EMF as the turns in the primary winding are related to the turns in the secondary one.
2	$E_2 \geqslant V_2$	The back induced EMF is less than the primary applied voltage.
3	$\frac{I_2}{I_1} = \frac{T_1}{T_2}$	The ratio of the secondary current to the total primary current equals to the ratio of the turns in the primary and secondary windings.
4	$E_1 < V_1$	The induced secondary EMF is greater than the secondary terminal voltage.
5	$\frac{E1}{E2} = \frac{T1}{T2}$	The voltage ratio is greater than the turns ratio

16. Using the prompts and the picture below explain to an international student from your department the principles of transformer operation:

1. Transformer function.
2. Transformer construction.
3. Transformer action.



https://cutt.ly/ATbEG85

17. Pairwork activity "Asking about Equivalent circuits". Each of you will get a different card with information about equivalent circuits. Read your card and ask your partner the questions to complete the missing information on your card (see Resource Pack, p. 194.).

Written Production

18. Write the passage (120-180 words) about transformer operation using the following expressions in the given order.

The transformer – moving parts. It consists – iron core – wound. The working principle – Faraday's Law of Electromagnetic Induction.

When the primary winding – the AC supply, the current – the primary winding. Since this winding – to the magnetic core, the current through – produces an alternating magnetic flux in the core. Since this flux – in nature and – linked with - winding, a mutually induced EMF - the secondary winding.

When a load – the secondary winding, the current – in the winding. Thus, the energy – the secondary winding – of electromagnetic induction. This transfer – the change in frequency.

The alternating magnetic flux produced in – links not only with – but also with the primary winding – a self-induced emf in the primary winding itself. This induced EMF – the applied voltage – Lenz's Law and – EMF – back EMF.

19. Find modern transformers or different models of them online and leave a comment / a series of comments (80-100 words) on the website to clarify some characteristics.

Self-Check 2.1

Choose the appropriate word to fill in the gaps in the sentences below.

Vocabulary

1. Transformer's work depends upon magnetic lines of force which can also be called ….

a) stream b) current c) flow d) flux

2. Both the primary and the secondary windings are usually wound on the same ….

a) core b) coil c) armature d) anchor

3. The core is usually made from very thin … laminations

a) iron b) steel c) metal d) silicon

4. Magnetically coils are not electrically connected to each other.

a) doubled b) paired c) coupled d) connected

5. The primary and secondary magnetic … must always be balanced.

a) fields b) lines c) fluxes d) forces

Grammar

1. The alternating magnetic flux induces an EMF in the turns of the secondary winding, the volts per turn … the same for both windings.

a) been b) being c) having been d) have been

2. The secondary circuit … and a load being applied, current appears in the secondary due to induced voltage.

a) closed b) having closed c) having been closed d) being closed

3. The two fields … each other result in a combined magnetic field.

a) opposing b) having opposed c) opposed d) being opposed

4. A varying magnetic flux … with the loop will induce an electromotive force across it.

a) has associated b) having associated c) associated d) associating

5. The power … from the primary to secondary coil, causes various kinds of energy loss

a) transferred b) having been transferred c) having transferred d) being transferred

Correcting mistakes

Work in pairs. Do the tasks and discuss the results with your partner.

a) Find 6 grammar mistakes (usage of participles) in the passage below and correct them.

An equivalent circuit is a simplifying model of an existing circuit that greatly simplifies the analysis of an original circuit. Any circuit will have an equivalent for specific parameters, such as signal frequency, component temperature and other factors, such as transducer inputs.

There are equivalent circuits for all types of circuits with all types of components. Transformers provide power through a secondary winding when power in the primary winding is providing. The transformer equivalent circuit helps in explaining the detailing characteristics of the real world transformer. An ideal transformer will not drain any power when there is no load at the secondary winding, but a real world transformer with an energised primary winding and disconnecting secondary winding will still drain power. The equivalent transformer circuit, due to the nature of core losses, will present a parallel core resistance or a resistance that does not exist, but can be seeing by the power source. A transformer equivalent circuit has an ideal transformer on the output with multiple distributing inductance, capacitance and resistance on the input.

b) Explain the role of equivalent circuits in the theory of electrical engineering to your partner and correct vocabulary and grammar mistakes if necessary.

Unit 2.2. Cooling methods of a transformer

Lead-in

Discuss these questions with your partner.

- *Why is it necessary to cool a transformer?*
- *What methods of cooling are used in them?*
- *What can the method of cooling depend on?*

https://cutt.ly/OTOfpZX

Reading Comprehension

1. Match the technical term with its definition, then choose any five and make sentences of your own.

	English	**Ukrainian**
1.	Excessive temperature	a) Охолоджуюча поверхня
2.	Surrounding air	b) Зовнішні радіатори
3.	Corrugated exterior	c) Витрати на виробництво
4.	Radiating surface	d) Навколишнє повітря
6.	Heat dissipation	e) Ізоляційне масло
7.	Oil pumps	f) Надмірна температура
8.	Manufacturing costs	g) Розсіювання тепла
9.	External radiators	h) Горючі гази
10.	Insulating oil	i) Рифлена зовнішня поверхня
11.	Combustible gases	j) Ізоляційна міцність
12.	Dielectric strength	k) Масляні насоси

2. Match the words and collocations with their definitions.

1. duct	a) a balance between two opposing things
2. absorb	b) a distensible membranous sac (usually containing liquid or gas)
3. tradeoff	c) become worse or disintegrate
4. contaminant	d) take in liquid or gas from the surface or space around something
5. deteriorate	e) the process or result of becoming smaller
6. tightly sealed	f) a pipe or tube that liquids or air pass through
7. contraction	g) a substance that makes something dirty
8. bladder	h) securely fixed or fastened and closed

3. Read the text about the Methods of Cooling and make three questions about the facts you did not know before.

Methods of Cooling

Various methods of cooling transformers are used in practice, depending upon the size and local conditions. Increasing the cooling rate of a transformer increases its capacity. Cooling methods must not only maintain a sufficiently low average temperature but must prevent an excessive temperature rise in any portion of the transformer (i.e. it must prevent hot spots). For this reason, working parts of large transformers are usually submerged in high-grade insulating oil. This oil must be kept as free as possible from moisture and oxygen, dissolved combustible gases, and particulate.

Ducts are arranged to provide free circulation of oil through the core and coils; warmer and lighter oil rises to the top of the tank, cooler and heavier oil settles to the bottom. Several methods have been developed for removing heat that is transmitted to the transformer oil from the core and windings.

Oil-Filled Self-Cooled Transformers

In small- and medium-sized transformers, cooling takes place by direct radiation from the tank to surrounding air. In oil-filled, self-cooled types, tank surfaces may be corrugated to provide a greater radiating surface. Oil in contact with the core and windings rises as it absorbs heat and flows outward and downward along tank walls, where it is cooled by radiating heat to the surrounding

air. These transformers may also have external radiators attached to the tank to provide greater surface area for cooling.

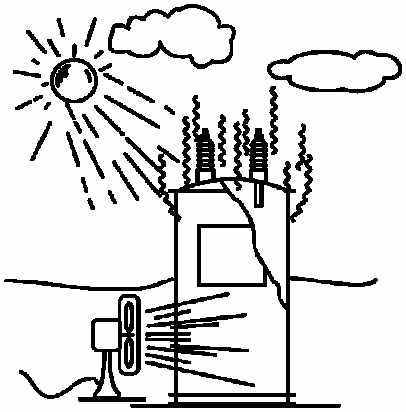


Figure 3. Cooling

Forced-Air and Forced-Oil-Cooled Transformers

Forced-air-cooled transformers have fan-cooled radiators through which the transformer oil circulates by gravity. Fans force air through radiators, cooling the oil.

Forced-air/oil/water-cooled transformers have a self-cooled (kVA or MVA) rating and one or more forced cooling ratings (higher kVA or MVA). Higher ratings are due to forced cooling in increasing amounts. As temperature increases, more fans or more oil pumps are turned on automatically.

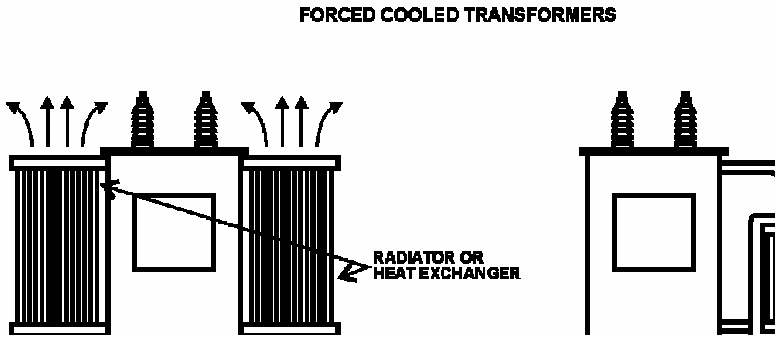


Figure 4. Forced-Air/Oil/Water-Cooled Transformers.

The forced-cooling principle is based on a tradeoff between extra cooling and manufacturing costs. Transformers with forced cooling have less weight and bulk than self-cooled transformers with the same ratings. In larger-sized transformers, it

is more economical to add forced cooling, even though the electricity needed to operate fans and pumps increases the operating cost.

Transformer Oil

In addition to dissipating heat due to losses in a transformer, insulating oil provides a medium with high dielectric strength in which the coils and core are submerged. This allows the transformers to be more compact, which reduces costs.

Insulating oil in good condition will withstand far more voltage across connections inside the transformer tank than will air. An arc would jump across the same spacing of internal energised components at a much lower voltage if the tank had only air. In addition, oil conducts heat away from energised components much better than air.

Over time, oil degrades from normal operations, due to heat and contaminants. Oil cannot retain high dielectric strength when exposed to air or moisture. Dielectric strength declines with absorption of moisture and oxygen. These contaminants also deteriorate the paper insulation. For this reason, efforts are made to prevent insulating oil from contacting air, especially on larger power transformers. Using a tightly sealed transformer tank is impractical, due to pressure variations resulting from thermal expansion and contraction of insulating oil. Common systems of sealing oil-filled transformers are the conservator with a flexible diaphragm or bladder or a positive pressure inert-gas (nitrogen) system. Smaller station service transformers have a pressurised nitrogen blanket on top of oil. Some station service transformers are dry-type, self-cooled or forced-air cooled.

Taken from https://eepower.com/technical-articles/current-transformer-operation-and-applications/

4. Decide whether the statements are true or false and correct them if necessary.

1. The transformer capacity depends on transformer cooling.
2. Very small transformers do not require special cooling arrangements.
3. Insulating oil must circulate freely through windings and the core.
4. In forced-air-cooled transformers the external radiator is cooled by fans.
5. Under no circumstances water shouldn’t get into the oil.
6. Forces cooling increases the manufacturing costs.
7. Transformer oil destroys the paper insulation.

8. Tightly sealed tanks are common in station service transformers.

5. a) Work individually. Use the prompts to make questions. Change the form of the verb, add the auxiliary one and the proper prepositions if necessary.

b) Work in pairs. Ask and answer the questions with your partner.

1. What methods / cooling transformers / you know?
2. What / the method / cooling depend on?
3. How / be / large transformers / cool /?
4. Why / be / ducts / arrange / to provide free circulation of oil / the core and coils?
5. Why / oil / contact / the core and windings / flow / along tank walls?
6. How / the desired increase / cooling surface / obtain /?
7. Why / the transformer oil / circulate / in forced-air-cooled transformers?
8. When / be / more fans or more oil pumps / turn / automatically?
9. How / forced cooling influence / the size / transformers?
10. What / happen / to the oil when it / be /affected / air or moisture?

Language in Use

6. Fill in the preposition from the box and translate the word collocations. There are two extra prepositions. Scan the text and check the answers.

to (×2) under through in (×2) upon on from with at

1. depend … the size
2. use … practice
3. submerge … oil
4. keep free … moisture
5. attach … the tank
6. turn … automatically
7. in contact … the core
8. rise … the top
9. force air … radiators

7. Match the antonyms. Then work in pairs. Choose any four and give

definitions so that your partner could guess the word.

1. Exterior	a) underneath
2. Cooling	b) minute
3. Top	c) liquid
4. Above	d) in front of
5. Enormous	e) heating
6. Solid	f) plain
7. Behind	g) interior
8. Corrugated	h) bottom

8. Fill in the gaps with the appropriate verb in the correct form (active or passive voice in a certain tense) and translate the sentences.

to substitute, to enclose, to confine, to occur, to gain, to depend, to prevent, to dissipate, to join, to abandon

1. The fuses are used in electric devices to _____the current from leaking off.
2. We can easily _____this piece of equipment by a similar one and the whole system will still work perfectly well.
3. When the surface of the tank is heated from the inside this heat _____into the atmosphere.
4. The transformer _____into the tank full of oil with the purpose of cooling.
5. A computer _____to the wall socket by means of a cord or a wire.
6. The skills of an engineer _____not _____to the operating electrical devices only.
7. By the look of that place we came to the conclusion that it ___long time ago.
8. It is well-known that mistakes and misprints _____almost in every textbook.
9. Having spent so many hours studying these schemes, we have _____a great advantage over our competitors.
10. Success of mankind in its struggle against contagious diseases will surely _____ on new scientific discoveries.

9. Put the words in the correct order to make sentences about transformer operation to learn why cooling methods are required.

1. In, copper, and, the, core, transformer, loss, the, losses, are, loss, main

2. The, occurs, core, winding, in, loss, the, of, the, and, core, transformer, copper, the, transformer, occurs, in, loss, of

3. These, increase, in, losses, thermal, appear, of, the, and, form, the, of, energy, transformer, temperature, the

4. Therefore, operation, heat, for, is, it, dissipate, to, transformer, reliable, life, from, the, and, long, necessary

5. If, properly, the, damages, of, heat, may, the, dissipated, insulation, the, not, transformer, get, is

6. Hence, control, essential, is, to, the, the, it, limits, of, transformer, within, permissible, temperature

7. The, used, mineral, coolants, for, oil, the, air, are, and, transformer

8. The, using, as, transformer, a, air, coolant, is, transformer, dry, as, known, type

9. The, oil, a, transformer, is, as, using, transformer, coolant, an, known, oil-immersed, as

10. The, method, and, of, type, of, choice, condition, on, size, depends, the, of, type, rating, application

10. Read the text below and choose the word a), b), c) or d) which best fits the space.

One of the most important characteristics of transformers is that it … 1) more heat energy and it needs to be … 2) in an efficient way, … 3) it would destroy … 4) the of the transformer. Basing on the cooling mechanism adopted, transformers are classified into two types: … 5) type transformer and liquid filled or oil … 6) transformer. These oil immersed power transformers use … 6) oil and cellulose paper in their insulation systems. This combination exhibits proper thermal and … 8) properties. This …9) is also relatively cheaper than the other options. But one negative point of such transformer is its flammability. This is the reason why oil transformers are usually restricted to … 10) installations.

1	a) scatters	b) dissipates	c) radiates	d) diffuses
2	a) frozen	b) refrigerated	c) cooled	d) chilled
3	a) otherwise	b) likewise	c) clockwise	d) contrariwise
4	a) seclusion	b) segregation	c) isolation	d) insulation
5	a) dry	b) dried	c) drying	d) dries
6	a) sunk	b) immersed	c) submerged	d) plunged
7	a) mineral-based	b) broadly-based	c) oil-bases	d) paper-based
8	a) electric	b) non-electric	c) dielectric	d) conductive
9	a) edition	b) opinion	c) variation	d) option
10	a) outdoor	b) indoor	c) inside	d) outside

Grammar Revision: Focus on Participle Constructions

GRAMMAR FOCUS

The **Nominative Absolute Participle Construction** is a combination of a noun in Common C pronoun in the Nominative case with the participle. The construction is formally independent rest of the sentence.

The construction is used in the function of an adverbial modifier:

1) of **cause**,
It being Sunday, there was no one in the University. (because it was Sunday)
Problems having been solved, we could start the project. (because the problem has been solved)

2) of **time**,
The sun having risen, he began working. (when the sun has risen)
His work finished, he went home. (when his work was finished)

3) of **condition**,
Time permitting, we'll finish this work next week. (if the time permits)

4) of **attendant circumstances**
They studied at the University for 5 years, John attending his classes all the time. (and John was attending his classes ...)

The **Prepositional Absolute Participle Construction** is introduced by the preposition ***with***. The construction is used in the function of an adverbial modifier of attendant circumstances.
Professor left the classroom, with the students following him. (and the students followed him)

1. Read the GRAMMAR FOCUS and rewrite the underlined parts of the sentences using Absolute Participle Constructions.

1. Because the transformer was submerged into oil, other methods of cooling weren't necessary.

2. Very small transformers are cooled naturally by the atmosphere, and no special cooling arrangements are necessary.

3. If a transformer operates on the lower voltages, a blast of cold air will be forced over the transformer windings.

4. Slightly larger transformers are oil-immersed, and the object of the oil is twofold.

5. When the electricity was cut off, all the equipment stopped working.

2.Change the following sentences according to the given example.

As the lecture was over, the students went to the laboratories.

The lecture being over, the students went to the laboratories.

1. As small tanks are made with a plain exterior, sufficient cooling surface is obtained in this manner.

2. As oil is heated again by the transformer, the cycle of operation is repeated.

3. If transformers are designed for use with an external oil cooler, the whole dissipation takes place in the oil cooler.

4. When an alternating magnetic flux is set up, a back e.m.f. is induced in the primary winding.

5. The alternating magnetic flux also induces e.m.f.in the turns of the secondary winding and the volts per turn are the same in both windings.

6. After the plant had been put into operation, the regular electricity cuts stopped.

7. The secondary winding of a current transformer is usually constructed to deliver 5 amperes to the meter when rated primary current flows in the main circuit.

8. The use of the oil-expansion chamber reduces the tendency of the oil to form sludge, since the access of atmospheric oxygen is effectively prevented.

3. Point out the Nominative Absolute Participal Constructions and Prepositional Absolute Participal Constructions and state what kind of adverbial

modifier they express. Translate the sentences.

1. My task having been finished, I went out of the lab.

2. The lecturer having informed us that it was 2 hours' work, we started immediately.

3. It being very cold, they decided to switch the heating on.

4. The student was doing the lab work, with his eyes carefully watching the meters.

5. The transformer worked properly, with metal vibrating thanks to alternating magnetic field caused by 25000 volts.

6. Transformers being used in many different devices, there are many methods of their cooling.

7. The key having been lost, we couldn't open the door.

8. The non-sludging oils should be used in transformers, working temperature of the oil exceeding 80°C.

Translation Practice: Ukrainian into English

11.Translate the sentences using Participle Constructions.

1. Оскільки трансформатори використовуються в багатьох приладах, різноманіття методів їхнього охолодження, з одного боку, залежить від їхнього розміру, а з іншого від навколишніх умов.

2. Вважається, що рівна зовнішня поверхня забезпечує достатнє охолодження в маленьких трансформаторах, а в значно більших трансформаторах ребриста зовнішня поверхня дозволяє збільшити площу охолодження.

3. Якщо трансформатори оздобити рядом труб, що йдуть зверху вниз зовні баку, ви отримаєте бажане збільшення охолоджуючої поверхні.

4. Коли в трансформаторах масло, яке безпосередньо контактує з трансформатором нагрівається, воно піднімається і витікає попадаючи в труби у верхній частині баку.

5. Охолонувши, масло стікає вниз, знову потрапляючи в бак в його нижній частині.

6. Якщо існують трансформатори, які охолоджуються за допомогою зовнішніх масляних охолоджувачів, де відбувається практично повне розсіювання тепла, то повинні існувати трансформатори, які охолоджуються

природнім шляхом, за допомогою навколишнього середовища.

7. Якщо навіть маленька кількість води потрапить у масло, його ізолюючі властивості значно знизяться.

8. Саме трансформатори, що працюють на більш низьких напругах, повинні охолоджуватись за допомогою потоку повітря направленого на обмотки.

12. Translate the following sentences into English paying attention to the position of the adverbs. Mind that adverbs of frequency (e.g. often, always, usually, etc.) are placed after the auxiliary verb, but before the main verb, e.g. *We <u>have</u> already <u>tested</u> these devices and they are totally ready for the operation.*

1. Методи охолодження трансформаторів зазвичай залежать від їх розміру та умов розташування.
2. Масло є безумовно кращим діелектриком, ніж повітря.
3. Маленькі баки часто мають достатньо велику поверхню для охолодження.
4. Більші за розміром баки мають більш зручну трубчасту конструкцію.
5. Масло нагрівається і, відповідно, піднімається.
6. Трансформатори, що працюють на низьких напругах, зазвичай охолоджуються за допомогою повітря.
7. Для занурення трансформаторів завжди використовується технічне масло.
8. Трансформатор повинен бути повністю занурений у масло для ефективного охолодження.

Listening Comprehension

13. Watch the video 'Transformer Cooling Fans Intelligent Control MTeC® MR' (<u>https://www.youtube.com/watch?v=--cdAis1bH8</u>) and do the following tasks.

Before watching the video:

a) Discuss the following questions:

1. What can cause failure in a transformer?

2. Why is it necessary to monitor winding and oil temperature in the transformer?

b) Match the words and collocations with their meanings.

1	Ambient conditions	a) the amount of time that something lasts
2	Thermal ageing	b) use something for a particular purpose
3	Longevity	c) easy to read and understand as soon as you see it
4	Hot spot	d) to find the origins of when something began or where it came from
5	Lifespan	e) the process of getting old because of heat influence
6	At a glance	f) a place where there is likely to be a problem
7	Allocate to	g) the state of the surrounding area which affects the way something happens
8	Trace back	h) the average length of time that something will continue to work

14. Watch the first half of the video (00.00-02.53) and state whether the statements are true or false. Correct the false ones.

1. Load and ambient conditions decrease the lifespan of the transformer cooling system.
2. Some problems of transformer operation can be closely connected with the insulating system.
3. The cooling system of a transformer should work constantly to prevent overheating of the windings.
4. Precise temperature indicators can decrease temperature fluctuations by initiating appropriate cooling measures.
5. Pumps and fans can work even when it is unnecessary without any consequences.
6. The MTeC devices can ensure intelligent control of transformer cooling.
7. The MTeC can calculate how long your transformer will work.
8. The MTeC system can be programmed for each menu item.

15. Continue watching (02.54-05.27) and complete the sentences with necessary information.

1. Navigation through the individual menu is ….

2. The inputs and outputs can be parameterised as ….

3. It is possible to configure the individual switching contacts so that they are allocated to either ….

4. Min/max values for the oil and winding temperature as well as the maximum load current are ….

5. To make all the settings of the MTeC you should use ….

6. To monitor winding temperature and oil level it is necessary … the functionality of the MTeC system with additional circuits.

7. To ensure that overheating does not damage the insulation of the transformer … of the winding is necessary.

8. An evaluation of the maximum economic efficiency depends on ….

16. After watching the video, fill in the gaps with the words from the box to complete the information about the functions of MTeC system.

the individual fan	vital	simultaneously	the central display	the input and output
data logging	equally	utilization	the requirements	modularity

The MTeC system meets all … 1) of IEC and ANSI standards. The load-dependent temperature monitoring controls transformer temperature within the required limits and … 2) reduces fan and pump operation. The additional load change circuit ensures that the individual fans are … 3) loaded.

The most important functions such as power, alarm, trip, error and the operational state of … 4) can be seen on the LEDs. All the information for operation and programming for the MTeC system is indicated on … 5). Moreover, … 6) parameters can be set as desired. MTeC can reveal the information about the transformer operation during the last few months with its … 7) function.

Function … 8) can also be applied in the MTeC system. However, a change to these new systems is … 9) to survival because power providers are forced to increase … 10) of their systems while employing fewer personnel.

Oral Interaction

17. a) Work individually. Your teacher will assign you one or two paragraphs (1-4) about different methods of cooling to fill in the gaps.

dissipation/ circulation/ coolers / pipes/ convection/ heat/ air/ water/ exchanger/ oil immersed/ radiator/ atmosphere

1. This method is used for … 1) transformers. In this method, the heat generated in the core and winding is transferred to the oil. According to the principle of … 2), the heated oil flows in the upward direction and then in the radiator. The vacant place is filled up by cooled oil from the radiator. The heat from the oil will dissipate in the atmosphere due to the natural air flow around the transformer. In this way, the oil in transformer keeps circulating due to natural convection and dissipating heat in … 3) due to natural conduction.

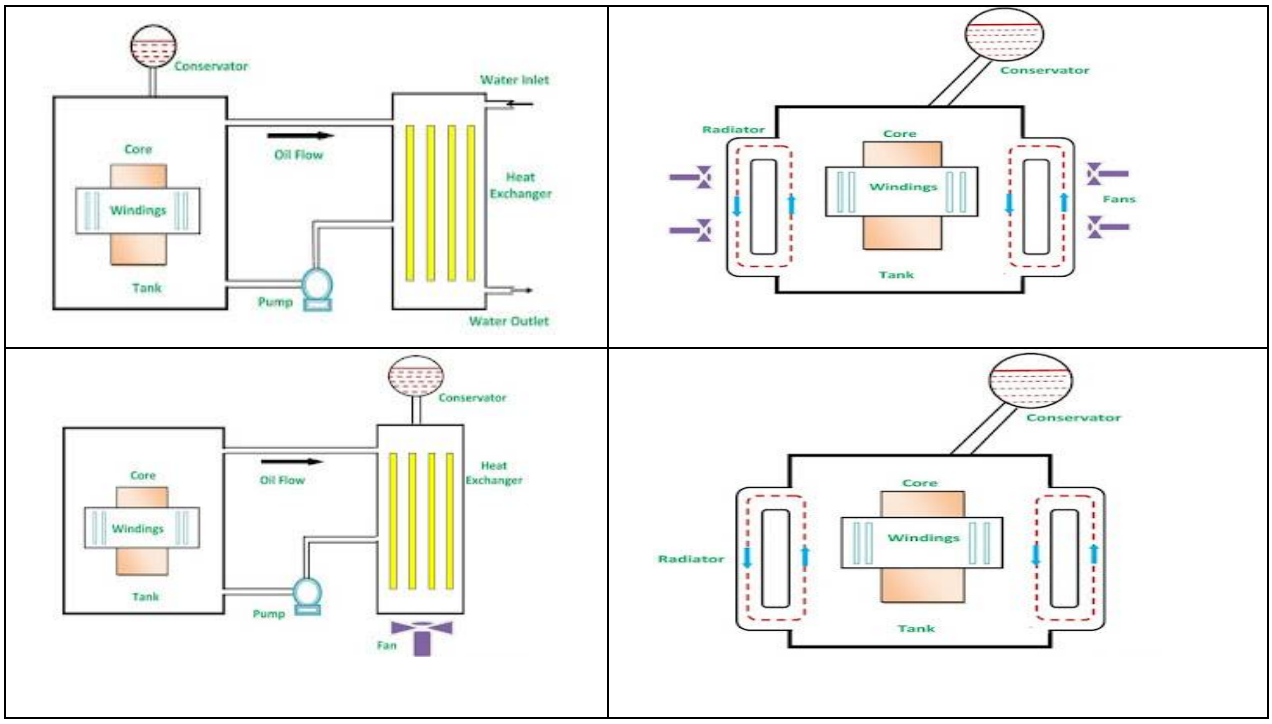
2. The heat … 4) can be improved further by applying forced air on the dissipating surface. Forced … 5) provides faster heat dissipation than natural air flow. In this method, fans are mounted near the … 6) and may be provided with an automatic starting arrangement, which turns on when temperature increases beyond certain value.

3. In this method, oil is circulated with the help of a pump. The oil … 7) is forced through the heat exchangers. Then compressed air is forced to flow on the heat … 8) with the help of fans. The heat exchangers may be mounted separately from the transformer tank and connected through … 9) at top and bottom.

4. In this method forced … 10) flow is used to dissipate heat from the heat exchangers. The oil is forced to flow through the heat exchanger with the help of a pump, where the …11) is dissipated in the water which is also forced to flow. The heated water is taken away to cool in separate … 12).

b) Match your paragraphs with the methods of cooling mentioned below. Then match the method of cooling with the pictures in the box.

1. Oil Forced Water Forced (OFWF)
2. Oil Forced Air Forced (OFAF)
3. Oil Natural Air Natural (ONAN)
4. Oil Natural Air Forced (ONAF)



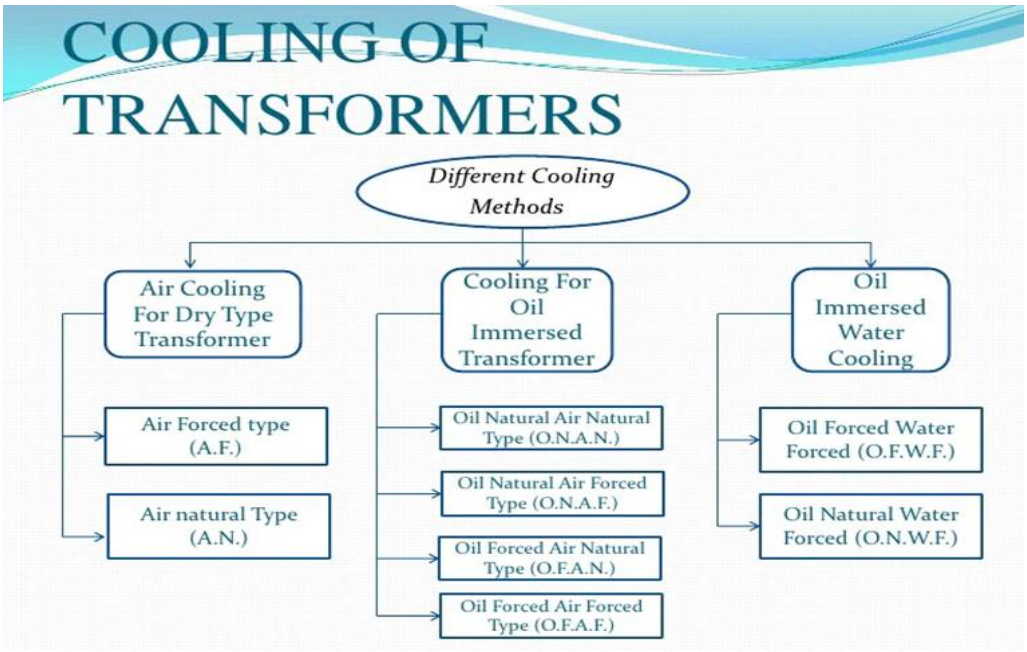
Taken from https://cutt.ly/WTOip4k

c) Work in pairs. Describe your method of cooling to your friend. Use the pictures and information above.

17. Work in groups. Discuss which method is the best for transformers up to about 30 MVA, up to about 60 MVA, for higher rating transformers at substations or power stations, as well as for very large transformers having rating of several hundred MVA.

Written Production

18. Summarise the information (120-180 words) about transformer cooling using the scheme below.



https://cutt.ly/ZTxREMF

Writing a review

19. Look through the website page of the company Ziehl-Abegg (https://www.ziehl-abegg.com/en/market-segments/transformers) and write its review (120-150 words). Follow the structure below and choose the format for your review of the website page (an article or an email). In addition, you can read about reviews on p. 196, Resource Pack.

WRITING FOCUS: Reviews	
Paragraph 1	
ARTICLE: background information	LETTER/E-MAIL: opening remarks; reasons for writing; background information
Paragraph 2 Main points of plot (book, film, etc.); regular features (magazine); tracks (album)	
Paragraph 3 General comments	
Paragraph 4	
ARTICLE: personal opinion with reasons; recommendation	LETTER/E-MAIL: your opinion with reasons; recommendations; closing remarks

Self-Check 2.2

Choose the appropriate word to fill in the gaps in the sentences below.

Vocabulary

1. … oil must be clean and practically free from moisture.

a) Isolated b) Isolating c) Insulating d) Insulation

2. Rather larger transformers' tanks are made with a … exterior to increase the cooling surface.

a) corrugated b) fluted c) crimped d) frilled

3. Forced-air-cooled transformers are equipped with … which force air through radiators, cooling the oil.

a) blasts b) blowers c) vents d) fans

4. The coils and core of a transformer … into insulating oil for cooling purposes.

a) submerge b) are submerged c) are sunken d) immerse

5. Heat and contaminants … the paper insulation.

a) decrease b) worsen c) deteriorate d) degrade

Grammar

1. The temperature …, more fans or more oil pumps will be turned on automatically.

a) increasing b) having been increased c) increased d) being increased

2. Forced cooling …, the operating cost of transformer greatly increased.

a) being added b) adding c) having added d) having been added

3. This transformer is cooled properly with the oil … heat.

a) being absorbed b) absorbed c) absorbing d) having absorbed

4. Oil-filled, self-cooled transformer worked well, oil constantly … outward and downward along tank walls,

a) flowing b) having flowed c) being flowed d) flowed

5. Transformer … with forced cooling, the weight and size could be substantially decreased.

a) having equipped b) having been equipped c) equipped d) equipping

Correcting mistakes

Work in pairs. Do the tasks and discuss the results with your partner.

a) Find an extra word in each line.

No transformer is truly an ideal type transformer, and hence	1___
each other will incur some losses most of which get converted into	2___
the heat if this heat is not dissipated properly. The excess	3___
temperature in transformer may be cause serious problems like	4___
insulation failure. It is as obvious that transformer needs a cooling	5___
system. Transformers can be divided into two types as though dry	6___
type transformers and as oil-immersed transformers. Air-Natural	7___
method of transformer cooling is generally used because in small	8___
transformers. In this method, the transformer is allowed to be cool	9___
by natural air flow than surrounding it. For transformers rated more	10___
than 3 MVA, cooling by natural air method is an inadequate. In this	11___
method air is forced by on the core and windings with the help of	12___
fans or blowers either. The air supply must be filtered to prevent the	13___
accumulation of dust over particles in ventilation ducts. This	14___
method can be both used for transformers up to 15 MVA.	15___

b) Make at least three sentences on the basis of the text above with the Absolute Participle Construction. Exchange these sentences with your partner and correct vocabulary and grammar mistakes if necessary.

Unit 2.3 Current transformer

Lead-in

Discuss these questions with your partner.

- *What are current transformers used for?*
- *What types of current transformers can you think of?*
- *Why do we need different types of current transformers?*

https://cutt.ly/OTOPMOK

Reading Comprehension

1. Match the technical terms 1-8 with their Ukrainian equivalents a-h, then choose any five and make sentences of your own.

	English	***Ukrainian***
1	Nameplate	a) шинопровід
2	Carrying capacity	b) навантаження на лінії
3	Destructive level	c) висока мангітопроникність
4	Heavy overcurrent	d) табличка з технічними даними
5	Busbar	e) руйнівний (нищівний) рівень
6	Line load	f) суміжні провідники
7	High permeability	g) сильне перевантаження по струму
8	Adjacent conductors	h) пропускна здатність

2. Match the term with its definition, then underline these terms in the text below.

1	Potential	a) a load, typically a heavy one

	transformer	
2	Iron core	b) an electrical connection made to some point between the end terminals of a transformer coil or other component
3	Reluctance	c) voltage decrease or loss in transmission line
4	Burden	d) a distinctive form in which a thing is made +
5	Line drop	e) a piece of soft iron forming the centre of an electromagnet or an induction coil
6	Mold	f) one of a set of iron plates forming the core of an electrical transformer
7	Tap	g) an apparatus for reducing or increasing the voltage
8	Lamination	h) the property of a magnetic circuit of opposing the passage of magnetic flux lines

3. Read the text about current transformers and choose the proper title to each paragraph. There are two extra options.

A.	Window Current Transformers
B.	Construction
C.	Turns of the primary winding
D.	Current Rating
E.	Wound Current Transformers
F.	Ratio of turns
G.	Bar Current Transformers
H.	Operation

CURRENT TRANSFORMERS

A current transformer is a device that is used for the transformation of current from a higher value into a proportionate current to a lower value. It transforms the high voltage current into the low voltage current due to which the heavy current flows through the transmission lines and is safely monitored by the ammeter.

The total power in a transformer is the same on the primary and secondary sides. The only way to step down the current is by stepping up the voltage. Therefore, a current transformer is a modified step-up voltage transformer.

The current transformer is used with the AC instruments, meters or control apparatus where the current to be measured is of such magnitude that the meter or instrument coil cannot conveniently be made of sufficient current carrying capacity.

1_____

Current transformers are unique because they usually have only one winding (see Figure 5). The primary is connected to the line load in series. When the primary has a high current rating, the primary winding may be a straight conductor that runs through the magnetic circuit's center. This straight conductor indicates a one-turn winding.

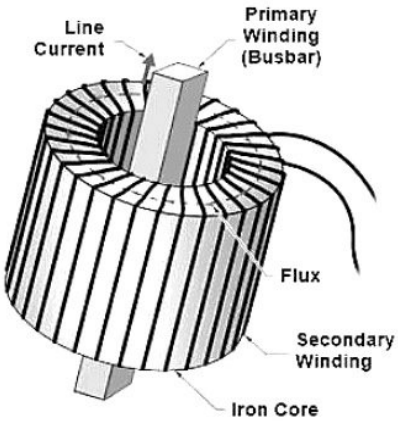


Figure 5. A current transformer typically has one pass of a conductor as the primary and many turns of wire for the secondary.

When the primary has a low current rating, the primary winding may consist of several turns wrapped around the core. This provides the required flux on low-current applications or to compensate for line drop to a power meter.

The secondary consists of many turns of wire wrapped around a core. The number of turns is determined by the desired turns ratio of the current transformer. The primary current of a current transformer is not controlled by the secondary, as it would be in a two-winding potential transformer. The secondary of a current transformer cannot affect the current in the primary, as the load on the feeder determines the primary current.

When the primary circuit is energised, the secondary of a current transformer must never be left open. When the circuit is operational, the load on

the secondary maintains low magnetising currents and thus low turn-to-turn potentials. When the secondary becomes an open circuit, the magnetising currents rise, and the current transformer acts as a step-up potential transformer. The voltage can rise to a destructive level and cause a short between the turns as the result of the degradation of the insulation. Therefore, a current transformer should always have its secondary shorted when not connected to an external load (see Figure 6.)

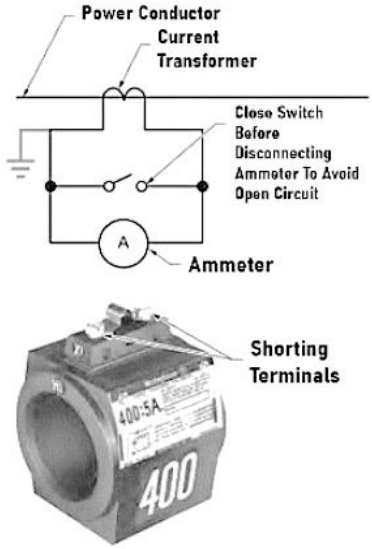


Figure 6. The secondary of a current transformer must be never left open.

2_____

All transformers have losses in power transfer from resistance, magnetising current, hysteresis, and other factors. These factors must be compensated for in the design of the transformer in order to ensure an accurate measurement.

A current transformer is constructed of high-permeability steel at the flux density at which the transformer operates. The flux density is kept to a low value so that the magnetising current is low. The circular coil of high-silicon steel provides the low-reluctance magnetic circuit needed to provide the necessary field strength for the secondary winding. For getting a high degree of accuracy Permalloy or Mumetal are used for making cores. The three types of current transformers in general use are the window, bar, and wound.

3_____

A window (torodial) current transformer is a transformer that consists of a secondary winding wrapped around a core and the primary sent through the opening in the core. After the secondary is wound around the core, the assembly is placed into a mold, and an insulating material is injected around the

transformer. Taps are brought out from the winding (see Figure 7). A power line is passed through the window and acts as the primary. This completed assembly is referred to as a window current transformer.

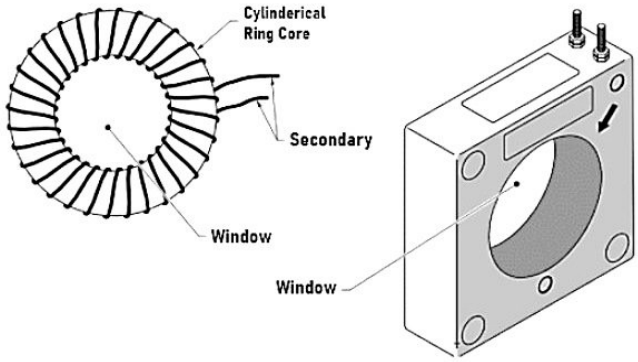


Figure 7. A window current transformer has an open area in the centre for a power line to be passed through as the primary.

4_____

A bar current transformer is a special type of window current transformer with a solid bar placed permanently through the window. A bar current transformer can withstand the stresses of heavy overcurrent. To avoid magnetic stresses that could destroy the bus and damage the transformer, care must be taken to properly mount these transformers with respect to adjacent conductors. This type of transformer is typically found on installations where the potential is 25kV or less (see Figure 8).

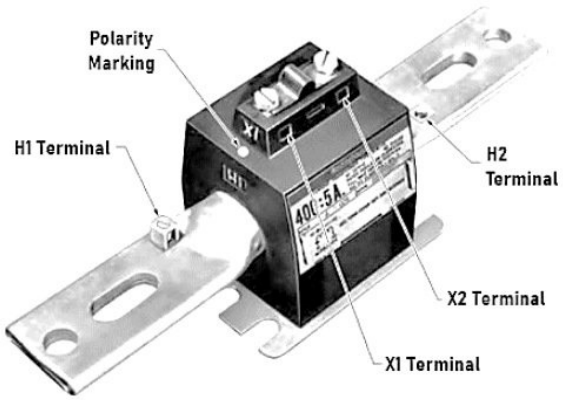


Figure 8. A bar current transformer has a bar permanently placed in the window. Primary connections are made on the bar.

5_____

A wound current transformer is a transformer with separate primary and secondary windings wrapped around a laminated core. A wound current transformer is designed so that the primary winding consists of one or more turns of large cross-section wire connected in series with the circuit to be measured. This kind of current transformer is located on the high-voltage side of substations and contains a primary conductor that carries the current and a wound current transformer for the output current (see Figure 9).

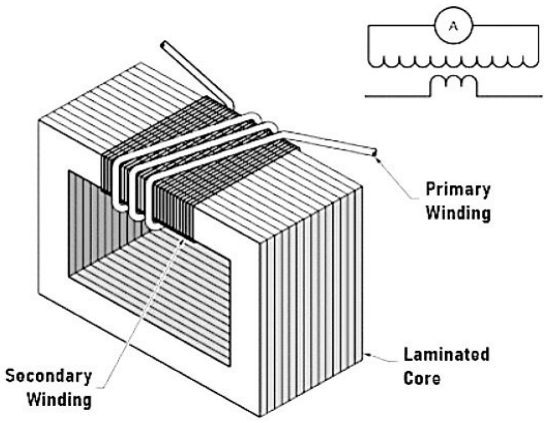


Figure 9. A wound current transformer has several turns of wire for the primary

6_____

The ratio of the primary current and the secondary current is known as a current transformer ratio of the circuit. The current ratio of the transformer is usually high. The secondary current ratings are of the order of 5A, 1A and 0.1A. The current primary ratings vary from 10A to 3000A or more. The current Rating of the primary winding of a current transformer is determined by the maximum value of the load current to be measured. The output of the secondary is current proportional to the primary current. The output is used to measure the primary current and used to provide power to the instruments used to make the measurement. The secondary of a current transformer is always rated at 5A, regardless of the current rating of the primary. This enables the production of standardised current devices rated at 5A. The nameplate would commonly have a rating like 400:5 to show that the secondary is designed to carry 5A.

For example, if the current Rating is 400 A with a secondary rating of 5A, the ratio between the primary and secondary is 400:5, or 80:1. This means that the secondary winding has 80 times as many turns as the primary, and the current

transformer can be used to measure a line load of 400A. The primary must be rated to withstand 400A.

Taken from https://eepower.com/technical-articles/current-transformer-operation-and-applications/

4. Decide whether the statements are true or false and correct them if necessary.

1. Current transformers usually reduce the current in transmission lines where it is necessary to measure the high-voltage current.
2. The primary winding usually comprises either one or a few turns of wire.
3. The secondary winding typically is typically wound around the core to control the primary current.
4. It is dangerous when the secondary of the current transformer is open-circuited.
5. Magnetising current, hysteresis, and other factors may affect the accuracy of measurements.
6. High-silicon steel called Permalloy or Mumetal is used to construct transformer coils.
7. The window type transformer is composed of only the primary winding.
8. The bar type current transformers has only one winding in the form of a busbar.
9. The wound type current transformer has two windings connected in series with the conductor that carries the measured current.
10. The secondary winding of a current transformer is usually constructed to deliver 5 amperes to the meter or instrument when rated primary current flows in the main circuit.

5. a) Work individually. Use the prompts to make questions. Change the form of the verb, add the auxiliary one and the proper prepositions if necessary.

b) Work in pairs. Ask and answer the questions with your partner.

1. What / be / a current transformer /use / for?
2. How and where / be / current transformers / use?
3. What / the number / turns / the primary winding / depend / on?
4. What / be / the number of turns / the secondary winding / determine / by?

5. Why should a current transformers secondary winding be never / leave / open-circuited?

6. What / be / a current transformer / construct / of?

7. What types / current transformers / be / commonly / use?

8. What / be / the current ratings / the primary and secondary windings?

Language in Use

6. Different forms of these words appeared in the text above. Practise word formation:

a) form adverbs from adjectives: proportional, convenient, sufficient, direct, usual, approximate, equal, heavy, appropriate, substantial;

b) form adjectives from verbs: to permit, to surround, to act, to magnetise, to respect, to exist, to nominate, to separate, to enclose, to construct.

7. Read the text below and choose the word a), b), c) or d) which best fits the space.

Construction of Current Transformer

The current transformer is used with its primary winding connected in … 1) with line carrying the current to be measured and, therefore, the primary current is … 2) upon the load connected to the system and is not … 3) by the load (burden) connected to the secondary winding of the current transformer.

The primary winding … 4) of very few turns and, therefore, there is no appreciable voltage … 5) across it. The secondary winding of the current transformer has a larger number of … 6), the exact number being determined by the turns' … 7). The ammeter, or wattmeter current coil, are connected directly across the secondary winding terminals.

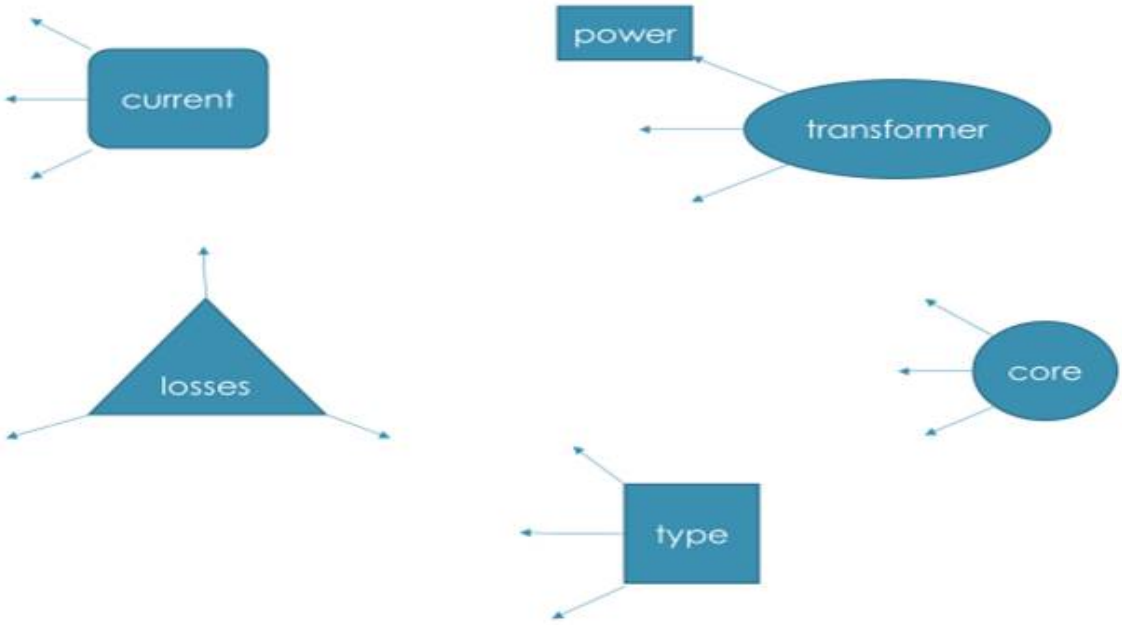
Thus, a current transformer operates its secondary winding nearly under … 8) circuit conditions. One of the terminals of the secondary winding is earthed to … 9) equipment and personnel in … 10) in the event of an insulation breakdown in the current transformer.

1	a) serious	b) series	c) parallel	d) shunt
2	a) independent	b) dependent	c) defendant	d) depend
3	a) determining	b) determines	c) determined	d) determine
4	a) encloses	b) includes	c) comprises	d) consists

5	a) down	b) drop	c) fall	d) breakdown
6	a) turns	b) twists	c) rounds	d) coils
7	a) correlation	b) interrelation	c) ratio	d) rate
8	a) short	b) long	c) primary	d) secondary
9	a) prevent	b) guard	c) defend	d) protect
10	a) beside	b) near	c) the vicinity	d) close

8. Match the words from the box with the corresponding key word to make N+N compounds. Choose any five and make sentences of your own.

low-voltage / iron / hysteresis / core / eddy current / copper / voltage / shell / full-load / steel / instrument / ring / no-load / transformer



9. Put the words in the correct order to make sentences about current transformers.

1. make / carry / such as / It / of / an ammeter / amperes / is / protection relays / to / difficult / that / measurement devices / or / can / a wattmeter / and / hundreds or thousands.
2. these / dangerous / levels / Higher voltage / make / connect / devices / to.
3. transformer / can / using / overcome / current / These / a / barriers / be.

4. the full load / of / is made / 5A or 1A / The turns ratio / current / gives / of / a current transformer / so that / in its primary / a secondary current / either.

5. secondary / to / in series / to / the / an ammeter / conductor / and / A current transformer / current-carrying / is connected / is connected / its.

6. turns ratio / The ammeter / either / of / a full deflection / with / 5A or 1A / current transformer / is arranged / depending on the / the / to give.

7. according / the / adjusted / turns ratio / scale / The ammeter's / to / is.

8. one / The primary / current transformer / has / turn / typically / only / a / winding / of.

9. has / the current / stepped down / The secondary / the magnitude / of / many turns / the transformer / depending on / to be / of.

10. around / connected to / The secondary coil / can be / a / and / the measurement / is wound / its ends / laminated ferromagnetic / devices / core.

Grammar Revision: Focus on Modal Verbs

*1. Complete the following sentences with the correct form of the infinitive in brackets. Keep in mind that modal verbs (**can, could, may, might, must, shall, should, will, would**) are followed by a bare infinitive (only **ought** is always followed by **to**).*

1. The secondary winding of a current transformer cannot … (to leave) open-circuited.

2. Core losses due to high flux density would … (to heat up) the core and the windings and damage them.

3. Air-blast cooling may … (to adopt) in confined spaces.

4. The students failed the exam yesterday. They should … (to revise) better.

5. You must … (to joke). I couldn't … (to get) an excellent mark because I didn't answer one question.

6. They must … (to use) this device for a long period of time because most of the parts are worn.

7. Mumetal or Permalloy may … (to use) where a high degree of accuracy is desired.

8. He is at the library now. He must … (to work) on his project.

9. We can't … (to measure) the current. The alternating-current meter must … (to break).

GRAMMAR FOCUS I	
Use **must + infinitive/perfect infinitive**	when you are sure sth is/was true
might/may/could + infinitive/perfect infinitive	when you think it's possible sth is/was true
might not/ may not + infinitive/perfect infinitive	when you think it's possible sth isn't/wasn't true
can't + infinitive/perfect infinitive	when you are sure sth isn't/wasn't true
Perfect infinitive = have + past participle	

2. Fill in the blanks with the appropriate modal verb. Look at GRAMMAR FOCUS I if necessary.

1. The electricity supply … be switched off when working with electrical devices.

2. We … light some candles when the electricity was cut off two days ago.

3. Current transformers are used wherever high-voltage current … be metered.

4. Do electrical engineers … work overtime?

5. They … use current transformer as the current to be metered didn't exceed 100 amperes.

6. To measure the current the students … connected the ammeter to the circuit in parallel, but they did.

GRAMMAR FOCUS II
Past modal structures
Use **should/shouldn't have + past participle** or **ought to/ought not to have + past participle** to criticise a past action or show regret. I *should have read* the manual before switching the new PC on.
Use **had to/didn't have to + infinitive** to say a past action was necessary/unnecessary. We *didn't have to go* to the University last week.
Use **didn't need to + infinitive** or **needn't have + past participle** to say a past action was unnecessary. There is a slight difference in meaning: We *didn't need to go* to the University last Saturday. (We didn't go.) We *needn't have gone* to the University last Saturday. (We went but it wasn't necessary.)

3. Fill in the gaps with the appropriate modal verb. Think about the infinitive form. Look at GRAMMAR FOCUS II if necessary.

1. In current transformer the primary and secondary windings … be insulated from the core and from each other.

2. The secondary winding of a current transformer … always be short-circuited before removing the device connected to its secondary.

3. The electricity supply … be switched off when working with electrical devices.

4. It is extremely important that no water … escape through any leak, because the presence of even minute proportion of water adversely affects the insulating properties of oil.

5. So that electric current … flow through a circuit, it is necessary that there … be an EMF acting on the circuit.

6. A very high voltage value between successive end turns imposed an additional stress on the inter-turn insulation which … resulted in failure because there were no precautionary measures.

7. Non-sludging oils … used in the transformer because working temperature of the oil exceeded 80°.

8. The engineers … repaired this equipment last week. I wonder why they didn't.

Translation Practice: Ukrainian into English

10. Translate the following sentences into English. Pay attention to the use of modal verbs.

1. Працюючи з трансформаторами струму, інженери ніколи не повинні залишати вторинну котушку розімкненою.

2. Студенти напевно скористались законом Фарадея для обчислень, коли виконували лабораторну роботу.

3. Первинна обмотка трансформатору струму може складатись з одного провідника у формі кабелю.

4. Не може бути, щоб тестова напруга була більше 2000 вольт.

5. Якщо номінальний вторинний струм буде менше 5 ампер, втрати в дротах можуть бути суттєво зменшені.

6. Студентам не потрібно було приєднувати амперметр, щоб виміряти струм. Вони могли скористатись законом Ома, знаючи напругу та опір.

7. Професор оголосив, що студентам доведеться здати лабораторні роботи до кінця тижня.

8. Надзвичайно висока напруга, що з'являється у вторинній обмотці трансформатора може бути небезпечною як для персоналу, так і для самого трансформатора.

9. Студент мав би закінчити доповідь до кінця заняття, але не зміг.

10. Не може бути, щоб вони використали гальванометр для вимірювання різниці потенціалів. Вони повинні були використати вольтметр.

Listening Comprehension

11. Watch the video 'How does a current transformer work?' (https://www.youtube.com/watch?v=CB0xyL5PHHI) and do the following tasks.

Before watching the video:

a) Discuss the following questions:

1. What is a basic operating principle of a current transformer?
2. How is the name of Maxwell connected with electromagnetic induction?
3. What do you know about the rule of Lenz?

b) Match the terms and collocations with their translation.

1	Classical electrodynamics	a) результуюче магнітне поле
2	Conductor loop	b) характеристика типової передачі
3	Radial magnetic field	c) класична електродинаміка
4	Steady changing direction	d) магнітні лінії
5	Elementary component	e) напрямок, що постійно змінюється
6	Magnetic lines	f) петля провідника
7	Resulting magnetic field	g) найпростіша складова
8	Typical transmission characteristic	h) радіальне магнітне поле

12. Watch the first half (00.00-01.55) of the video and state whether the statements are true or false.

1. The basic principle of current transformer operation is electromagnetic induction.
2. Electromagnetic induction is fully explained by Maxwell's equation.
3. A constantly changing alternating field can be generated by applying an AC voltage to the coil.
4. The alternating current flowing through the conductor generates radial magnetic field along it.
5. The magnetic field of the coil changes its direction because of the current which constantly changes its direction.

13. Continue watching (01.56-02.32) and complete the sentences with necessary information.

1. The magnetic field of the coil is bundled in ….
2. The magnetic flux is created as the sum of ….
3. This magnetic flux induces voltage in ….
4. The secondary current and the resulting magnetic field counteract ….
5. The magnetic flux of the iron core is ….

*14. Fill in the gaps with **primary** or **secondary** to complete the information about the turns ratio in current transformers.*

If the number of turns in the primary winding is increased, the … side current also increases. The ratio between the … and secondary sides is the number of … turns that are related to the number of secondary turns as is the … current to the … current. If we reduce the number of turns on the primary side, the resulting current on the … side also decreases, and we get the typical transmission characteristic for current transformers.

Oral Interaction

15. a) Work individually. Match the types of current transformers with their descriptions. Add the last sentence to each paragraph to complete the information.

b) Work in pairs. Compare your answers with the partner and find out where each type of these transformers is used. Surf the Internet for examples of such transformers.

Ring Type / Summation / Bus Bar / Wound primary

1. These transformers are used for ensuring proper functioning of relay circuits.

2. By using oil insulation and porcelain bushings, such transformers can be applied at the highest transmission voltages.

3. Wire wound Current Transformer can be used to measure currents in the range of 1A to 100A.

4. The core is usually laminated silicon steel and the windings are of copper.

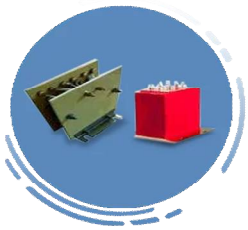
a) In this type, the primary winding is physically connected in series with the conductor that measures the current. The primary winding has a single turn and is composed inside the transformer.

b) In this type, the bus bar of the main circuit itself acts as the primary winding with a single turn. So, the bar type transformer has only secondary windings. The body of the CT itself provides insulation between the primary circuit and ground.

c) In this type, the CT is installed over a bus bar or an insulated cable and only a low level of insulation is present on the secondary coil. To obtain non-standard ratios or for other special purposes, more than one turn of the primary cable may be passed through the ring.

d) These transformers are used for comparing the relaying quantities derived from the current in the three phases of the primary circuit. This is done by converting the three-phase quantities into the single-phase quantity. The line Current Transformers are connected to the primary of the Auxiliary Current Transformer.

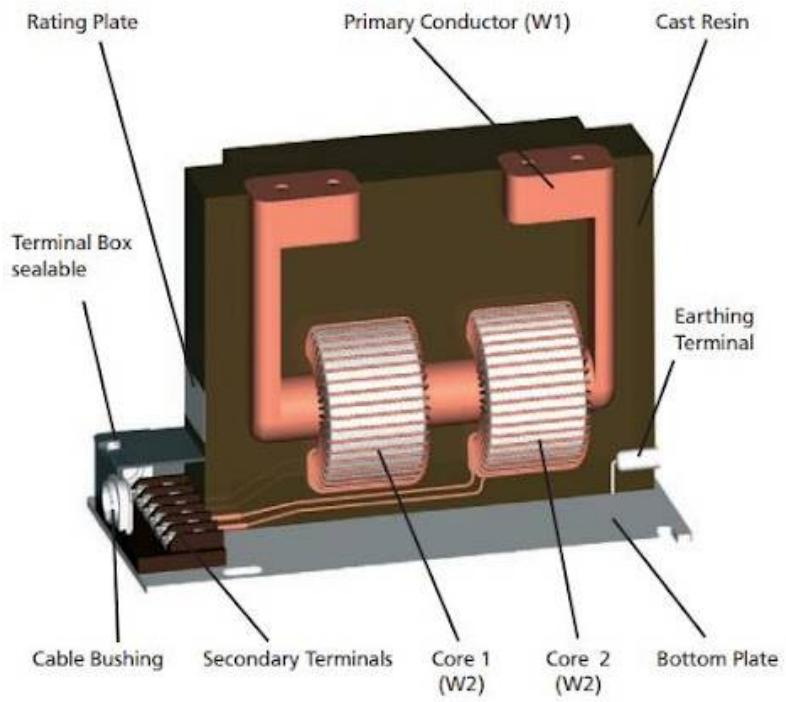
16. Discuss what types of transformers are presented in the table and complete it with the information you have learnt about these types of transformers. Use the link given below.

https://www.ksinstruments.net/role-of-current-transformers-in-ammeter-measuring-applications/

17. Work in pairs. Study the figure and present the fundamentals of current transformers to your partner highlighting the following issues. Student A talks about statements 1 and 2, student B presents 3 and 4. Be ready to ask questions to clarify the information when necessary.

1. The necessity of using current transformers.
2. The principal parts of the transformer and their functions.
3. Characteristics of the transformer windings and their insulation.
4. Types of current transformers.



General design sample of a current transformer

https://cutt.ly/0Pow2zq

Written Production: Letter of Advice

18. You have received a letter from an international student Tom who is an engineering student working on power measurement project. In his letter he asks you about selecting the right current transformer to maximise the performance of his power meter.

Choose the appropriate level of formality and write a letter of about 150-180 words to tell your friend that when going through the selection process, it can be helpful to consider several parameters including current transformer type, current rating, and accuracy, and why they are important.

Use the phrases below.

Writing Focus		
	Formal	**Informal**
Opening remarks	Thank you for your letter requesting … I am writing in reply to your letter asking for …	I've just got your letter and I think I can help you … I am sorry to hear about your problem. Here's what I think you should do …
Suggestions	I would suggest that… I strongly recommend that… I would advise you to … If I were you, I would …	It would be a good idea … / How about … The best advice I can give you is … Whatever you do, ... / Your only option is to ... A (self-help) book I read recommends...
Closing remarks	I hope this will be of help ... I trust you will accept this advice … I would very much like to know if my advice was helpful…	Please let me know how it goes … I hope this has helped …

https://teateaching.pbworks.com/f/letter.pdf

19. Work in pairs. Choose two quotations below and say to what extent you agree with them. Search for the information about the author of the quotation on the Internet and start your talk with it.

One man's 'magic' is another man's engineering. 'Supernatural' is a null word.

Robert Heinlein

The fuel cell is just a fundamentally inferior way of delivering electrical energy to an electric motor than batteries.

Elon Musk

Byrne's Law: In any electrical circuit, appliances and wiring will burn out to protect fuses.

Robert Byrne

Scientists study the world as it is; engineers create the world that has never been.

Theodore von Karman

Self-Check 2.3

Choose the appropriate word to fill in the gaps in the sentences below.

Vocabulary

1. Resistance, … current, hysteresis, and other factors usually cause power loss in current transformers.

a) magnetic b) magnetisation c) magnetising d) magnetite

2. In a … current transformer a power line is passed through the window and acts as the primary winding.

a) shell-type b) wound c) bar d) window

3. In the wound current transformer, wires of the primary winding should have large ….

a) cross-section b) section c) cut d) size

4. The secondary current … of a current transformer is always 5A.

a) ratio b) rating c) rate d) value

5. If the ratio between the primary and secondary is 400:5, the current transformer can be used to measure a line … of 400A.

a) thrust b) stress c) burden d) load

Grammar

1. The primary circuit of that current transformers … a straight conductor because the primary had a high current rating.

a) must be b) must have been c) should be d) can't have been

2. It … bar type transformer because it had separate primary and secondary windings wrapped around a laminated core.

a) can't have been b) must have been c) might not be d) can be

3. Bar current transformer … found on installations where the potential is 25kV or less.

a) may be b) must be c) should be d) can be

4. Bar current transformers … mounted with respect to adjacent conductors to avoid magnetic stresses and transformer damage.

a) can't have been b) should have been c) might have been d) needn't have been

5. We … to worry about the secondary current rating because the value of 5 amperes is adopted in most countries.

a) need b) ought c) didn't need d) ought not

Correcting mistakes

Work in pairs. Do the tasks and discuss the results with your partner.

a) Find an extra word in each line.

Value of the load is connected across the secondary side is known for as burden. It is expressed in VA. The product of secondary voltage and current one burden of current transformer includes protective relays, how connecting wires and resistance of the secondary winding. Specific of VA loading at rated secondary current on to which the current transformer performs with specified accuracy is known as well rated burden. It is specified to ensure that errors are in the measurements do not exceed the limits. The permissible load is called by burden of current transformer. It is expressed in both VA or ohms at rated secondary circuit.	1___ 2___ 3___ 4___ 5___ 6___ 7___ 8___ 9___ 10___

b) Tell each other about the application of current transformers of different types and correct vocabulary and grammar mistakes if necessary. Use the words/expressions from Unit 2.3.

Unit 2.4. Voltage transformer

Lead-in

Discuss the questions with a partner:

- *What types of transformers do you know? What are they used for?*
- *When is it necessary to reduce the voltage for measuring purposes?*

https://www.indiamart.com/proddetail/high-voltage-transformer-9002166788.html

Reading Comprehension

1. Match the technical terms with their translation a-j. Then choose any five and make sentences of your own.

English	***Ukrainian***
1. Voltage transformer	a) Ізолюючий трансформатор
2. Electrical component	b) Магнітне коло
3. Magnetic circuit	c) Вихідна напруга
4. Mutual induction	d) Лінійний пристрій
5. Impedance transformer	e) Розподільчий пристрій
6. Output voltage	f) Трансформатор напруги
7. Isolation transformer	g) Трансформатор повних опорів
8. Impedance matching	h) Електрична складова
9. Linear device	i) Взаємна індукція
10. Switchgear	j) Узгодження повних опорів

2. Complete the collocations with the noun a-h. Study their Ukrainian translation. Can you notice any patterns?

	English collocation	Noun
1	Alternating-current___ - коло змінного струму	a) transformer
2	High-voltage___ - система високої напруги	b) construction
3	Low-voltage___ - обмотка низької напруги	c) system
4	Core-type___ - трансформатор стрижневого типу	d) core
5	Shell-type___ - конструкція броньового типу	e) circuit
6	Three-limbed___ - 3-стрижневе осердя	f) area
7	Cross-sectional___ - площа перерізу	g) winding
8	Inter-turn___ - ізоляція між витками	h) insulation

3. Words 1-10 all appear in the text. Match them with their definitions a-j. Deduce the meanings of any words you don't know from the context.

Term	Definition
1. electromagnet	a) this mark is used to indicate a statement of proportion between two numbers;
2. domain	b) a point of connection for closing an electric circuit;
3. oscillation	c) the power rating, measured in watts, of an electrical appliance;
4. colon	d) a complete and closed path around which a circulating electric current can flow;
5. circuit	e) a discrete region of magnetism in ferromagnetic material;
6. wattage	f) metal drawn out into the form of a thin flexible thread or rod;
7. terminal	g) a regular fluctuation in value, position, or state about a mean value, such as the variation in an alternating current;
8. wire	h) a magnet consisting essentially of a coil of insulated wire wrapped around a soft iron core that is magnetized only when current flows through the wire.

4. Read the text about the voltage transformers application and construction. Then make up three questions about the facts you did not know before.

VOLTAGE TRANSFORMERS

A Typical Voltage Transformer

The Voltage Transformer can be thought of as an electrical component rather than an electronic component. A transformer basically is very simple static (or stationary) electro-magnetic passive electrical device that works on the principle of Faraday's law of induction by converting electrical energy from one value to another.

The transformer does this by linking together two or more electrical circuits using a common oscillating magnetic circuit which is produced by the transformer itself. A transformer operates on the principles of 'electromagnetic induction', in the form of mutual Induction.

Mutual induction is the process by which a coil of wire magnetically induces a voltage into another coil located in close proximity to it. Then we can say that transformers work in the 'magnetic domain', and transformers get their name from the fact that they 'transform' one voltage or current level into another.

Transformers are capable of either increasing or decreasing the voltage and current levels of their supply, without modifying its frequency, or the amount of electrical power being transferred from one winding to another via the magnetic circuit.

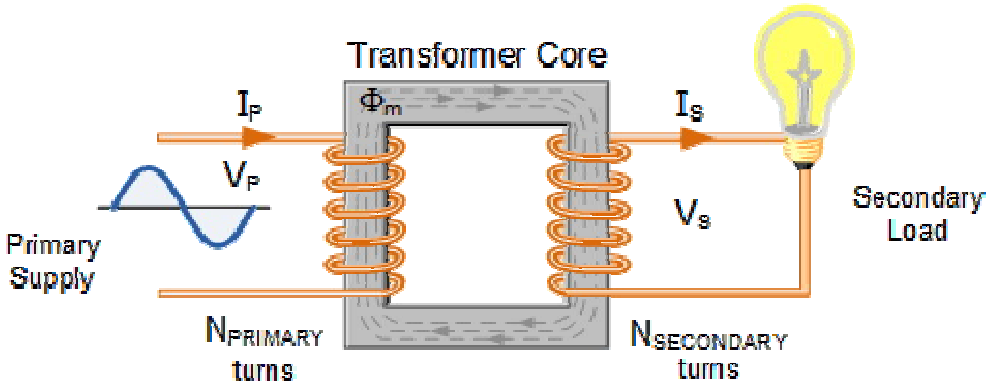
A single-phase voltage transformer basically consists of two electrical coils of wire, one called the 'primary winding' and another called the 'secondary winding'. We will define the 'primary' side of the transformer as the side that usually takes power, and the 'secondary' as the side that usually delivers power. In a single-phase voltage transformer, the primary is usually the side with the higher voltage.

These two coils are not in electrical contact with each other but are instead wrapped together around a common closed magnetic iron circuit called the 'core'.

This soft iron core is not solid but made up of individual laminations connected together to help reduce the core's magnetic losses.

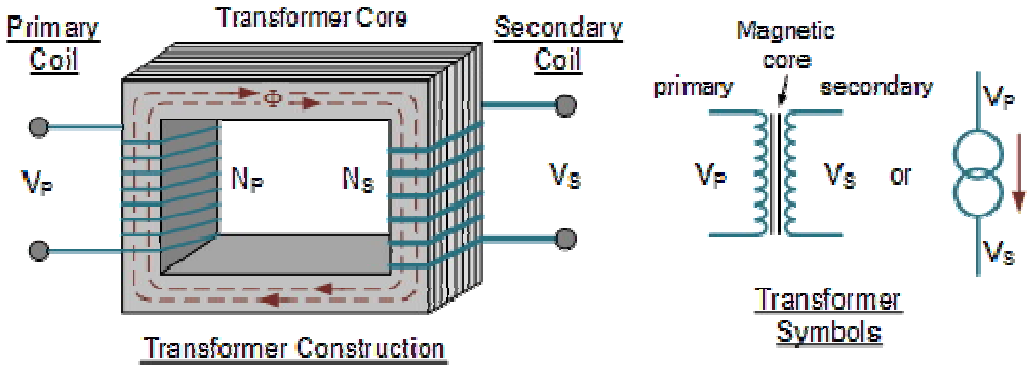
The primary and secondary windings are electrically isolated from each other but are magnetically linked through the common core allowing electrical power to be transferred from one coil to the other. When an electric current passed through the primary winding, a magnetic field is developed which induces a voltage into the secondary winding and this basic operating principle of a simple transformer is shown below.

Single Phase Voltage Transformer



In other words, for a transformer there is no direct electrical connection between the two coil windings, thereby giving it the name also of an isolation transformer. Generally, the primary winding of a transformer is connected to the input voltage supply and converts or transforms the electrical power into a magnetic field. While the job of the secondary winding is to convert this alternating magnetic field into electrical power producing the required output voltage as shown.

Transformer Construction (single-phase)



where:

- V_P – is the Primary Voltage
- V_S – is the Secondary Voltage
- N_P – is the Number of Primary Windings
- N_S – is the Number of Secondary Windings
- Φ (phi) – is the Flux Linkage

Notice that the two coil windings are not electrically connected but are only linked magnetically. A single-phase transformer can operate to either increase or decrease the voltage applied to the primary winding. When a transformer is used to increase the voltage on its secondary winding with respect to the primary, it is called a step-up transformer. When it is used to decrease the voltage on the secondary winding with respect to the primary it is called a step-down transformer.

However, a third condition exists in which a transformer produces the same voltage on its secondary as is applied to its primary winding. In other words, its output is identical with respect to voltage, current and power transferred. This type of transformer is called an 'impedance transformer' and is mainly used for impedance matching or the isolation of adjoining electrical circuits.

The difference in voltage between the primary and the secondary windings is achieved by changing the number of coil turns in the primary winding (N_P) compared to the number of coil turns on the secondary winding (N_S).

As the transformer is basically a linear device, a ratio now exists between the number of turns of the primary coil divided by the number of turns of the secondary coil. This ratio, called the ratio of transformation, is more commonly known as a transformers 'turns ratio', (TR). This turns ratio value dictates the operation of the transformer and the corresponding voltage available on the secondary winding.

It is necessary to know the ratio of the number of turns of wire on the primary winding compared to the secondary winding. The turns ratio, which has no units, compares the two windings in order and is written with a colon, such as 3:1 (3-to-1).

This means in this example, that if there are 3 volts on the primary winding there will be 1 volt on the secondary winding, 3 volts-to-1 volt. Then we can see

that if the ratio between the number of turns changes the resulting voltages must also change by the same ratio, and this is true.

The ratio of the primary to the secondary, the ratio of the input to the output, and the turns ratio of any given transformer will be the same as its voltage ratio. In other words, for a transformer: 'turns ratio = voltage ratio'. The actual number of turns of wire on any winding is generally not important, just the turns ratio and this relationship is given as:

A Transformers Turns Ratio

$$\frac{N_P}{N_S} = \frac{V_P}{V_S} = n = \text{Turns Ratio}$$

Note that the order of the numbers when expressing a transformers' *turns ratio* value is very important as the turns ratio 3:1 expresses a very different transformer relationship and output voltage than one in which the turns ratio is given as: 1:3.

Another one of the transformer basics parameters is its power rating. The power rating of a transformer is obtained by simply multiplying the current by the voltage to obtain a rating in volt-amperes, (VA). Small single phase transformers may be rated in volt-amperes only, but much larger power transformers are rated in units of kilo volt-amperes, (kVA) where 1 kilo volt-ampere is equal to 1,000 volt-amperes, and units of mega volt-amperes, (MVA) where 1 mega volt-ampere is equal to 1 million volt-amperes.

In an ideal transformer (ignoring any losses), the power available in the secondary winding will be the same as the power in the primary winding, they are constant wattage devices and do not change the power only the voltage to current ratio. Thus, in an ideal transformer the power ratio is equal to one (unity) as the voltage, V multiplied by the current, I will remain constant.

That is the electric power at one voltage/current level on the primary is 'transformed' into electric power, at the same frequency, to the same voltage/current level on the secondary side. Although the transformer can step-up (or step-down) voltage, it cannot step-up power. Thus, when a transformer steps-up a voltage, it steps-down the current and vice-versa, so that the output power is always at the same value as the input power. Then we can say that primary power equals secondary power, ($P_P = P_S$).

Protection of voltage transformers

Voltage Transformers can be protected by High Rupturing Capacity (H.R.C.) fuses on the primary side for voltages up to 66kV. Fuses do not usually have a sufficient interrupting capacity for use with higher voltages. Practice varies, and in some cases protection on the primary is omitted.

The secondary of the voltage transformer should always be protected by fuses or miniature circuit breaker. The device should be located as near to the transformer as possible.

A short circuit on the secondary circuit wiring produces a current of many times the rated output and causes excessive heating. Even where primary fuses can be fitted, these usually do not clear a secondary side short circuit because of the low value of primary current and the minimum practicable fuse rating.

Construction of voltage transformers

The size of a VT is largely determined by the system voltage and the insulation of the primary winding often exceeds the winding in volume.

A VT should be insulated to withstand overvoltages, including impulse voltage, of a level equal to the withstand value of the switchgear and the high voltage system. To achieve this in a compact design the voltage must be distributed uniformly across the winding, which requires uniform distribution of the winding capacitance or the application of electrostatic shields.

Voltage transformers are commonly used with switchgear so the physical design must be compact and adapted for mounting in or near to the switchgear. Three-phase units are common up to 36kV but for higher voltages single-phase units are usual.

Voltage transformers for medium voltage circuits have dry type insulation, but high and extra high voltage systems still use oil immersed units.

Taken and modified from https://www.electronics-tutorials.ws/transformer/transformer-basics.html , https://electrical-engineering-portal.com/voltage-transformers-essentials

5. Decide whether the statements are true or false and correct them if necessary.

1. Voltage transformers transform the voltage level from one value to another by using oscillating magnetic circuit.

2. A single-phase transformer usually has two windings which are connected and wound on the same core.

3. In voltage transformer the primary winding is connected to the high-voltage supply.

4. The secondary winding transforms the input voltage into alternating magnetic field.

5. Impedance transformer can operate like step-up and step-down transformer.

6. The resulting voltages are directly proportional to the turns' ratio in the secondary and primary windings.

7. The power ratio does not change when voltage is increased or decreased.

8. Fuses are always used to protect both the primary and the secondary side of any transformer.

9. Voltage transformers are frequently mounted in switchgear.

6. a) Work individually. Use the prompts to make questions. Change the form of the verb, add the auxiliary one and the proper prepositions if necessary.

b) Work in pairs. Ask and answer the questions with your partner.

1. What / be / the main principle / transformer operation?
2. How / be / electrical circuits / link?
3. What / be / the functions / the primary and secondary windings?
4. How / be / the primary and secondary windings / insulate?
5. What / be / the primary and secondary windings / connect / to?
6. What / be / the difference / the step-up and step-down transformers?
7. What type / transformer / be / call / impedance transformer?
8. What / the ratio / transformer mean?
9. How / be / the power rating / obtain /? What / be / the units / this rating?
10. What / be / the power ratio / ideal transformer equal to?
11. How / be / voltage transformers / protect / overvoltages?
12. What / be /the size / a voltage transformer / determine / by?

Language in Use

7. Fill in the gaps in word combinations with the antonyms to the given adjectives using the following prefixes: un-, in-, ir-, dis-, ab-, im-. How many of them can you find in the text above?

sufficient	____ space
necessary	____ part
reliable	____ instrument
desirable	____ result
usual	____ arrangement
normal	____ stress
practicable	____ insulation
common	____ use
possible	____ application
advantageous	____ position

8. Fill in the gaps with the words or word combinations below.

voltage transformer / voltage / primary winding / insulation / alternative disposition / damage / limb / magnetic circuit / terminals / section

1. When an instrument or meter having a voltage winding is connected to a high-voltage alternating-current circuit, the use of a … is necessary.
2. The secondary winding is the winding the … of which are connected to the meter or instrument. It is customary, however, to reinforce the insulation of the whole of the turns in the first … of the winding.
3. The stress on the … is greatest between the first and second turns counting from the end of the high-voltage winding and diminishes turn by turn until the abnormal stress disappears entirely.
4. Each … carries the primary and secondary windings for one phase of the supply, and when used for connection to a meter, the connections are usually arranged star/star.
5. This disposition of the windings is advantageous in the case of open-type transformers since the high-voltage winding is shielded from mechanical … by the two tubes and only the more robust low-voltage winding is exposed.

6. The … which is connected to the high-voltage supply consists of a large number of turns of a fine-gauge wire and is usually divided into a number of separate sections.

7. The … of a single-phase voltage transformer may be of the core type or the shell type, somewhat similar in shape to the cores of current transformers.

8. The …, in which the secondary winding is adjacent to the core and is surrounded by the primary, is more usual, a heavy tube separating the windings.

9. A voltage transformer may be defined as an instrument transformer for the transformation of … from one value to another, usually a lower one.

9. Fill in the table with the corresponding part of speech and make your own sentences with any ten.

Noun	Adjective	Verb
magnet	magnetic	
	restricting	to restrict
comparison		to compare
breakage	breaking	
	increasing	to increase
practice		to practice
	equal	to be equal
addition		to add
operation	operational	
occasion	occasional	

10. Fill in the gaps with the proper preposition. There are two extra prepositions.

of, by, up, under, on, by, into, of, in, to, as, between

1. Clearances between conductors or other live parts in power transformer design are regarded … minimum values.

2. In this connection, potentials in excess … 660 volts are regarded as high voltage.

3. The primary winding is connected … the high-voltage supply.

4. Voltage transformers are made … in single units for connection to single-phase, two-phase or three-phase systems.

5. In alternative disposition the secondary winding is surrounded … the primary.

6. The primary winding is usually divided … a number of separate sections.

7. Both tubes must be capable withstanding the full working voltage continuously.

8. When a transformer is switched … to a live line, the voltage between the turns of the high voltage winding adjacent to the line terminal may be raised momentarily.

9. Transformers for the higher voltages are protected … a tank or other enclosure containing oil or some other insulating medium.

10. An additional stress on the inter-turn insulation in the absence of precautionary measures may result … failure.

Grammar Revision: Focus on Clauses

GRAMMAR FOCUS I	
Expressing time	
You can use the following time conjunctions to introduce time clauses: **when / since / as soon as / till / until / before / after / by the time / during, etc.**	
When the time clause precedes the main clause, a comma is used. **When the voltage is very high for distribution,** we use a step-down transformer.	
Time clauses follow the rule of the sequence of tenses.	
Main clause Present / future/ imperative Past simple / past perfect	**Time clause** Present simple / perfect Past simple /perfect
The voltage *had been decreased* **before** it *was supplied* to the houses. The voltage *was supplied* to the houses **after** it *had been decreased*.	

1. Complete the sentences below by putting the proper time conjunction from the list below. Read GRAMMAR FOCUS I if necessary.

when, whenever, until, after, by the time, as soon as, whereas, while, since, before

1. Specially designed high-energy fuses dissipate stray voltage … it reaches you.

2. Choosing the best digital multimeter is critical … you work with more voltage and energy than you realise.

3. The students learnt a lot ... they were listening to the lecture.

4. They published the book … the author had died.

5. I'll let you know … I have the results.

6. Our engineers will continue their research … they finish the project.

7. They have been studying English … they were at school.

8. AC reverses its direction … DC flows in one direction only.

9. You can pass the credit … you want.

10. … the student finished his test, the lesson had been over.

GRAMMAR FOCUS II

Expressing contrast

You can use the conjunctions **however** and **nevertheless** to express contrast.
The device is brand new, ***however / nevertheless,*** *it consumes much energy.*
The device consumes much energy, ***however / nevertheless,*** *it is brand new.*

You can use the conjunctions **while** and **whereas** as more advanced alternatives to *but* when expressing contrast.
Note the position of the commas and the different word order pattern.
While / whereas *current transformers are used to increase and decrease the current, voltage transformers increase and decrease voltage.*
Current transformers are used to increase and decrease the current, ***while / whereas*** *voltage transformers increase and decrease voltage.*

2. Combine the sentences using the words in brackets. Read GRAMMAR FOCUS II if necessary.

1. The equipment is old enough. They paid a lot of money for it. (nevertheless)

2. Tom is good at Maths. His brother is good at English. (while)

3. Current transformers are used to decrease current. Voltage transformers are used to decrease voltage. (whereas)

4. Very small transformers are cooled naturally by the atmosphere. Slightly larger transformers are oil-immersed. (however)

6. Certain oils tend to form sludge in the course of time. There are high

quality oils called non-sludging. (nevertheless)

7. The core loss occurs in the core of transformer. The copper loss occurs in the winding of the transformer. (while)

8. The primary winding may consist of several turns wrapped around the core. The secondary consists of many turns of wire wrapped around a core. (however)

GRAMMAR FOCUS III

Expressing cause and result

You can use **thus / therefore / consequently / hence / as a result** to express the result of something.

*The voltage was very high for distribution, **therefore** we decided to use a step-down transformer.*

You can make your writing more various by using **so** and **such + *that* clause** to give information about a cause and link it to a result:

- **so + adjective + *that* clause**

*The voltage was **so** high for distribution **that we decided to use a step-down transformer.***

- **such (+ a/an) (+ adjective) + noun + *that* clause**

*It was **such a** high voltage **that we decided to use a step-down transformer.***

Expressing reason

You can use **because / as / since / due to** and **for** (in formal written style) to express the reason for something.

*We decided to use a step-down transformer **because** the voltage was very high for distribution.*

3. Read GRAMMAR FOCUS III and combine the sentences below with appropriate word or expression.

1. Solar energy technology is gaining increasing importance. It is environmentally friendly.

2. The teacher explained the problem in detail. The student understood it.

3. He studied electrical engineering. He wanted to become an engineer very much.

4. She didn't study well. She failed her exam.

5. The voltage can rise to a destructive level. A current transformer should always have its secondary shorted when not connected to an external load.

6. The transformer was very small. We didn't need any additional cooling except for the atmospheric air.

GRAMMAR FOCUS IV

Expressing concession

Although / Even though + clause

Although Faraday's Law is familiar to every engineering student, some of them can't explain the principle or transformer operation.

Some students can't explain the principle or transformer operation, *even though Faraday's Law is familiar to every engineering student*

In spite of / Despite + noun/-ing

In spite of the knowledge, some students can't explain the principle or transformer operation.

Some students can't explain the principle or transformer operation, *despite the knowledge.*

Despite knowing Faraday's Law, some students can't explain the principle or transformer operation.

4. Rewrite the sentences below using the words in capitals. Read GRAMMAR FOCUS IV if necessary.

1. Although Helen woke up early, she was late for her appointment. DESPITE

2. In spite of being highly qualified, he couldn't get a job. ALTHOUGH

3. Even though the lecture was very important, few students attended it. IN SPITE OF

4. Despite being tired, the student continued working on his project. EVEN THOUGH

5. Match the beginning and the ending of each sentence.

1	They stole my car	a) because they had sent it to the wrong address.
2	They were repairing the road	b) as soon as we saw each other.
3	I didn't receive the invitation	c) we got to the stadium.
4	They had lived in their house for 20 years	d) because they were decorating it.

5	She spent a lot of hours studying for her exam	e) even though I had seen it before.
6	I realised that we had met before	f) when he was driving across France last month.
7	We couldn't go to our favourite restaurant	g) while I was away on holiday.
8	I enjoyed the film	h) when they decided to sell it.
9	They had sold all the tickets by the time	i) because she had already failed it twice.
10	He was very nervous	j) when the accident happened

Translation Practice: Ukrainian into English

11. Translate the following sentences into English. Pay attention to the use of clauses and linking words.

1. Він написав багато наукових статей, коли був студентом.

2. Викладач пояснив принцип роботи трансформатора перед тим, як студенти почали робили лабораторну роботу.

3. Як тільки студенти закінчили експеримент, продзвенів дзвоник.

4. Поки працювала підстанція, всім споживачам постачали достатньо електроенергії.

5. Коли студент закінчить свою доповідь, йому почнуть задавати запитання.

6. Поки я готувалась до занять, мої друзі писали статті на студентську конференцію.

7. Не зважаючи на те, що він приїхав на вокзал вчасно, він запізнився на поїзд.

8. Він створює презентацію, оскільки вже написав доповідь.

9. Поки ремонтували дорогу, ми змушені були ходити 5 км пішки до найближчої зупинки.

10. Обладнання було встановлене вчасно, проте станція не була введена в дію.

Listening Comprehension

12. Watch the video 'High Voltage Transformer'(https://cutt.ly/yFl59Z8) and do the following tasks.

Before watching the video:

a) Answer the following questions:

1. Where are voltage transformers used?

2. What will happen if voltage transformers are not used before current gets into our houses?

b) Match the verbs with their meanings.

1	to commit	to suddenly move very quickly in a particular direction
2	to double	to make a loud noise or noises
3	to soak	to shake quickly and continuously with very small movements
4	to surge	to become twice as big or twice as much
5	to vibrate	to do something wrong or illegal
6	to bang	if something soaks up a liquid, it takes the liquid into itself

13. Watch the first half (00.00-02.20) of the video and state whether the statements are true or false.

1. Transformer is the last point from which current gets into our houses.
2. The voltage of transmitted current is 250000 volts.
3. If you let high voltage current into your home, it may commit short circuit, fire or explosion.
4. 25000 volts get into the transformer through the primary coil.
5. The current in the primary coil generates a magnetic field.
6. If the number of turns on the primary and the secondary coils matches, the current induced in the secondary coil will be higher.
7. If the secondary coil has half as many turns of wire as the primary coil, the current induced in the secondary coil is doubled.
8. The coils inside the transformer do not touch each other.

14. Continue watching (02.21-04.56) and complete the sentences with necessary information.

1. The transformer contains ....

2. The copper wires are covered with ....
3. There are ...coils near the primary coil.
4. Oil is an ....
5. Paper soaks up the oil allowing ....
6. The 25 000-volt current surges through ....
7. An electric current is induced in ....
8. Each secondary coil generates ....
9. No one of these components ever ....

15. Fill in the gaps to complete the information about transformer buzzing.

magnetic	reverses	rings
change	metal	buzzing

We may recognise the transformer by its .... The ... is vibrating thanks to the alternating ... field caused by 25000 volts. An alternating magnetic field constantly ... its direction. With every direction ... the metal bangs and ....

Oral Interaction

16. a) Read the text about two types of transfomers construction and fill in the gaps with ***core*** *or* ***shell****.*

b) Work in pairs and compare two types of transromers construction and agree on a better one.

Which Construction Type is More Popular?

… (1) form power transformers are by far much more widely used throughout the world; this is because of the simplicity of the design of … (2) form power transformers. Since … (3) form transformers design is so simple, they cost less than … (4) form transformers, which have a much more complex design. However, … (5) form power transformers are widely used in North America. Some of the main advantages of … (6) form transformers are, they are more compact than … (7) form transformers and have a great mechanical strength. Having great mechanical strength comes into advantage here because, in an overcurrent situation, the transformer is less prone to being damaged. Despite the many advantages the … (8) form power transformer has over the … (9) form,

it is usually only chosen in larger power transformer applications, due to the cost of the … (10) form transformer being greater than the … (11) form transformer.

17. Split into teams of core form and shell form transformers. Prepare information about the cases in which these two types are used and come to a conclusion as to their effectiveness. Use the words and phrases below.

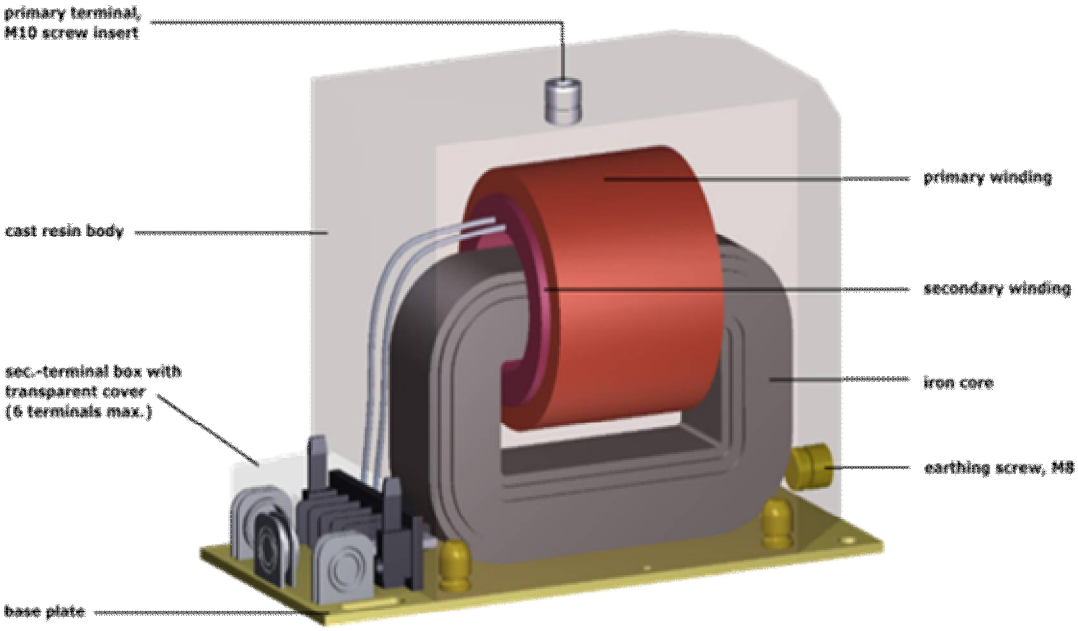
Useful Language
To list viewpoints: To begin with, … / Firstly, … / In the first place, … Secondly, … / Thirdly, … / Finally, … etc.
To add viewpoints: In addition, … / What is more, … / Furthermore, … / Besides, … / Not to mention the fact that… etc. …both…and…, …not only…but also…
To present the other side of the argument: Some people argue that… / Contrary to what most people believe, … / As opposed to the above ideas, …
Conclusion: The results of this investigation show that… The following conclusions can be drawn from… The information studied/analysed has shown that…

18. Pairwork activity ‘Asking about Voltage transformers’. Each of you will get a different card with information about voltage transformers. Read your card and ask your partner the questions to complete the missing information on your card (see Resource Pack, p. 197).

19. Work in pairs. Study the figure and present the fundamentals of current transformers to your partner highlighting the following issues. Student A talks about statements 1 and 2, student B presents 3 and 4. Be ready to ask questions to clarify the information when necessary.

1. The principal parts of the transformer and their functions.

2. Two dispositions of the transformer windings used in common practice.
3. Single-phase, two-phase and three-phase voltage transformers.
4. Insulation requirements in power transformers.



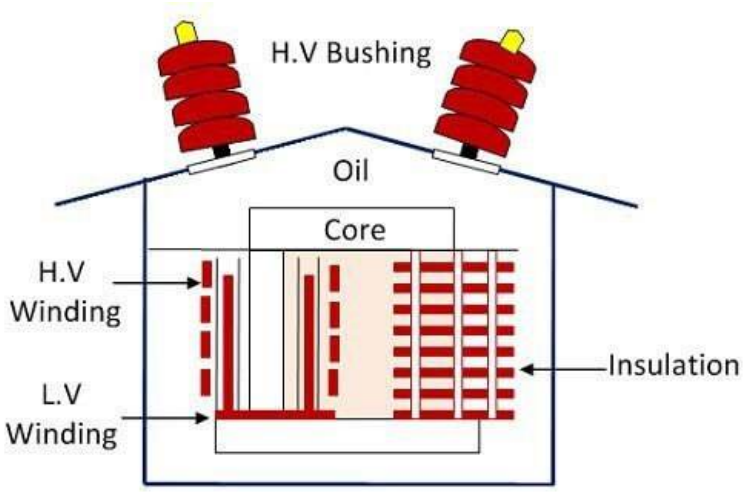
https://cutt.ly/dYlKeKs

Written Production

20. Write a summary of the text below. Use the phrases from the Resource Pack, p. 201 and write 60-80 words.

Construction of a potential transformer

Compared to the conventional transformer, potential transformers or PTs use larger conductor sizes and core. PTs designed for ensuring the greater accuracy and hence, at the time of designing economy of the material is not considered as main aspect.



PTs are made with special high-quality core operating at lower flux densities in order to have small magnetising current so that no load losses are minimised. Both core and shell type constructions are preferred for PTs. For high voltages, core type PTs are used while shell type is preferred for low voltages.

To reduce the leakage reactance, co-axial windings are used for both primary and secondary. For reducing the insulation cost, low voltage secondary winding is placed next to the core. And for high voltage PTs, high voltage primary is divided into sections of coils to reduce the insulation between coil layers. For these windings, vanished cambric and cotton tape are used as laminations. In between the coils, hard fiber separators are used.

These are carefully designed to have minimum phase shift between the input and output voltages and also to maintain a minimum voltage ratio with variation in load. Oil filled PTs are used for high voltage levels (above the range of 7KV). In such PTs, oil filled bushings are provided to connect the main lines.

https://www.electronicshub.org/potential-transformers/

Writing a letter of complaint

*22. You ordered a **750 W STEP UP/DOWN TRANSFORMER** POB1031 from Walmart company a week ago; however, your order was delivered 3 days later than the company promised. When you opened the box you realised that the transformer was dented, on and off switch was broken and instead of 2 spare fuses there was only 1 included.*

Write a letter of complaint to the supplier, explain the situation and claim either a full refund ($73) or an immediate replacement. Use the words and

phrases from writing focus below and the description of the transformer (see the Resource Pack, p. 203).

Writing Focus: Letter of Complaint		
	Mild	**Strong**
Opening Remarks	I am writing to complain about … / regarding/on account of/ because of /on the subject of … I am writing to draw your attention to … I am writing to you in connection with …	I was appalled at … I want to express my strong dissatisfaction with … I feel I must protest/ complain about ….
Closing Remarks	I hope/assume you will replace… I trust the situation will improve… I hope the matter will be resolved… I hope we can sort this matter out amicably…, etc.	I insist you replace the item at once. I demand a full refund … I hope that I will not be forced to take further action…, etc.

Self-Check 2.4

Choose the appropriate word to fill in the gaps in the sentences below.

Vocabulary

1. In a single-phase voltage transformer, two coils are wrapped together around a common … core.

a) solid steel b) soft metal c) hard metal d) soft iron

2. The … is supplied to the primary winding of a transformer.

a) input voltage b) output voltage c) input current d) output current

3. The required output voltage is produced by the secondary winding which converts alternating … into electrical power.

a) magnetic flux b) current c) magnetic field d) voltage

4. A transformer which produces the same voltage on its secondary as is applied to its primary winding is called … transformer.

a) current b) power c) isolation d) impedance

5. The … of any given transformer will be the same as its voltage ratio.

a) current ratio b) turns ratio c) frequency ratio d) turns rating

Grammar

1. Core type PTs are used for high voltages … shell type is used for low voltages.

a) when b) while c) since d) as soon as

2. … an instrument or meter with a voltage winding is connected to a high-voltage alternating-current circuit, the use of voltage transformer is necessary.

a) When b) During c) Whereas d) Thus

3. The voltage between the turns of the high voltage winding adjacent to the line terminal may be raised to a value many times the normal … of switching operations elsewhere on the system.

a) in spite b) despite c) hence d) as a result

4. The stress on the insulation is greatest between the last two turns of the high-voltage winding and diminishes turn by turn … it entirely disappears.

a) before b) after c) until d) since

5. In power transformers it is customary to reinforce the insulation between the end turns of the high-voltage winding. …, in voltage transformers the insulation of all turns in the first section of the winding is reinforced.

a) However b) Thus c) Therefore d) As soon as

Correcting mistakes

Work in pairs. Do the tasks and discuss the results with your partner.

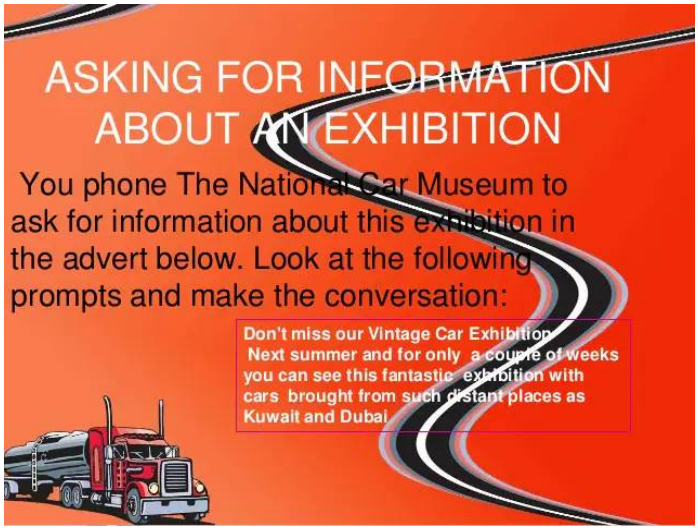
a) If the line is correct, put the tick (√). If it has a word that should not be there, write this word on the line. There are five correct lines altogether.

The electromagnetic device is used for the transformation of the higher voltage of the circuit to the lower voltage is called a potential transformer. The output of a low voltage circuit can to be measured through both voltmeters or wattmeters. These are capable of increasing or decreasing the voltage levels of a circuit without a change in its frequency and windings. The working and principle and construction of a potential transformer are as similar to the power transformer and conventional transformer. The potential transformer consists of the primary winding with bit more turns and the secondary winding with less number of turns. The high input AC voltage is given due to the primary winding. The lower output voltage is taken across the secondary winding by using a voltmeter. The two windings are magnetically coupled to each one other without any connection between them.	1___ 2___ 3___ 4___ 5___ 6___ 7___ 8___ 9___ 10___ 11___ 12___ 13___

b) Tell each other about the construction of voltage transformers of different types and correct vocabulary and grammar mistakes if necessary. Use the words/expressions from Unit 2.4.

RESOURCE PACK

Section 1, Unit 1.1



https://www.slideshare.net/cristinaca/exhibition-31815577

- Good morning. The National Car Museum, how can I help you?
- Hello (or other greeting). Like / information / car exhibition.
- Sure, what would you like to know?
- When /start?
- The exhibition will be on from 14th to 30th July.
- OK. Open/weekends?
- Well, it is open on Saturday but only on Sunday morning.
- I see. Closed/any weekdays?
- The museum is closed on Tuesdays so the exhibition will be closed, too.
- What time/ open/close?
- It opens at 8.00 in the morning and closes at six in the evening.
- Price/ tickets?
- They are 5 dollars for adults and three for children.
- Discount/groups?
- If you are more than 4 people, there is a 15%discount.
- OK. The nearest underground station?
- I'm afraid there isn't a line which gets near but bus number 4 will leave you right in front of the museum.
- Thanks/ information. Goodbye.
- You're welcome. Goodbye.

Section 1, Unit 1.2

Role-play 'Trade Negotiations'

This chart shows what these six countries produce and how much it costs for them. It also shows what markets are in each country.

Emland Produces: *Motorbikes* ($250 unit price) *Coal* ($40 tonne) *Tea* ($60 tonne) Market for: **Motorbikes, Oil, Tea**	**Arland** Produces: *Computers* ($120 unit price) *Motorbikes* ($200 unit price) *Electric cars* ($400 unit price) Market for: **Computers, Electric cars, Tea**	**Teland** Produces: *Coal* ($50 tonne) *Oil* ($60 tonne) *Electric cars* ($400 unit price) Market for: **Coal, Computers, Oil**
Oland Produces: *Motorbikes* ($300 unit price) *Computers* ($100 unit price) *Tea* ($40 tonne) Market for: **Motorbikes, Computers, Coal**	**Veland** Produces: *Coal* ($60 tonne) *Oil* ($40 tonne) *Tea* ($50 tonne) Market for: **Coal, Electric cars, Tea**	**Essland** Produces: *Computers* ($80 unit price) *Oil* ($50 tonne) *Electric cars* ($450 unit price) Market for: **Motorbikes, Electric cars, Oil**

Stage 1. Divide into six groups, one group to be the government of each country. You have ten minutes to have a government meeting to consider the following questions:

1. What do you produce? Which markets (domestic and/or export) do you want to sell to?

2. Look at your own market. What do you want to import? Do you want to pay a lot or a little for imports? Which countries do you want to import from?

3. Do you want to protect any of your producers? How can you do that? If you impose a tariff, how much will it be? (e.g. If you manufacture bikes at $100 each and your competitors make them at $80, what will a reasonable tariff be?)

4. Are there any countries you want to make trade agreements with?

Stage 2. You now have 10 minutes to negotiate with other countries if necessary and to draw up and sign any agreements.

Stage 3. You have further 5 minutes to make a final decision about any trade restrictions you want to impose. Write down your trade restrictions. One representative of your government must go to an international conference and make a formal announcement of your country's trade policy.

Section 1, Unit 1.2

Role-play 'Buying and Selling a Solar Panel'

You are a Seller working for the company 'Solar World' and your partner is a Buyer. Your primary goal is to have the Buyer sign the contract to purchase your product – solar panels. The minimum goal is to leave your business card, and the optimistic goal is to make them commit to the Solar World brand and become a constant buyer of your solar panels.

Read the cards and roleplay.

<table>
<tr><th colspan="2">My product and firm</th></tr>
<tr><th>Product 'Sunmodule'</th><th>My company 'Solar World'</th></tr>
<tr><td>What is it?
· made from pure silicon, glass, and aluminum;
· no cadmium or arsenic which are in low-grade panels;
· panels are completely recyclable;
· independently tested to strict standards for safety and durability.
How does it work?
· Photovoltaic solar panel (photo = light and voltaic = electricity) uses clean, renewable energy from the sun. It reduces the amount of electricity coming from fossil fuels</td><td>·Solar World has been in business since 1975;
·the leader in solar manufacturing in the country.
The 1st company to:
·produce more than 1 MWt of PV modules per year;
·offer a 25-year warranty.
The mission is to move the country closer to achieving clean energy independence.
The company is committed to managing resources wisely so we can lower costs and maximise the return on investment for our business partners.</td></tr>
<tr><th colspan="2">What has been done</th></tr>
<tr><td colspan="2">· I met with the committee to determine UMD's needs and potential solar savings.
· They have called me back to present my case to the Facilities Management Purchaser.
· Spoke with the Facilities Management secretary and learned that the Office of Sustainability Coordinator, Mindy Granley, is on maternity leave.
· Instead she directed me to Kevin Claus who works with construction on campus.
· Kevin was able to provide me with information on UMD's past solar panel providers.
· I decided from consultation that 28 220W panels would be sufficient.
· Place atop the Life Sciences building
· Good location since it is now more energy efficient after its recent renovation.</td></tr>
</table>

The Buyer – company UMD
• In 2009 alone, UMD utility bills totalled around 5 million dollars; • Facilities Management Purchaser; • Makes the final decision on which particular panels the school will buy; • Currently UMD has 2 solar panels in place; • Sharp brand panel is installed on the Malosky Stadium; • Sanyo brand panel is installed on the Bagley Outdoor Classroom; • UMD strives to be more sustainable; • Reducing energy use is a top priority; • Committed to the environmental impact of its operations. **The needs:** • Save money; • Good quality solar panel.

The Buyer's options

A. Solar World- Sunmodule, Price $40,000 for 28 220W panels

Strengths	Weaknesses
10 year workmanship warranty	13.1% module efficiency
Service warranty: degression of .7% over 25 years compared to 2 phase warranties	Not a well recognised brand
Plus sorting ensures top efficiency	Many competitors
Reasonable price	
Made in our country: stimulates the economy	
Holds snow loads up to 112 psf	

B. Sharp - ND-220UCI, Price $45,000 for 28 220W panels

Strengths	Weaknesses
Made in our country: stimulates the economy	5 year workmanship warranty
Durable - impact test 2" steel ball 1.18 lbs	Service warranty: 90% for10 yrs, 80% for25 yrs
Holds 8% of the market share	13.5% module efficiency

C. Sanyo - Hit Power 220A, Price $55,000 for 28 220W panels

Strengths	Weaknesses
Patented Hit Power- best efficiency 17.4%	Expensively priced
Can handle wind loads up to 50 psf	5 year workmanship warranty
	Service warranty- 90% for 10 yrs, 80% for 20 yrs

Useful phrases

Objections (Buyer's words)	Responses (Seller's words)
1. Is it durable to withstand weather in …?	1. That's a great question! Our solar panels are independently tested to strict international standards for safety and durability. An advantage that our panels have is that they can hold snow loads up to 112 psf, which is a good feature for …, which once again highlights our high quality, which was a need that you were concerned about.
2. The economy is really bad right now, so I don't think we will be able to afford it.	2. I completely understand. I still have customers making purchases and you will experience savings in the long-run, so it is a great investment. If you purchase panels today, you can obtain a rebate, if that helps you in your decision.
3. We already have panels from two other brands. Why should we purchase yours?	3. I can see what you mean. I encourage you to compare your current provider's prices with ours. If I remember correctly, you said you were looking for reasonably priced panels. I think you would benefit in the long run if you switched to our brand.
4. Aren't you a little young to be selling solar panels?	4. I could see why you might think that. Although I may be young, I am very experienced in the industry, having received extensive training from my company and shadowing many other salespeople in my field.
5. I need more time to think about it before I make my final decision.	5. I completely understand, I will leave this portfolio with you to look over. If you have any questions you can reach me by this number on my business card. Would next week be a good time to meet again?
6. Your brand name is not well known. Why should I buy your panels?	6. I can certainly see how you feel. One of my clients from the New Science High School had that concern as well. Yet ever since they switched to our panels, they have been extremely satisfied. Here is a testimonial from them.
7. Would you like to get together later tonight?	7. To talk about the panels more? I'm sorry, it's actually against company policy.
8. I don't want to buy.	8. Perhaps you could help me understand why.
9. I've heard that your panels perform very poorly.	9. I'm not sure where you heard that, but I assure you that our panels perform very highly because of our plus-sorting. Plus-sorting ensures that systems operate at top efficiency which results in maximum energy yield year after year.
10. We already have panels on two of our campus buildings, I'm not sure if we need more.	10. Well, was one of your needs to save money? To save money on your utility bill, purchasing another solar panel would be in your best interest because of the money you'll save in the long run.

11. This is a big decision. How do I know if I am making the right choice?	11. I agree, tins is a large investment. This is your decision, and I assure you that I want the best for your organization. I could go over the information again and clarify the questions you have.
12. Why are your prices lower than your competitors? Is your product inferior?	12. Over the years we have been in business, we have optimized efficiency using lean manufacturing. Maintaining our costs helped us lower our costs to our consumers.
13. I will buy your panels, but I need a little kickback to make it worth my time and trouble.	13. I'm sorry, I would like to help you out, but unfortunately it is against my company policy.
14. You know, I don't quite understand your warranty that you offer.	14. I'm sorry, I didn't do a good job of explaining it We use a linear performance guarantee versus our competitor that uses a standard tiered guarantee.
15. I've never bought from your company before. Why should I buy from you?	15. Yes, I understand your concern. We are an established organization and have been in business for 36 years. We are the leading manufacturer of solar panels and we have very similar values compared to yours. We strive to be fiscally, environmentally, and socially sustainable.
16. Sanyo provided high quality solar panels. Why should we purchase yours instead?	16. You're absolutely right, Sanyo does have higher module efficiency. They have patented the Hit Power which increases efficiency. Although they may have 4% module efficiency over our brand, we offer our panels at a much lower price, which I believe was one of the needs that you specified.
17. I'm sorry, I don't want to buy any panels. I just don't like you.	17. I'm sorry that you feel that way. I hope I didn't offend you in anyway, and I hope that this does not jeopardize your business with our company. I will have a different associate assigned to you.
18. Why should we buy panels? Can't we just keep using electricity?	18. You could, but solar panels have many benefits. They reduce your carbon footprint, which makes you more sustainable. It is also a good investment and will help protect you from rising energy costs.
19. We had trouble finding qualified people to install our panels. How will I know that that won't happen again?	19. I'm glad you mentioned that. At Solar World, we hand-select the most qualified solar installers across the country to install your panels, which also fits your concern of high quality.
20. I've heard of panels flying off of roofs in heavy winds and I think yours will do the same.	20. That's understandable. Although we have a 10 year product guarantee, which is 5 years longer than our competitors. If the panels are not installed correctly and they fall off and break, we will gladly come and replace them.

Section 1, Unit 1.3

Role-play 'Sources of Energy'

Step 1: The teacher outlines the task. (T↔Ss)
Step 2: The students write questions and answers. (S↔S, S↔Ss)
Step 3: The students role play the dialogue. (S↔S)
Step 4: Follow up/feedback (T↔Ss)

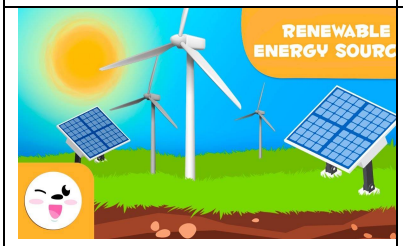
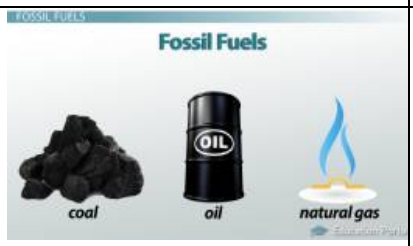
Role Cards

Student A

You are an environmentalist and you want to discuss the carbon problem with university students. The students are to express their thoughts dealing with advantages and disadvantages of renewable and non-renewable sources of energy and their influence on the world around us. Tell the students about the renewable and non-renewable sources of energy. Familiarise them with a range of sources they can choose from, using the following prompts.

You start the conversation

1) Greet the students and introduce yourself.
2) Tell them about the renewable and non-renewable sources of energy they will have to discuss.
3) Tell your partner about the advantages and disadvantages of the energy source(s) you have.
4) Ask the students about their ideas dealing with our green future.
5) Estimate the work done.

Renewables (Solar/Wind)	Fossil fuels (Oil/Gas/Coal)	Nuclear Power
		
• Advantages - Quantity is limitless, they will never run out - Energy is free to use - Environmentally friendly • Disadvantages - High development costs - Not always available everywhere - Usually not as powerful	• Advantages - Cheap & easy to use - Produce a lot of power - The main source for our economy/society. • Disadvantages - Damage the environment - Won't last forever/can cause conflicts overseas - Can be dangerous	• Advantages - Inexpensive and reliable source - Low greenhouse gas emission - Power output is maximum • Disadvantages - Potential of nuclear accident - Problems with disposing of radioactive waste - Strong public opposition - Non-renewable

Student B

You are a proponent of renewable sources and you are interested in solving the carbon problem. Make notes! Tell what sources of energy we need to use and why.

Your partner starts the conversation.

1) Greet your partner and say you have heard a lot about renewable sources of energy.

2) Tell your partner you are aware of advantages of renewable sources and ask about their disadvantages.

3) Make notes and thank for the information. Say what source people need for solving the carbon problem and why.

4) Thank your partner for the information provided.

Put down the answers to your questions here. Make any other notes if necessary.

Possible questions.

- What are the main renewable sources?
- Why are they important?
- What are the differences between renewable and non-renewable sources?
- Do you think people should generate their own electricity using wind/solar power, etc. or should governments choose options like nuclear power?
- What laws/schemes would you introduce to deal with environmental problems?

Student C

You are a proponent of fossil fuels and you are interested in solving energy supply problems. Make notes! Tell what sources of energy we need to use and why.

Your partner starts the conversation.

1) Greet your partner and say you have heard a lot about fossil fuels.

2) Tell your partner you are aware of advantages of fossil fuels and ask about their disadvantages.

3) Make notes and thank for the information. Say what sources people need for solving the energy supply problem and why.

4) Thank your partner for the information provided.

Put down the answers to your questions here. Make any other notes if necessary.

Possible questions.

- What are the main fossil fuels?
- Why are they important?
- What are the differences between renewable and non-renewable sources?
- Do you think people should generate their own electricity using wind/solar power, etc. or should governments choose options like nuclear power or others?
- What laws/schemes would you introduce to deal with energy supply and environmental problems?

Student D

You are a proponent of nuclear power and you are interested in solving both environmental and energy supply problems. Make notes! Tell what sources of energy we need to use and why.

Your partner starts the conversation.

1) Greet your partner and say you have heard a lot about nuclear power.

2) Tell your partner you are aware of advantages of nuclear power and ask about its disadvantages.

3) Make notes and thank for the information. Say what sources people need for solving the energy supply and environmental problems and why.

4) Thank your partner for the information provided.

Put down the answers to your questions here. Make any other notes if necessary.

Possible questions.

- Why is nuclear power important?
- What are the differences between renewable and non-renewable sources?
- Do you think people should generate their own electricity using wind/solar power, etc. or should governments choose options like nuclear power or others?
- What laws/schemes would you introduce to deal with energy supply and environmental problems?

Section 1, Unit 1.3 Writing a Paper for Conference

Conference Proceedings

Conference proceedings are the publications of papers presented at a conference. A conference may require that papers missing the publication deadline for the proceedings cannot be presented at the conference.

Proceedings usually contain four kinds of information:

• purpose or rationale of study (why they did it)

• methodology (how they did it)

• results (what they found)

• conclusion (what it means)

It is not easy to include all the information in just a few words. Start by writing a summary that includes whatever you think is important, and then gradually prune it down to size by removing unnecessary words, while retaining the necessary concepts.

Some rules

- Scientific writing must be accurate. Although writing instructors may tell you not to use the same word twice in a sentence, it is okay for scientific writing.
- Make sure you say what you mean.
- Be careful with commonly confused words.

For example:
Temperature has an effect on the reaction. ≠ Temperature affects the reaction.
I used solutions in various concentrations. ≠ I used solutions in varying concentrations.
Less food (can't count numbers of food), but: Fewer animals (can count animals)
A large amount of food (can't count them), but: A large number of animals.
The erythrocytes, which are in the blood, contain hemoglobin. ≠ The erythrocytes that are in the blood contain hemoglobin. (Wrong. This sentence implies that there are erythrocytes elsewhere that don't contain hemoglobin.)

- Write in a formal style, but at a level appropriate for your audience.
- Use verbs instead of abstract nouns (Instead of: take into consideration – Write: consider)
- Use strong verbs instead of 'to be' (Instead of: The enzyme was found to be the active agent in catalyzing... – Write: The enzyme catalyzed...)
- Use short words and short sentences. A sentence made of more than 40 words should probably be rewritten as two sentences.
- Check your grammar, spelling and punctuation. Use a spellchecker, but be aware that they do not catch all mistakes. Don't use commas.

Section 1, Unit 1.5

Game Roleplay 'At the job interview'

Work in two big groups: applicants and HR managers recruiting for their companies. The winner is the one who takes the most positions.

Role 1 You are a job interviewer ……	**Role 2 You are an applicant ……**
Task 1 Ask the applicant's name	Task 1 Introduce yourself
Task 2 Ask about the applicant's likes and dislikes about his present job.	Task 2 Answer the question
Task 3 Ask a question about strengths	Task 3 Answer the question
Task 4 Ask a question about weaknesses	Task 4 Answer the question
Task 5 Ask a question about applicant's experience	Task 5 Answer the question
Task 6 Ask a question about applicant's qualifications	Task 6 Answer the question
Task 7 Ask a question about the applicant's goals for the future	Task 7 Answer the question Ask a question how you can succeed if hired. <u>Possible questions are:</u> • What will be my biggest challenge in this role? • Why did the previous person leave this role? • What are the opportunities for growth within this role? What types of training and professional development programs can you offer? • How will my success be measured in this role? Ask questions about the starting salary and the benefit package.

Stage I

The first step is when the teacher outlines the task and the students take notes.

Task 1. Students answer the questions about what they know about job interviews, their types and how to prepare for a job interview.

Task 2. Students brainstorm questions asked at a job interview.

Stage II

The second step is role-playing scenario. The teacher offers to divide students into 2 groups. One group of students are students who play a role of an applicant, another group are students who play a role of an HR manager.

Task 3. Students prepare handouts for job interviewers and applicants. Students may use their own cards or swap the cards thus playing both roles: of an applicant and an interviewer.

Task 4. Students roleplay the scenario. Applicants try to get a job. HR managers try to find the best employee.

HR managers fill in the assessment form on their partner's performance by circling the number of points and decide if they hire the applicant.

Content	1-2-3-4-5
Grammar	1-2-3-4-5
Vocabulary	1-2-3-4-5
Body Language	1-2-3-4-5
Pronunciation	1-2-3-4-5

Useful phrases and questions:

Do you always do what you say you will do? Are you able to plan ahead successfully? Are good at coming up with imaginative solutions?

I'm good at … I'm interested in…. I am…. I try to….

I can sometimes be….. I can be a little bit….

What do you like most/least at your present job?

What are your strengths?

What are your weaknesses?

Why do you apply for this position?

What companies have you worked for?

What are your goals for the future?

Where do you see yourself in 10 years?

What would you do if you were the head of this company?

Section 2, Unit 2.1

Game 'Guess the word'

You are Student A. Guess the word the explanation of which you hear from Student B.

Then looks at the words below and explain what it means without giving the word itself. Students A must guess the word.

loss / loop / parameter / lamination / burden

Section 2, Unit 2.1

Pairwork activity 'Asking about Equivalent circuits'

Your teacher will give you some information about equivalent circuits. You will not have the same information as your partner. Ask and answer questions to complete the information.

Step 1: The teacher outlines the task.

Step 2: Each student receives a copy of role and cue cards.

Step 3: The students write questions.

Step 4: The students role play the dialogues.

Student A: read the cards below.

Student B: turn to p.198.

Student A
Equivalent Circuits

Copeland and Slemon (1963) presented ... (What?) and introduced. They presented a conceptual equivalent circuit using a nonlinear hysteretic element. Miyairi and T. Kataoka (1965) introduced the idea ... (What?) and gave an equivalent circuit for the axial motor. Ishikawa and Kataoka (1981) extended this work to ... (What?). Hysteresis motors are different from induction motors in that they exert a constant torque during startup (neglecting eddy effects) instead of a torque proportional to the slip. The poles on the rotor of a hysteresis motor are

always moving ... (How?), whereas the poles on an induction motor are always moving at a speed different from the stator field. This means ... (What?).
Hysteresis motors are also different from other synchronous motors in the non-linear response of the rotor field. ... (Which?) fields cannot be treated separately and then added by linear superposition.
This means that the stator and rotor inductive properties must be treated as a single unit. ... (What?) follows from Miyairi and Kataoka (1965), that the effect of back-EMF from the rotor during synchronous conditions must be incorporated as part of the self-inductance of the rotor-stator system. Any additional back-EMF above this baseline occurs only under slip conditions.

Your questions:

1. What did Copeland and Slemon (1963) present introduce?
2. What idea did Miyairi and T. Kataoka (1965) introduce?
3. What did Ishikawa and Kataoka (1981) extend this work to?
4. How are the poles on the rotor of a hysteresis motor always moving?
5. What does this mean?
6. Which fields can-not be treated separately and then added by linear superposition?
7. What follows from Miyairi and Kataoka (1965)?

Here are the answers to your partner's questions:

1. Equivalent circuit using a nonlinear hysteretic element.
2. For the axial motor.
3. In that they exert a constant torque during startup (neglecting eddy effects) instead of a torque proportional to the slip.
4. At a speed different from the stator field.
5. In the non-linear response of the rotor field.
6. The stator and rotor inductive properties.
7. Only under slip conditions.

Section 2, Unit 2.3

Writing a review

- **A review** is a short description of a book, website, magazine, exhibition, etc. It is written to inform readers and to give them our opinion/recommendation.
- Reviews can be formal or informal, depending on the target audience and the publication.
- They can appear as articles in magazines/newspapers or as part of a letter/e-mail.
- The introduction should contain some background information about the book, film, etc. (i.e. the name of the author/director, type, setting, name of main characters, etc.)
- The main body normally consists of two paragraphs:
  - ➢ one about the main points of the plot of the film, book, etc. we are reviewing in chronological order;
  - ➢ the other contains general comments on the plot, main characters, etc. We should never reveal the end of the story to the reader
- The conclusion contains our personal opinion and whether we recommend the book, film, etc. or not to the reader. We should justify our opinion with reasons.
- Present tenses are mainly used to describe the plot.
- We can use a variety of adjectives to make our review more interesting to the reader.

Section 2, Unit 2.4

Pairwork activity 'Asking about Voltage transformers'

Your teacher will give you some information about voltage transformers. You will not have the same information as your partner. Ask and answer questions to complete the information.

Step 1: The teacher outlines the task.

Step 2: Each student receives a copy of role and cue cards.

Step 3: The students write questions.

Step 4: The students role play the dialogues.

Student A: read the cards below.

Student B: turn to p. 199.

Student A

Voltage Transformers

... (What?) are also known as potential transformers. Principle of operation of a potential transformer is the same as that of a two-winding transformer. ... (Why?) the potential instrument transformers are designed more liberally than transformers for power transformation purposes. This results in keeping the magnetizing current and the transformer parameters as small as economically possible.

The construction of voltage transformer is primarily dependent on ... (What?). For voltages up to 3.3 kV, dry type transformers with varnish impregnated taped windings are used. For ... (What?) voltages, core and windings are immersed in oil. With windings impregnated and incapsulated in synthetic resin, dry type voltage transformers are available in higher voltages up to 66 kV also.

Potential transformers are used for ... (What?). They are also applied to operate pilot lights or relays and to increase the voltage of instruments like wattmeter, energy meter, etc.

For safety, the secondary winding should be completely insulated from ... (What?) and, in addition, should be grounded for safety of personnel.

Your questions:

1. What are also known as potential transformers?

2. Why are potential instrument transformers designed more liberally than transformers for power transformation purposes?
3. What is the construction of voltage transformer primarily dependent on?
4. For what voltages are core and windings immersed in oil?
5. What are potential transformers used for?
6. What should the secondary winding be completely insulated from for safety?

Here are the answers to your partner's questions:

1. It is the same as that of a two-winding transformer.
2. In keeping the magnetizing current and the transformer parameters as small as economically possible.
3. Dry type transformers with varnish impregnated taped windings.
4. Dry type voltage transformers with windings impregnated and incapsulated in synthetic resin.
5. To operate pilot lights or relays and to increase the voltage of instruments like wattmeter, energy meter, etc.
6. For safety of personnel.

Student B: 'Asking about Equivalent circuits' (Section 2, Unit 2.1)

Student B

Equivalent Circuits

Copeland and Slemon (1963) presented an analytical study of hysteresis motors and introduced the idea of using the fundamental harmonic response of the rotor material in reponse to the magnetizing field. They presented a conceptual equivalent circuit ... (What?).

Miyairi and T. Kataoka (1965) introduced the idea of a elliptical hysteresis curves and gave an equivalent circuit for ... (What?). Ishikawa and Kataoka (1981) extended this work to disk motors.

Hysteresis motors are different from induction motors in ... (What?). The poles on the rotor of a hysteresis motor are always moving along with rotating stator field (except for oscillations in the lag angle), whereas the poles on an induction motor are always moving at a ... (What?) speed .... This means that the back-EMF characteristics of the two types of motors are not the same.

Hysteresis motors are also different from other synchronous motors ... (How?). The stator and rotor fields can-not be treated separately and then added by linear

superposition. This means that ... (Which?) properties must be treated as a single unit. It follows from Miyairi and Kataoka (1965), that the effect of back-EMF from the rotor during synchronous conditions must be incorporated as part of the self-inductance of the rotor-stator system. Any additional back-EMF above this baseline occurs ... (When?).

Your questions:

1. What eqiuvalent circuit did they present?
2. What did they give an equivalent circuit for?
3. What are hysteresis motors different from induction motors in?
4. What speed are the poles on an induction motor always moving at?
5. How are hysteresis motors also different from other synchronous motors?
6. Which properties must be treated as a single unit?
7. When does any additional back-EMF above this baseline occur?

Here are the answers to your partner's questions:

1. Copeland and Slemon (1963) presented an analytical study of hysteresis motors and introduced the idea of using the fundamental harmonic response of the rotor material in reponse to the magnetizing field.
2. The idea of an elliptical hysteresis curves.
3. To disk motors.
4. They are always moving along with rotating stator field (except for oscillations in the lag angle).
5. That the back-EMF characteristics of the two types of motors are not the same.
6. The stator and rotor fields.
7. That the effect of back-EMF from the rotor during synchronous conditions must be incorporated as part of the self-inductance of the rotor-stator system.

Student B: 'Asking about Voltage transformers' (Section 2, Unit 2.4)

Student B

Voltage Transformers

Voltage Transformers are also known as potential transformers. Principle of operation of a potential transformer is ... (What ... like?). In order to keep the change in ratio with load as small as possible the potential instrument transformers are designed more liberally than transformers for power transformation purposes. This results in ... (What?).

The construction of voltage transformer is primarily dependent on its voltage rating. For voltages up to 3.3 kV, ... (What?) transformers are used. For voltages

more than 3.3 kV, core and windings are immersed in oil. ... (What?) transformers are available in higher voltages up to 66 kV also.

Potential transformers are used for measuring high voltages with low range voltmeters. They are also applied ... (Where?).

For safety, the secondary winding should be completely insulated from high voltage primary winding and, in addition, should be grounded for ... (What?).

Your questions:

1. What is the principle of operation of a potential transformer like?
2. What does this result in?
3. What transformers are used for voltages up to 3.3 kV?
4. What transformers are available in higher voltages up to 66 kV?
5. Where are they also applied?
6. What should the secondary winding be grounded for?

Here are the answers to your partner's questions

1. Voltage transformers.
2. In order to keep the change in ratio with load as small as possible.
3. On its voltage rating.
4. For voltages more than 3.3 kV.
5. For measuring high voltages with low range voltmeters.
6. The secondary winding.

Section 2, Unit 2.4

Writing a Summary

A good summary has the following characteristics:

►Proper Citation: The summary begins by citing the title, author, source, and, in the case of a magazine or journal article, the date of publication and the text.

►Thesis Statement: The overall thesis of the text selection is the author's central theme. There are several aspects to an effective thesis statement:

- It comprises two parts: a) the topic or general subject matter of the text, and b) the author's major assertion, comment, or position on the topic.
- This central theme is summarized clearly and accurately in a one- sentence thesis statement.
- The thesis statement does not contain specific details discussed in the text.
- The thesis statement is stated at the beginning of the summary.

►Supporting Ideas: The author supports his/her thesis with supporting ideas. Use the following basic guidelines when summarising supporting ideas:

- Cover all of the author's major supporting ideas.
- Show the relationships among these ideas.
- Omit specifics, such as illustrations, descriptions, and detailed explanations.
- Indicate the author's purpose in writing: to inform, to persuade, or to entertain. If the passage is a persuasive piece, report the author's bias or position on the issue.
- Omit all personal opinions, ideas, and inferences. Let the reader know that you are reporting the author's ideas.

►Grammar and the Mechanics of Writing: the following are particularly important:

- Restate the ideas in your own words as much as possible. Avoid direct quotations.
- Use transitional words for a smooth and logical flow of ideas.
- Edit and re-write your work.
- Check your grammar, punctuation, and spelling.

►Length: The length of a summary depends on how long the original document is.

Some linking words and useful phrases

1. The article under consideration deals with…

It covers a large number of problems concerning….

2. Beginning: First,…/To begin with,
   First of all

Continuing: Secondly,
After this / that
Then,
Next

To add more points on the same topic: What is more,
Furthermore,
In addition (to this)
Besides (this)

To rephrase: In other words,…/ That is to say,
To put it another way

To contrast and compare: Although,
Whereas
On the other hand,
In contrast,
In comparison (with) /As compared (with/to)

To express reality: It is a fact that, / In fact,
As a matter of fact,
In practice,
Indeed,
It goes without saying

To emphasize: Clearly,…/ Obviously,
Needless to say
One cannot but mention
It is of primary basic importance that…

To list advantages: One advantage of… is that
Another advantage of… is that
A further advantage of… is that
The greatest advantage of… is that

Reference: Considering…/Concerning…/ Regarding
As far as …is concerned

3. To conclude: In conclusion,…/ To sum up,
As it was previously stated,
On the whole,
Taking everything into account

Section 2, Unit 2.4

Product details for a letter of complaint

POWER BRIGHT 750 W STEP UP/DOWN TRANSFORMER

Features

- Free grounded adapter included ($3 value)
- 2 Spare fuses included
- Voltage transformer
- Fuse protected
- On and off switch
- CE approved
- Product Type: Travel inverter
- Finish: Black

Generic Specifications

- Universal 220V plug

Dimensions

- Overall Height - Top to Bottom: 4.1"
- Overall Width - Side to Side: 4.7"
- Overall Depth - Front to Back: 7.2"
- Overall Product Weight: 11.22 lbs

Brand and Manufacturer: Power Bright

Manufacturer Part Number: VC-750W

Assembled Product Weight: 11.22 lbs

Assembled Product Dimensions (L x W x H): 7.20 x 4.70 x 4.10 Inches

Taken from https://www.walmart.com/ip/Power-Bright-750W-Step-Up-Down-Voltage-Transformer/22854480

GRAMMAR REFERENCE

PRESENT TENSES

Present Simple is used:

- for permanent states, repeated actions and daily routines;
- for timetables (planes, trains, etc.) and programmes;
- for sports commentaries, reviews and narration;
- to give instructions or directions (instead of the imperative).

Present Continuous is used:

- for actions which are in progress now, at the moment of speaking;
- for temporary actions (actions that are going on around now, but not at the actual moment of speaking;
- for actions which happen very often to express irritation, annoyance or anger (usually used with adverbs: always, constantly, etc.);
- for arranged actions to do in the near future (especially when the time and place have been decided);
- for changing and developing situations.

Present Perfect is used:

- for an action that started in the past and continues up to the present (especially with state verbs). In this case **for** or **since** are used;
- for an action which has recently finished and whose result is visible in the present;
- for an action which has happened within a specific time period which is not over at the moment of speaking (words and expressions such as**: today, this morning/evening/week**, etc. are often used).

Present Perfect Continuous is used:

- to put emphasis on the duration of an action that started in the past and continues up to the present (words and expressions such as**: for, since, today, this morning/evening/week**, etc. are often used).
- for an action that started in the past and lasted for some time. The action may be finished or not, but the result is visible in the present;
- to express anger, irritation or annoyance.

Note: with the verbs **live, work, teach** and **feel** (have a particular emotion) either the Present Perfect or the Present Perfect Continuous can be used with no difference in meaning.

PAST TENSES

Past Simple is used to talk about:

- actions and situations which started and finished in the past (we often say when they happened);
- a series of actions that happened one after the other.
- habits or states which are now finished (in such cases we can also use the expression **used to**).

Past Continuous is used:

- to talk about actions which were in progress at a particular time in the past;
- to talk about an action which was in progress when another action interrupted it (for the shorter action, which happened while the longer was in progress, use the Past Simple);
- to talk about two or more simultaneous past actions;
- to describe background states for other events (usually in the introduction to a story).

Past Perfect is used to talk about:

- an action that happened before a particular time in the past or before another past action (for the action that happened first, use the Past Simple);
- an action which was finished in the past and whose result was visible in the past.

Note: The Past Perfect is the past equivalent of **the Present Perfect.**

Past Perfect Continuous is used to talk about:

- an action that was in progress for some time in the past before another past action;
- an action which lasted for some time in the past and whose result was visible in the past.

Note: The Past Perfect Continuous is the past equivalent of **the Present Perfect Continuous.**

FUTURE TENSES

Future Simple is used:

- in predictions about the future (usually with the verbs **think, believe, expect**, etc.; with the adverbs **probably, perhaps**, etc.; with the expressions **be sure be afraid**, etc.);
- for on-the-spot decisions;
- for promises, threats, warnings, requests, hopes and offers;
- for actions/events/situations which will definitely happen in the future and which

we cannot control.

Future Continuous is used:

- for an action which will be in progress at a stated future time;
- for an action which will definitely happen in the future as the result of a routine or arrangement;
- to ask politely about someone's plans for the near future (when we want to know if our wishes fit in with their plans).

Future Perfect is used to talk about:

- for an action which will be finished before a stated future time used with time expressions: **before, by, by then, by the time, till/until**);

Future Perfect Continuous is used:

- to emphasise the duration of an action up to a certain time in the future (used with by …, for).

VERB PATTERNS

- verb + *to*-infinitive, e.g. *agree, arrange, can't afford, decide, intend, learn, manage, offer, refuse, remember, seem, tend:*

  *She **decided to leave** the University and find a job.*

  *My groupmate **agreed to help** me finish my project.*

- verb + object + *to*-infinitive, e.g. *advise, allow, cause, enable, encourage, expect, force, remind, urge, warn:*

  *Our teacher **encourages us to study** English.*

  *Professor **reminded students not to use** their smart phones during the test.*

- verb + object + infinitive without *to,* e.g. *make, let:*

  *University lecturers **make us write** a lot of tests.*

- verb + *-ing* form, e.g. *admit, avoid, can't help, can't stand, enjoy, fancy, imagine, keep, miss, practise, spent/waste time, stop:*

  *I **can't stand doing** a lot of homework.*

  *The criminal **admitted having stolen** the purse.*

- verb + *-ing* form/*to*-infinitive:

  After the verbs *begin, continue, hate, intend, like, love, prefer* and *start* we can use both the *-ing* form and the *to*-infinitive. The meaning stays the same or changes very slightly.

  We ***continued playing*** football. We ***continued to play*** football.

  *She **likes playing** the guitar. She **likes to play** the guitar.*

WORDLIST

This list contains the key words from the units. Write the part of speech (n – noun, v – verb, adv – adverb, adj – adjective, prep – preposition, phr – phrase) and translation of unknown words.

Word	Translation	Word	Translation
I. Unit 1 Exhibitions and trade shows		**I. Unit 2 Energy markets**	
adhere to announce appreciate attract auspice bankruptcy biodiversity bureau case client coast convention corporate drawback duration economical equality expenditure exposition fair gamut horticultural innovative international lakh pavilion potential prefabricate precise probability receptivity sanctioning scope specific sub-topics tolerance universal		accountable additional administrative ahead applicable appropriate assessment assume barrier competitive competitor consumer crude distribution ensure fragmented gasoline government grid internal integration liberalise market milestone mobility monopoly network price production protection receive retail suppose underdeveloped	

I. Unit 3. Energy and the environment		I. Unit 4 Writing an Engineering CV	
acid climate consumption dam dependent destruction destructive disposal environment exacerbation fauna fertile flora floods global hazardous infrastructure inherent insurmountable landscape mining nuclear peat precipitation production protect rational renewable significantly shale solar panels spawning sulphur thermonuclear tidal power plants unprecedented waste windmills wind turbines		allow applicant assist career carry out check competence cover(ing) letter distinguish economical employ employee employer encourage essential exaggerate experience highlight include invert job list load memorable occupation opposite professional pursue qualification relevant responsibility resume search skills succeed in switchboard vary volunteering work	

I. Unit 5. Successful interviews for engineering jobs		II. Unit 1 Transformer basics	
affect aim apply candidate choice communicator daunt decorum discourteous engagement etiquette explanation framework get ready grumbling honesty ignore individual interrupt interview intimidate mains memory passion person process professional promising promote prospective proud of qualified quality recruit refresh rude ruin speech target		ability alternating apparatus burden bushing cell circuit clearance coil condition connect decrease electromagnetic empirical equivalent ferromagnetic flux force gradient increase induce induction insulate limb load potential primary ratio resistance secondary shift slide steel tension terminal theoretical transformer wave	

II. Unit 2 Cooling methods of a transformer		II. Unit 3 Current transformer	
abandon absorb absorption arrange bladder bottom capacity conclusion confine contaminant contraction cooling destroy deteriorate dissipate duct enclose equipment fan gain heat interior join liquid medium-sized misprint moisture occur oil prevent provide radiation station substitute tank tradeoff underneath		adjacent busbar control cover create degree dependent describe determine draw examine glow heavy in series iron lamination line drop mold obtain parallel perceptible pressure rate readout reduce reluctance rugged securely separate shunt simplify solid susceptible to tap tend to terminal test prod	

II Unit 4 Voltage transformer			
bang breakage colon core-type desirable difference domain fluctuation electromagnet equal impedance insulation isolation oscillation		protection ratio reliable restrict selective shell-type soak step-down step-up switchgear value wire	

AUDIO SCRIPTS

Section 1 Unit 1.1

Highlights of Engiexpo Vadodara 2020 Mega Industrial Exhibition

From concept to successful completion.

From rigorous planning to time bound implementation.

Days, months and years of hard work by dedicated team.

Engiexpo is an enabling platform for the growth of India's MSME sector.

Since last 5 years:

- More than 3, 000 exhibitors
- More than 12 lakh visitors
- More than robust 4, 000 crore worth of trade activity
- More than 20, 000 products at display
- Participants from 16 states of India
- Make in India
- India first
- Digital India
- Start-up India
- Brand India

All rolled up in one mission - 10 mega events.

Engiexpo is one of the largest shockers on the latest advances in engineering, converging innovations and latest developments, driving efficiency and profitability to enable traders, manufacturers and service providers to compete and grow in an ever-competitive global market.

Engiexpo has emerged as prestigious brand in field of exhibitions and trade fairs consecutively in the last 5 years with 5 annual events in hand about Surat, Vadodara, Rajkot, Ahmedabad and in Mumbai and Delhi.

Engiexpo has become a national event with tremendous support and response from industries, trade bodies, and various government agencies.

Engiexpo is organised by 2wayadvertising, a well-known name for industrial exhibitions and space selling concern since last 20 years.

We provide an enabling platform for various stakeholders to argument growth and prosperity for the large MSME sector. We are one of the biggest industrial exhibition organisers in India having 100% satisfied customer ratio and 90% renewal ratio. We are India's living subjective expo organisers.

Engiexpo is recognised nationally in the recent years for depicting entire value chain for engineering industries with focused approach and has scripted a phenomenal growth bud and creating brand value while supporting products and processes that have become marker leaders and enhance sustainability.

Engiexpo is dedicated to present specialised technologies in the areas like weighing scale, welding, cutting, power tools, safety equipment material handling, construction, machine tools, automation, information technology, finance, electricals, and electronics. It brings together top manufacturers, suppliers and traders to source from all levels of the engineering supply chain supported by media trade bodies and regional associations.

Engiexpo brings sum up the latest innovations and gets studies to the marketplace. In B2B our vision is to connect one business with the other business, in B2C we provide every business direct connect with their customers. We help our exhibitors grow the business and achieve huge profits.

Engiexpo is a forum bringing together manufacturers and suppliers of all sizes to further automate their planning, design, test, manufacturing and logistics processes, reducing costs and gaining more competence and advantage worldwide.

Facilities at the Engiexpo include conference room for seminars and conferences on a wide range of topics to foster, increase the trade information of strategic alliances. The halls are right finables, having ample height, good lighting, well-designed ventilation and strong flooring to withstand even the heaviest machinery. Major highlights of the available facilities include operational air-conditioned food court, business communication centres, site offices, service centres, and sufficient parking space, utilities and infrastructure to meet demands of power, water supply and medical facilities.

Engiexpo is committed to provide an upgraded, dynamic and a real platform to tap unexplored opportunities and technological innovations. We help creating a competent image and value edition for our exhibitors and participants.

Section 1 Unit 1.2

Understanding Basics of the Power Market

Electricity is a relatively new type of tradable commodity. Several characteristics differentiate it from other commodities such as crude oil or natural gas. First, it is completely fungible, meaning one megawatt hour of electricity produced from either coal or natural gas contains exactly the same amount of energy. Second, it must be produced and used simultaneously. Industrial battery storage is still prohibitively expensive. Therefore, additional systems need to be in place to meet peak levels of consumption. Third, the supply must meet demand exactly in the power grid.

Ancillary services and demand response programs ensure that increase is in demand or handled in real time. This means uneconomic generation resources are not dispatched when demand is low. They are only put into service during periods of peak demand. Due to these unique characteristics of electricity independent system operators (ISO) and regional transmission organisations (RTO) are responsible for keeping the power grid balanced between generation and load. ISOs and RTOs forecast and schedule generation to assure that sufficient generation and backup power is in place to meet unexpected demand or generation loss. ISOs and RTOs must be non-commercial organisations, neutral and independent from commercial

players. Currently, there are nine ISO and RTOs in North America, each one is responsible for the reliability, operations, resource planning and expansion in the deregulated electricity marker. Each ISO and RTO typically operates and manages four markets: energy, capacity, financial transmission rights and ancillary services.

Let's first look at how ISOs and RTOs manage the energy market which includes the generation and consumption of electricity. They manage the energy market via two sub-markets. The first is through the day-ahead market and the second is through the real-time market. In the day-ahead market, electricity generators and load serving entities submit their bids to ISO and RTOs to receive and offer electricity to the power grid based on varying costs for each hour or next operating day. In the real-time market, ISOs and RTOs manage the changes in production and consumption throughout the day. This can range from 5 minutes to half an hour increments. ISOs and RTOs optimise the generation dispatch schedule where they consider cost, security, and transmission constraints. Market participants will commit to the schedule with a locational marginal price or LMP, set at each location based on published prices from ISO/RTO.

In the real-time market, operators send dispatch instructions to each generator based on actual system operating conditions in a real-time basis. Generation and load are priced at each node on the bus for longer-term grid resource stability. ISOs and RTOs operate a capacity market that auctions the commitment of providing electricity generation capacity to ensure generation exceeds load in the long term. This market incentivises long term capital investment in generation resources and revenues are paid to the capacity providers, regardless of whether energy is produced or not. CME Group offers a variety futures and options contracts for electricity day-ahead, real-time and capacity markets. This provides market participants a variety of regional locations to hedge and manage risks exposure.

Section 1 Unit 1.3

Green Growth Indicators

For years economic growth has been seen as the way to improve humankind's well-being. But it came at a steep environmental cost. Now we know that growth and the protection of natural resources can go hand in hand. Green growth. But the relationships between economic environmental and social outcomes are complex. The Covid-19 pandemic makes it even more challenging. How can we know that our growth is green? In 2011 several indicators were defined to track progress in aligning economic and environmental priorities. The so-called green growth indicators answer such questions as:

Are we becoming more efficient in using natural resources and environmental services?

Is the natural asset base of our economies being maintained?

Does the greening of growth generate benefits for people?

How does green growth generate economic opportunities?

In 2011 the Netherlands was the first country to pilot test this set of green growth indicators. Today this measurement framework is widely used by the European Union and

beyond to help policymakers make the decisions that stimulate economic growth and well-being while preserving the environment. The six eastern partnership countries: Armenia, Azerbaijan, Belarus, Georgia, the Republic of Moldova and Ukraine also started raising awareness and developing their national sets of green growth indicators. Let's see what these indicators tell us. For example, the indicator for CO_2 productivity shows that over the past decade production across the EaP region has increased while CO_2 has gone down. This means production has become cleaner and more efficient. This indicator shows whether the economy is decoupling growth from CO_2 emissions, that is whether the growth rate of CO_2 emissions is lower than the growth rate of GDP.

How are these indicators used in practice? Azerbaijan, Moldova and Ukraine developed reports that show progress in greening their economies. The government of Moldova is using green growth indicators to make better informed decisions. Belarus and Ukraine included green growth indicators in regular statistical systems and reports. This is a good start. But more work is needed. Green growth is about fostering economic growth and development while ensuring that the natural assets continue to provide the resources and environmental services on which our well-being relies. Green growth policies need to be supported with appropriate indicators to monitor progress. Green growth indicators can help track and communicate progress in greening economic growth. Informed decisions demonstrate accountability to national and international stakeholders, raise public awareness about the links between economic growth and the environment and compare progress between countries. The EU funded EU for environment programme, supports the six EaP countries to better monitor progress at the environment economy nexus. It helps reinforce the work on green growth indicators, update the existing sets and add new indicators and improve access to data. The green growth indicators that we design today will support the development of policies that will determine our lives tomorrow.

Section 1 Unit 1.4

How to write a CV with no experience

Whether you are making a career change or taking your first step onto the career ladder, writing a CV with no experience can be hard. However, even if you don't have much or any relevant work experience, you'll have gained transferable skills throughout your life. Transferable skills are core skills and abilities which can be transferred from one context to another, such as communication, leadership and research. You'll have gained these from volunteering, extracurricular activities, or academic projects for example. 75% of employers believe that transferable skills are equal to or more important than technical skills, so read the job description carefully and identify which skills you already have from other areas. Make sure to include achievements from a variety of different contexts if possible. If you are concerned about how your CV will look with no experience, don't feel confined to a traditional layout. You may find that a 'functional CV' (also known as a skills-based CV) suits you better. This format places your skills at the top of your CV. Recruiters spend on average 7 seconds

looking at a CV before deciding to leave it or continue reading, so a functional CV gives you a chance to immediately convey how your skills make you good fit for the job, taking attention away from your lack of experience. Don't compensate for having no experience by bulking out your CV. Keep it concise by using one-line bullet points and make sure to include keywords from the job description throughout. You may also benefit from including a hobbies and interests section towards the end of your CV. 51.2% of employers said they select candidates based on their hobbies and interests, as this indicates a good cultural fit. Your hobbies and interests must be relevant, so show how an enthusiasm for the industry and amateur experience carrying out responsibilities of the role are reflected in your recreational activities. If you haven't worked in the field before, employers will still expect you to be well informed about industry news. Three quarters of graduate employers said they viewed commercial awareness as either 'quite' or 'very' important. Write on your CV that you proactively keep up to date with all trends and developments in your field, and list publications and podcasts you subscribe to. Make sure not to lie, as you'll likely get asked some industry news-specific questions at an interview. Your lack of experience doesn't have to hold you back. These tips should help you nail your CV and get your foot in the door.

Thanks for watching, don't forget to like, subscribe or comment!

Section 1 Unit 1.5

Tell me about yourself – Job Interview

Receptionist: Mr Davis is ready to interview you now.

Mr Torres: Thank you.

Mr Davis: Hello Mr Torres, nice to meet you.

Mr Torres: Hello.

Mr Davis: I'm Tom Davis, the Manager of LCI Software.

Mr Torres: Nice to meet you Mr Davis.

Mr Davis: First I'd like to congratulate you on passing our aptitude test. You did very well.

Mr Torres: Thank you.

Mr Davis: So, how did you **hear about** this job?

Mr Torres: I saw an **advertisement** online. I clicked on it and it brought me to your company's website, where I **applied for** it.

Mr Davis: **Makes sense.** What do you know about our company so far?

Mr Torres: I've read on your website that for over ten years LCI Software has **delivered** professional services on software development projects for clients all over the world. I can tell from the pictures and client **testimonials** on the website that you do great, quality work.

Mr Davis: Yes, we always try to do quality work. The software products we build help many brands transform their businesses. So, tell me about yourself.

Mr Torres: I completed a Bachelor's Degree in Environmental Biology and a Master's Degree in Environmental Informatics. I managed to get a job in the **environmental** engineering

industry. But I soon realised I wasn't **cut out for** that job and decided to move to a different industry. I decided to take the **path** of a software developer.

Mr Davis: Wow, what determined you to make such a **bold** career shift?

Mr Torres: I've had a great enthusiasm for technology since an early age. I've always loved computers and **gadgets** and enjoyed building them and **taking** them **apart**. I took online courses **endorsed** by high-profile universities and studied how to **code**. I have a few official software certificates. I started by building websites for people I knew. It helped me build a **portfolio** of projects. I got my first IOS development job at a software agency called Tech Services. I had the opportunity to learn more about the software-building process there. But, since there were not too many projects at that agency, after 2 years, I decided to **look for** another job. I soon started to work at an international **startup** company, Soft Solutions. It was a good chance to join a team. I've been able to use my **training** and experience fully at this company. I gained experience in many things like teamwork, time management and quick decision making.

Mr Davis: How long have you been working for Soft Solutions?

Mr Torres: I've been working there for three years.

Mr Davis: Why do you want to leave that job?

Mr Torres: I am looking for a company where I can contribute more and grow. I am ready to take the next step of my career.

Mr Davis: What exactly made you apply for this job at our company?

Mr Torres: I can see that your company has much future growth **potential**. I would love to grow my career at a company that has a great reputation in the software industry.

Mr Davis: What are your **strengths**?

Mr Torres: My strengths are **persistence** and courage. I **give my all** to **achieve** my **goals** on spite of any **hardships** I might **encounter** along the way. I have a **hard-working** nature. I am always looking for ways to **improve** and grow. I'm also a great **team player**.

Mr Davis: Can you **provide** an example of how you acted as a team player?

Mr Torres: I always tried to help my **teammates** complete their **tasks** if I had completed mine. Whenever someone needed to leave earlier, I would offer to **cover for** them. I am willing to do **whatever it takes** for the team or company to **succeed**.

Mr Davis: Great! So … what would you do if you didn't **get on with** someone on your team?

Mr Torres: I would try to **sort things out** in a calm and rational manner. I would do my best to get on with that person **for the sake of** the team.

Mr Davis: What are your weaknesses?

Mr Torres: I can be a bit too **straightforward** at times and sometimes that hurts people. But I'm **working on** this and try to stop myself from being **overly** direct.

Mr Davis: Where do you see yourself in five years?

Mr Torres: In five years, I'd like to be seen as someone with deep **expertise** in software development. I hope to be offered the opportunity to **take the lead on** some projects.

Mr Davis: There are definitely promotion opportunities at our company, depending on your **achievements** and expertise. Do you work well **under pressure**?

Mr Torres: Usually I don't panic and manage to **maintain** self-control. There were many **tight deadlines** and stressful situations at my previous job. I always **put in** extra hours and did my best in **meeting the needs** of the clients. I've always **delivered** high quality work and respected my deadlines.

Mr Davis: Interesting … Can you tell me about a recent accomplishment or success you had?

Mr Torres: I was part of the team that built the Louis Kitchen app. With this app, it's easy to order your favourites, even when you're **on the go**. I love creating something that people can interact with and enjoy.

Mr Davis: That's quite impressive, I must admit. Okay, thanks so much for coming in, Mr Torres. It was great to meet you.

Mr Torres: It was great to meet you too.

Mr Davis: I'll give you a call tomorrow.

Mr Torres: Sounds good. I look forward to it. Thank you.

(Telephone is ringing)

Mr Torres: Hello!

Mr Davis: Hello! This is Tom Davis, the manager of LCI Software. Am I speaking to Mark Torres?

Mr Torres: Yes, this is Mark Torres speaking.

Mr Davis: Great! I'm calling to inform you that you interview was successful, and I'd like to offer you the job.

Mr Torres: Thank you so much, I'd love to take the job. When would you like me to start?

Section 2 Unit 2.1

How does a transformer work?

Transformers are capable of receiving AC power at one voltage and delivering it at another voltage. In this way they help achieve better transmission efficiency, while transferring the power over longer distances.

In this video we will go through the working and construction of a three-phase transformer, by starting from its simplest form. The basic working principle of a transformer is simple, electromagnetic induction. According to this principle a varying magnetic flux associated with the loop will induce an electromotive force across it. Such a fluctuating magnetic field can easily be produced by a coil and an alternating EMF system.

A current-carrying conductor produces a magnetic field around it. The magnetic field produced by a coil will be as shown in the figure. With the fluctuating nature of the alternating current, the magnetic field associated with the coil will also fluctuate. This magnetic flux can be effectively linked to a secondary winding, with the help of a core made up of a

ferromagnetic material. This fluctuating magnetic field will induce an EMF in the secondary coils due to electromagnetic induction. Since the turns are arranged in a series, the net EMF induced across the winding will be the sum of the individual EMFs induced in each turn. Since the same magnetic flux is passing through the primary and secondary coils, the EMF per turn for both the primary and secondary coils will be the same. The EMF per turn for the primary coil is related to the applied input voltage as shown. As a result, the induced EMF at the secondary coil is expressed as follows: $E_s=\frac{Ep}{Np}N_s$. This simply means that with fewer turns in the secondary than in primary one can lower the voltage.

For the reverse case one can increase the voltage. But since energy is conserved, the primary and secondary currents have to obey the following relationship: $E_sI_s=E_pI_p$.

Three-phase transformers use three such single-phase transformers, but with a slightly different coil configuration. Here the primary and secondary coils sit concentrically. Two more such windings are employed in a three-phase transformer. Transformers with high power ratings generally employ a special kind of winding known as a Disc type winding, where separate disk windings are connected in series through outer and inner crossovers. The low voltage windings are connected in a delta configuration. And the high voltage windings are connected in a star configuration. Thus, the line voltage further rises to 3 times at high voltage side. This also means that from a three-phase step up transformer we can draw four output wires, three-phase power wires and one neutral. High voltage insulated bushings are required to bring out the electrical energy.

The core of the transformer is made of thin insulated steel laminations. Such steel laminations are stacked together as shown to form three-phase limbs. The purpose of thin laminations is to reduce energy loss due to eddy current formation. The low voltage winding usually sit near the core. Various kinds of energy loss happen while transferring power from the primary to secondary coil. All these energy losses are dissipated as heat. So, usually the transformer is immersed in a cooling oil to dissipate the heat. The oil dissipates the heat via natural convection. Oil in the tank will expand as it absorbs the heat. A conservator tank helps to accommodate for this volume change.

To know more on different types of transformer cores and windings, please, check out our other videos.

Section 2 Unit 2.2

Transformer cooling fans intelligent control MTeC®MR

Power transformers are critical components for the supply of electrical power. Load and ambient conditions accelerate ageing and sudden failure. There is always a high risk of failure when critical components are not monitored. It is in the interest of operators to ensure their longevity.

Almost every failure can be traced back to the failure of the insulating system. So, the winding temperature is the most important factor. Winding temperature indicators are normally used for the operation of the cooling system. And when they are accurate, they can minimise a

large temperature fluctuation and ensure that cooling only kicks in when necessary. This ability can be increased by using temperature monitoring devices with communication capabilities and converting the device from a single monitoring relay to a temperature management tool. The ideal winding temperature indicator will precisely reflect the behaviour of the windings of a transformer, immediately indicate the highest temperature under all load conditions and initiate appropriate cooling measures.

The MTeC EPT 202 generation of devices meets these requirements and then some imprecise temperature monitoring can cause hot spots in some transformer applications and unnecessarily low load limits in others. Pumps and fans which run even when they are not needed cause an unnecessary high amount of wear. In the worst-case scenario, they must be completely replaced. The load-dependent temperature monitoring of the MTeC controls transformer temperature within the required limits and simultaneously reduces fan and pump operation to an absolute minimum. The additional load change circuit ensures that the individual fans are equally loaded. All temperature and fan control is based on proven algorithms from the IEC (International Electrotechnical Commission) and ANSI (American National Standards Institute) standards. The lifespan of your transformer depends to a great extent on thermal aging of the insulation materials. The MTeC calculates for you the percentage of lifespan which has already been used. The most important functions on the device such as power, alarm, trip, error and the operational state of the individual fan groups can be seen at a glance on the LEDs. The well-organised central display indicates all device information for operation and programming of the MTeC system for each menu item.

Navigation through the individual menu is child's play using the cursor keys to the right of the central display. You are guided intuitively through the individual function areas. Based on which sensor you use for measuring the top oil temperature, the input parameterisation can be selected as desired. The outputs of MTeC can also be set as desired. If you want to connect another device later on, just parameterise the output again. You can configure the individual switching contacts so that they are allocated to either the oil or the winding temperature. In addition, you can switch each fan group by hand. For correct forecast of future temperature peaks accurate knowledge of the past is necessary. The menu item *peak value* is an easy-to-use version of the mechanical drag hands.

Min/Max values for the oil and winding temperature and the maximum load current are logged and indicated. And if you want to know what your transformer has been up to during the last few months, MTeC will reveal everything with its data logging function. Just download the data with a PC, the easy-to-use windows-based software lets you make all the settings of the MTeC even from a remote PC away from the transformer. Click on an extra module to expand the functionality of the MTeC system with additional circuits to monitor winding temperature and oil level. We are talking about function modularity here. It is important to measure the winding temperatures of all transformers which are equipped with cooling systems to increase load ability. Such transformers require precise measurement of the winding temperature to ensure that overheating does not damage the insulation of the transformer. An evaluation of the

maximum economic efficiency which can be achieved during operation depends on accurate monitoring and realistic operational and maintenance strategies. Since power providers are also forced to increase utilisation of their systems while employing fewer personnel, a change to these new systems is vital to survival.

Section 2 Unit 2.3

How does a current transformer work?

Current transformers are used to transform standardised primary currents into standardised secondary currents. The AC currents converted in this way are much smaller than the primary flowing currents and can be directly processed by the connected protection control and measuring systems. In this video we look at basic operating principle of an inductive current transformer. The basic principle of the transmission of current transformers is simple – electromagnetic induction.

Electromagnetic induction is part of Maxwell's equations and classical electrodynamics and reflects the state of knowledge at the end of the 19th century. According to its principle an alternating magnetic field induces an electromotive force E within a conductor loop. Such a constantly changing alternating field can be easily generated using a coil by applying an AC voltage to the coil. The alternating current flowing through the connector now generates a radial magnetic field along the conductor. The resulting magnetic field of a coil then looks like this. Due to the steady changing direction of the current the magnetic field of the coil also changes its direction.

As a further elementary component of the current transformer, we now carry a ferromagnetic material, for instance an iron core through the coil. The magnetic field of the coil is bundled in the iron circle and the magnetic flux F is created as the sum of all magnetic lines. This periodically changing magnetic flux now induces a voltage in a secondary winding, which in turn drives a secondary alternating current. By the rule of Lenz, it follows that the secondary current and the resulting magnetic field counteract the magnetic flux of the iron core. Since the magnetic flux of the iron core is the same in both windings, and the primary and the secondary coils have the same number of turns, we will have the same current on both sides. In this case the primary current equals the secondary current. If we now increase the number of turns of the primary winding, the secondary side current also increases.

The ratio between primary and secondary side is the number of primary turns (N_P) that are related to the number of secondary turns (N_S) as is the secondary current (I_S) to the primary current (I_P). If we reduce the number of turns on the primary side, the resulting current on the secondary side also decreases and we get the typical transmission characteristic for current transformers. Those small standardised secondary currents are obtained from large standardised primary currents in order to be processed. In the power supply one current transformer per phase is used to measure the usually three-phase current systems.

ok at basic operating principle of an inductive current transformer. The basic principle of the transmission of current transformers is simple – electromagnetic induction.

Electromagnetic induction is part of Maxwell's equations and classical electrodynamics and reflects the state of knowledge at the end of the 19th century. According to its principle an alternating magnetic field induces an electromotive force E within a conductor loop. Such a constantly changing alternating field can be easily generated using a coil by applying an AC voltage to the coil. The alternating current flowing through the connector now generates a radial magnetic field along the conductor. The resulting magnetic field of a coil then looks like this. Due to the steady changing direction of the current the magnetic field of the coil also changes its direction.

As a further elementary component of the current transformer, we now carry a ferromagnetic material, for instance an iron core through the coil. The magnetic field of the coil is bundled in the iron circle and the magnetic flux F is created as the sum of all magnetic lines. This periodically changing magnetic flux now induces a voltage in a secondary winding, which in turn drives a secondary alternating current. By the rule of Lenz, it follows that the secondary current and the resulting magnetic field counteract the magnetic flux of the iron core. Since the magnetic flux of the iron core is the same in both windings, and the primary and the secondary coils have the same number of turns, we will have the same current on both sides. In this case the primary current equals the secondary current. If we now increase the number of turns of the primary winding, the secondary side current also increases.

The ratio between primary and secondary side is the number of primary turns (N_P) that are related to the number of secondary turns (N_S) as is the secondary current (I_S) to the primary current (I_P). If we reduce the number of turns on the primary side, the resulting current on the secondary side also decreases and we get the typical transmission characteristic for current transformers. Those small standardised secondary currents are obtained from large standardised primary currents in order to be processed. In the power supply one current transformer per phase is used to measure the usually three-phase current systems.

Section 2 Unit 2.4

The High Voltage Transformer. How does it work?

You may not even notice it anymore, but it's out there. If the work for the buzzing, you might have completely forgotten they exist. The transformer, it's the last leg in the journey the electric current before it zips inside your home. It's job, are you kidding. Try cutting 25 000 volts down the size. Then massively high voltage is the only way to get electric current to travel long distances without losing energy. Try. If you let 25 000 volts in your home, nothing good can happen. It would get pretty oddly. Your appliances will instantly fry. Plus, you will have to contend with the certain short circuits, fires and explosions, which is precisely why the transformer is so handy.

The outside of the transformer is not much to look at. The high voltage bushing, it's here that 25 000 volts arrive. The body of the transformer is just a planes-deal cylinder. Finally, there are three low-voltage bushings. The 120 volts that run practically all your household appliances come out here along with the 240 volts that run your oven and drier. So, how do you

job 25 000 volts down to 120 and 240 volts? One word – induction. It's fascinating and really simple. Here is how induction works. The current comes into the transformer and shoots into a copper coil. It's the primary coil. That current generates a magnetic field and if you put a second coil within that magnetic field, an electric current happens in the second coil. That's induction. Now, if the wire is wound around the secondary coil the same number of times as the primary coil, the current induced in the secondary coil will exactly match the current in the primary coil. But if the wire is wound around half as many times, you get half the voltage. It's as simple as that.

So, the voltage in the secondary coil is controlled, boosted, or reduced by the number of times the wire is wound around the coil. The coolest thing about induction is that all this happens without ever having the two coils touched each other. You can chuck back up to the sides of magnetism. In this model of transformer, magnetism has a few more surprises. The first surprise, the transformer contains exactly 70 litres of oil. The second surprise, the coil's copper wire is aluminum leaves that are covered in paper. Surprise number three, there isn't just one secondary coil near the primary coil, there are two. Don't worry, we've got a cover!

So, why oil? It's an excellent insulator and prevents humanity from getting into the transformer. In a nutshell, it protects against short circuits. Since it does not conduct electricity, its job is to insulate the components from each other. No argument here, paper inside the transformer does seem a little strange, but paper soaks up the oil allowing it to get in between the transformer's sturdy packed components. Oil insulates the transformer, but it would be nowhere without paper. Let's go over it. The metal leaves of the coils never touch. They're insulated from each other thanks to the oil-soaked paper. No short circuits to worry about. The 25 000-volt current surges through the primary coil generating a magnetic field in the metallic core surrounding the coils. An electric current is induced in the secondary coils.

But why two secondary coils? Well, because of the number of times the wire is wrapped around the coil each one generates 120 volts. Two means they can be combined to get 240 volts. And all this without any of these components ever touching each other. Induction: simple, efficient, safe. Induction! There is only one thing left to explain: that constant buzzing… It sounds complicated but it's super simple! It means that metal is vibrating thanks to the alternating magnetic field caused by 25 000 volts. An alternating magnetic field just means that the direction keeps reversing itself. With every direction change the metal bends and regains the shape over and over again. None of us knows what it buzzes about.

Keys to Self-Check tasks

Section I Introduction to the Energy business

Self-Check 1.1					
Vocabulary	1) b	2) c	3) a	4) c	5) b
Grammar	1) d	2) a	3) d	4) c	5) b
Correcting mistakes	Expo 2020 will be held in Dubai, UAE. The country *won* the voting in 2013. The hosting country represents the event as *the* biggest and most expensive throughout 100-year history of Expo. The area of exhibition is 432 hectares (compare: World Expo in Milan occupied only 110 hectares); it took 6 months of construction work; there will be 190 participating countries; UAE expenses *before* COVID-19 pandemic *were* more than $44 billion. Expo 2020 is an outstanding exhibition *event* where participating countries demonstrate the best innovative products. Each month is devoted *to* a separate theme which is coherent *with* the main theme – Connecting the minds, Creating the future and key sub-topics: Mobility, Opportunities and Sustainability. The core of Expo 2020 is *an* intensive program involving all participating countries and international organisations. Expo events cover almost all directions *of* modern society development, they tend to unfold the most sensible global problems: tolerance, equality, accessible innovative health care, global dialogue of nations through development of culture, art, business etc. Expo calendar *is* separated into theme weeks, each of which is devoted to a separate topic: climate and biodiversity, energy efficiency, space exploration, urban and country development, tolerance and inclusiveness, *education*, tourism, global objectives of development, agriculture, trade and investment, farming and animal husbandry, development of *water* recourses etc. Within the program of theme weeks, the hosting country and participating countries host various events.				
Self-Check 1.2					
Vocabulary	1) c	2) d	3) a	4) a	5) a
Grammar	1) b	2) d	3) a	4) b	5) a
Correcting mistakes	1) generation; 2) transmission; 3)world; 4) many; 5) allow; 6) electrical; 7) essentially; 8) network; 9) through; 10) business				
Self-Check 1.3					
Vocabulary	1) b	2) d	3) a	4) d	5) c
Grammar	1) b	2) a	3) b	4) d	5) c
Self-Check 1.4					
Vocabulary	1) c	2) a	3) d	4) b	5) d
Grammar	1) a	2) c	3) a	4) d	5) b
Correcting mistakes	1) referred; 2) help; 3) to talk; 4) shortlisting; 5) (for) having; 6) hear; 7) themselves; 8) talk; 9) know; 10) knowing				
Self-Check 1.5					
Vocabulary	1) b	2) a	3) d	4) c	5) b
Grammar	1) a	2) c	3) d	4) b	5) c

Section II Transformers in Electrical Engineering

Self-Check 2.1					
Vocabulary	1) d	2) a	3) b	4) c	5) a
Grammar	1) b	2) d	3) a	4) c	5) d

Correcting mistakes	1) simplified; 2) provided; 3) detailed; 4) disconnected; 5) seen; 6) distributed				
Self-Check 2.2					
Vocabulary	1) c	2) a	3) d	4) b	5) c
Grammar	1) a	2) d	3) c	4) a	5) b
Correcting mistakes	1) type; 2) other; 3) the; 4) be; 5) as; 6) though; 7) as; 8) because; 9) be; 10) than; 11) an; 12) by; 13) either; 14) over; 15) both				
Self-Check 2.3					
Vocabulary	1) c	2) d	3) a	4) b	5) d
Grammar	1) b	2) a	3) d	4) b	5) c
Correcting mistakes	1) is; 2) for; 3) one; 4) how; 5) of; 6) to; 7) well; 8) are; 9) by; 10) both				
Self-Check 2.4					
Vocabulary	1) d	2) a	3) c	4) d	5) b
Grammar	1) b	2) a	3) d	4) c	5) a
Correcting mistakes	1) is; 2) -; 3) to; 4) both; 5) -; 6) and; 7) as; 8) -; 9) bit; 10) due; 11) -; 12) -; 13) one				

REFERENCES

1. A well-functioning EU energy market [Electronic resource] — Mode of access: https://ec.europa.eu/commission/presscorner/detail/en/fs_21_5212 (date of access: 11.11.2021). — Title from screen.

2. An equivalent circuit is a simple [Electronic resource] — Mode of access: https://www.wise-geek.com/what-is-an-equivalent-circuit.htm (date of access: 02.10.2021). — Title from screen.

3. Another crucial current [Electronic resource] — Mode of access: https://www.conserve-energy-future.com/15-current-environmental-problems.php (date of access: 08.11.2021). — Title from screen.

4. Burden of current transformer [Electronic resource] — Mode of access: https://come4concepts.com/what-is-current-transformer-ct-construction-types/ (date of access: 20.01.2022). — Title from screen.

5. Cambridge Dictionary [Electronic resource] — Mode of access: https://dictionary.cambridge.org/(date of access: 09.01.2022). — Title from screen.

6. Construction of a potential transformer [Electronic resource] — Mode of access: https://www.electronicshub.org/potential-transformers/.(date of access: 05.01.2022). — Title from screen.

7. Construction of Current Transformer [Electronic resource] — Mode of access: https://cutt.ly/GT1xb7C (date of access: 07.12.2021). — Title from screen.

8. Current Transformers [Electronic resource] — Mode of access: Retrieved from: https://eepower.com/technical-articles/current-transformer-operation-and-applications/ (date of access: 11.01.2021). — Title from screen.

9. Difference between core form and shell form power transformers [Electronic resource] — Mode of access: https://cutt.ly/GYP0WR4 (date of access: 29.11.2021). — Title from screen.

10. Environmental Problems [Electronic resource] — Mode of access: https://www.conserve-energy-future.com/15-current-environmental-problems.php (date of access: 02.12.2021). — Title from screen.

11. Equivalent Circuit [Electronic resource] — Mode of access: https://en.wikipedia.org/wiki/Equivalent_circuit (date of access: 10.01.2022). — Title from screen.

12. Exhibitions [Electronic resource] — Mode of access: https://www.researchgate.net/publication/228339879_An_Overview_of_Online_Exhibitions(date of access: 10.01.2022). — Title from screen.

13. Focus 4. Student's Book /Kay Sue, Jones Vaughan, Brayshaw Daniel, Beata Trapnell. — Pearson, 2016. — 142 p.

14. Graduate Electrical/Mechanical Engineers [Electronic resource] — Mode of access: https://cutt.ly/6U3U3FP (date of access: 15.11.2021). — Title from screen.

15. Grammarway 4 // Jenny Dooley, Virginia Evans. — Express Publishing, 2013. —224 p.

16. How to introduce yourself during a job interview [Electronic resource] — Mode of access: https://www.youtube.com/watch?v=wexzvClUcUk (date of access: 23.12.2021). — Title from screen.

17. How to prepare for your first engineering job interview [Electronic resource] — Mode of access: https://www.theengineer.co.uk/prepare-engineering-job-interview/ (date of access: 09.11.2021). — Title from screen.

18. How to Write an Application Letter [Electronic resource] — Mode of access: https://www.hashmicro.com/blog/how-to-write-application-letter/ (date of access: 09.01.2022). — Title from screen.

19. Impact on the environment caused by the production of electrical energy [Electronic resource] — Mode of access: http://energopostachalnyk.com/en/electricity/environmental-impact/ (date of access: 18.01.2022). — Title from screen.

20. In the post-World War II period there have been two major oil crises. [Electronic resource] — Mode of access: https://www.britannica.com/topic/oil-crisis (date of access: 30.10.2021). — Title from screen.

21. Methods of Cooling [Electronic resource] — Mode of access: — https://eepower.com/technical-articles/current-transformer-operation-and-applications/ (date of access: 11.10.2021). — Title from screen.

22. Mikhnenko G. English for Electrical Engineers (Англійська мова для інженерів-електриків): навч. посібник для студентів спеціальності 141

«Електроенергетика, електротехніка та електромеханіка». — К.: Центр учбової літератури, 2017. — 236 с.

23. National and International Exhibitions [Electronic resource] — Mode of access: https://online-teacher.ru/blog/national-exhibitions(date of access: 25.01.2022). — Title from screen.

24. One of the main objectives of the EU energy policy [Electronic resource] — Mode of access: https://ec.europa.eu/energy/content/liberalisation-energy-market-electricity-and-gas_en (date of access: 06.11.2021). — Title from screen.

25. One of the most important characteristics of transformers [Electronic resource] — Mode of access: https://cutt.ly/9TYqZdd (date of access: 08.12.2021). — Title from screen.

26. Poor communication and body language [Electronic resource] — Mode of access: https://www.businessnewsdaily.com/9728-interview-guide.html(date of access: 15.11.2021). — Title from screen.

27. Poor etiquette at a job interview [Electronic resource] — Mode of access: https://www.businessnewsdaily.com/9728-interview-guide.html (date of access:09.01.2022). — Title from screen.

28. Potential transformer [Electronic resource] — Mode of access: https://cutt.ly/2YOVQVK (date of access:30.01.2022). — Title from screen.

29. Principles of Transformer Operation [Electronic resource] — Mode of access: https://www.usbr.gov/tsc/techreferences/mands/mands-pdfs/Trnsfrmr.pdf (date of access: 28.12.2021). — Title from screen.

30. Ring Type Current Transformers [Electronic resource] — Mode of access: https://www.ksinstruments.net/current-transformers-characteristics-types-standards/ (date of access: 21.11.2021). — Title from screen.

31. Saienko, N. & Akhmad, I. Professional English for Future Electrical Engineers: E-book for undergraduate students of specialty 141 ‘Electricity, electrical engineering and electro mechanics’. — Kyiv: Igor Sikorsky KPI, 2020. — 165 p.

32. Supplying energy to homes across the UK involves three key elements [Electronic resource] — Mode of access: https://www.energy-uk.org.uk/energy-industry/the-energy-market.html (date of access: 27.11.2021). — Title from screen.

33. The transformer: moving parts. [Electronic resource] — Mode of access: https://www.electrically4u.com/construction-and-working-principle-of-transformer/ (date of access: 03.11.2021). — Title from screen.

34. There are 3 traditional bundles in the electrical power industry [Electronic resource] — Mode of access: https://cutt.ly/ETliSnY (date of access: 14.01.2022). — Title from screen.

35. There are three basic CV formats [Electronic resource] — Mode of access: https://resumelab.com/uk/cv/format (date of access: 02.01.2022). — Title from screen.

36. Thermal power plants [Electronic resource] — Mode of access: https://www.azocleantech.com/article.aspx?ArticleID=861 (date of access: 22.01.2022). — Title from screen.

37. Trade shows: how to maximise the benefits of attending? [Electronic resource] — Mode of access: https://connectamericas.com/content/trade-shows-how-maximize-benefits-attending (date of access: 18.12.2021). — Title from screen.

38. What are the types of cooling methods in transformers? [Electronic resource] — Mode of access: https://cutt.ly/WTOip4k (date of access: 27.01.2022). — Title from screen.

39. What is Video Resume? [Electronic resource] — Mode of access: https://www.jobsoid.com/video-resume/ (date of access: 12.01.2022).

40. What's your biggest weakness? [Electronic resource] ——Mode of access: https://cutt.ly/3Is91Q6 (date of access: 21.01.2022). — Title from screen.

41. World's fair [Electronic resource] — Mode of access: https://en.wikipedia.org/wiki/World%27s_fair (date of access: 23.11.2021). — Title from screen.

42. Writing a good CV [Electronic resource] — Mode of access: https://learnenglish.britishcouncil.org/business-english/business-magazine/writing-a-good-cv (date of access: 19.01.2022). — Title from screen.

Videos

1. Green Growth Indicators [Electronic resource] — Mode of access: https://www.youtube.com/watch?v=cKkFV6i57ac (date of access: 19.01.2022).

2. Highlights of Engiexpo Vadodara 2020 [Electronic resource] — Mode of access: https://www.youtube.com/watch?v=5PDYn9QPofI(date of access: 30.10.2021).

3. How does a current transformer work? [Electronic resource] — Mode of access: https://www.youtube.com/watch?v=CB0xyL5PHHI (date of access: 19.12.2021).

4. How does a transformer work? [Electronic resource] — Mode of access: https://www.youtube.com/watch?v=vh_aCAHThTQ (date of access: 12.01.2022).

5. How to write a CV with no experience [Electronic resource] — Mode of access: https://www.youtube.com/watch?v=7xMI_leue1 (date of access: 26.01.2022).

6. Tell me about yourself – Job Interview [Electronic resource] — Mode of access: https://www.youtube.com/watch?v=HMQlA-TIAsk (date of access: 07.12.2021).

7. The high voltage transformer [Electronic resource] — Mode of access: https://www.youtube.com/watch?v=UchitHGF4n8 (date of access: 19.11.2021).

8. Transformer Cooling Fans Intelligent Control MTeC® MR [Electronic resource] — Mode of access: https://www.youtube.com/watch?v=--cdAis1bH8 (date of access: 03.01.2022).

9. Understanding Basics of the Power Market [Electronic resource] — Mode of access: https://www.youtube.com/watch?v=dYvEG3uQzsQ (date of access: 13.11.2021).

Images

1. At the Job Interview [Electronic resource] — Mode of access: https://cutt.ly/bUlL6nm (date of access: 22.01.2022).

2. Cool a transformer [Electronic resource] — Mode of access: https://cutt.ly/OTQfpZX (date of access: 12.01.2022).

3. Cooling of Transformers [Electronic resource] — Mode of access: https://cutt.ly/ZTxREMF (date of access: 02.01.2022).

4. Current transformers [Electronic resource] — Mode of access: https://www.electricalclassroom.com/current-transformers-ct-working-types/ (date of access: 21.01.2022).

5. Davin Callahan. Electrical Engineer Resume Example [Electronic resource] — Mode of access: https://resume.io/resume-examples/electrical-engineer (date of access: 10.11.2021).

6. Electricity Deregulation [Electronic resource] — Mode of access: https://environmental-conscience.com/electricity-deregulation-pros-cons (date of access: 12.10.2021).

7. Equivalent circuit diagram [Electronic resource] — Mode of access: http://www.electricalunits.com/equivalent-circuit-diagram-of-transformer/ (date of access: 23.01.2022).

8. Expo 2020 [Electronic resource] — Mode of access: https://expo2020.gov.ua/en/expo-2020.html(date of access: 20.12.2021).

9. Expo 2020 will be held in Dubai, UAE. [Electronic resource] – Mode of access: https://cutt.ly/NTutlfF(date of access: 01.12.2021).

10. For and Against Essay [Electronic resource] — Mode of access: https://cutt.ly/xTlpBsj (date of access: 05.12.2021).

11. High Voltage Transformer [Electronic resource] — Mode of access: https://www.indiamart.com/proddetail/high-voltage-transformer-9002166788.html (date of access: 21.12.2021).

12. How the electricity market works [Electronic resource] — Mode of access: https://cutt.ly/bTjk5A7 (date of access: 27.12.2021).

13. Markets and customers [Electronic resource] — Mode of access: https://cutt.ly/aTups7T (date of access: 04.01.2022).

14. Mega Industrial Exhibition [Electronic resource] — Mode of access: https://www.industrialexpo.co.in/ (date of access: 19.10.2021).

15. National and International Exhibitions [Electronic resource] — Mode of access: https://online-teacher.ru/blog/national-exhibitions (date of access: 18.10.2021).

16. Protecting the Environment [Electronic resource] — Mode of access: https://www.ravifans.com/blog/blogdetail/saveenergy (date of access: 01.10.2021).

17. PSA stands for public service announcement. [Electronic resource] — Mode of access: https://cutt.ly/4IZ4Huz (date of access: 10.01.2022).

18. Specialised Expos [Electronic resource] — Mode of access: https://cutt.ly/hTuyd1W(date of access: 12.10.2021).

19. Successful writing proficiency [Electronic resource] — Mode of access: https://teateaching.pbworks.com/f/letter.pdf (date of access: 21.01.2022).

20. The critical role of current transformers in ammeter measuring applications [Electronic resource] — Mode of access: https://www.ksinstruments.net/role-of-current-transformers-in-ammeter-measuring-applications/ (date of access: 02.01.2022).

21. The principle parts of a transformer [Electronic resource] — Mode of access: https://cutt.ly/dYlKeKs (date of access: 19.11.2021).

22. The principles of transformers' operation [Electronic resource] — Mode of access: https://cutt.ly/ATbEG85 (date of access: 03.12.2021).

23. Voltage Transformers [Electronic resource] — Mode of access: https://www.electronics-tutorials.ws/transformer/transformer-basics.html (date of access: 15.12.2021).

24. Walmart [Electronic resource] — Mode of access: https://www.walmart.com/ip/Power-Bright-750W-Step-Up-Down-Voltage-Transformer/22854480 (date of access: 09.01.2022).

25. What are current transformers used for? [Electronic resource] — Mode of access: https://cutt.ly/OTOPMOK (date of access: 11.12.2021).

26. What are the types of cooling methods in transformers? [Electronic resource] – Mode of access: https://cutt.ly/WTOip4k(date of access: 07.11.2021).

27. What is a CV [Electronic resource] — Mode of access: https://the-steppe.com/razvitie/pravila-idealnogo-rezyume-7-sovetov-professionala (date of access: 25.01.2022).

28. What is a transformer? [Electronic resource] — Mode of access: https://cutt.ly/WPi98z1 (date of access: 09.01.2022). screen.

29. World Expos [Electronic resource] — Mode of access: https://cutt.ly/ATuy0vN (date of access: 09.01.2022).

30. World Expos [Electronic resource] — Mode of access: https://cutt.ly/OTutAcD (date of access: 30.12.2021).

31. World Horticultural Expos [Electronic resource] — Mode of access: https://cutt.ly/DTuywr3 (date of access: 08.01.2022).