ДОНСКОЙ ГОСУДАРСТВЕННЫЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ

УПРАВЛЕНИЕ ДИСТАНЦИОННОГО ОБУЧЕНИЯ И ПОВЫШЕНИЯ КВАЛИФИКАЦИИ

Кафедра «Научно-технический перевод и профессиональная коммуникация»

Учебно-методическое пособие

по английскому языку для студентов направления
11.03.04 «Электроника и наноэлектроника»
по дисциплине

«Иностранный язык в профессиональной сфере»

Авторы
Грицай И.П.,
Бойко А.К.

Ростов-на-Дону, 2017

Аннотация

Данное учебное пособие предназначено для студентов направления 11.03.04 «Электроника и наноэлектроника», изучающих дисциплину «Иностранный язык в профессиональной сфере (английский)». Авторы пособия предлагают задания на развитие навыков изучающего и ознакомительного чтения, а также формирование коммуникативной компетенции в сфере профессионального общения

Авторы

ст.преп. кафедры «НТП и ПК»
Грицай И.П.
к.ф.н., доц.каф. «НТП и ПК»
Бойко А.К.

Оглавление

UNIT 1. HISTORY OF LIGHTNING

Exercise 1. Read and remember the words.
artificial lightning – искусственное освещение
to occur – происходить, случаться
shell – раковина, скорлупа, очищать, чистить
grease – топленое сало, смазочное вещество
fuel – топливо, дрова, топливный
wick – фитиль, свеча
reduction – снижение, понижение, уменьшение
Ubiquitous – повсеместный, вездесущий
tallow - жир
to elaborate – тщательно разрабатывать, обдумывать
brightness – яркость, блеск
lantern – фонарь, световое устройство
liquid - жидкий
viscosity – вязкость, липкость, тягучесть

Exercise 2. Read and translate the text A.

With the discovery of fire, the earliest form of artificial lighting used to illuminate an area were campfires or torches. As early as 400,000 BCE, fire was kindled in the caves of Peking Man. Prehistoric people used primitive lamps to illuminate surroundings. These lamps were made from naturally occurring materials such as rocks, shells, horns and stones, were filled with grease, and had a fiber wick. Lamps typically used animal or vegetable fats as fuel. Hundreds of these lamps (hollow worked stones) have been found in the Lascaux caves in modern-day France, dating to about 15,000 years ago. Oily animals (birds and fish) were also used as lamps after being threaded with a wick. Fireflies have been used as lighting sources. Candles and glass and pottery lamps were also invented. Chandeliers were an early form of "light fixture".

Major reductions in the cost of lighting occurred with the discovery of whale oil and kerosene. The potential of electric light as a new building material was recognized in the 1920s and became a useful design tool by the mid-century. Skillful lighting allowed for theatricality, narrative, and a new emphasis on structure and space.

Gas lighting was economical enough to power street lights in major cities starting in the early 1800s, and was also used in some commercial buildings and in the homes of wealthy people. The gas

mantle boosted the luminosity of utility lighting and of kerosene lanterns. The next major drop in price came about with the incandescent light bulb powered by electricity.

Over time, electric lighting became ubiquitous in developed countries. Segmented sleep patterns disappeared, improved nighttime lighting made people made more activities possible at night, and more street lights reduced urban crime. Without light fittings there can be no Architectural Lighting Design. As these light sources change so does the practice of lighting Design.

Candles

For most of recorded history candles were tallow and beeswax until the mid 1800s and purified animal fats (stearin) ox fat, rat fat and even pigeon fat when sailors were at sea. The whaling industry was based around acquiring the whale oil to create candles and light. A candle manufacturer is traditionally known as a chandler. Various devices have been invented to hold candles, from simple tabletop candle holders, to elaborate chandeliers.

Argand lamps

The argand lamp is a home lighting oil lamp producing a light output of 6 to 10 candela which was invented and patented in 1780 by Aimé Argand. Aside from the improvement in brightness, the more complete combustion of the wick and oil required much less frequent trimming of the wick.

In France, they are known as "Quinquets" after Antoine-Arnoult Quinquet, a pharmacist in Paris, who used the idea originated by Argand and popularized it in France. He is sometimes credited with the addition of the glass chimney to the lamp.

It was the lamp of choice until about 1850 when kerosene lamps were introduced.

Kerosene lamps

A kerosene lamp or paraffin lamp is a type of lighting device that uses kerosene as a fuel. Kerosene lamps have a wick or mantle as light source, protected by a glass chimney or globe; lamps may be used on a table, or hand-held lanterns may be used for portable lighting.

Kerosene was cheaper than vegetable oil, it produced a whiter flame, and as a liquid of low viscosity, it could easily travel up a wick eliminating the need for complicated mechanisms to feed the fuel to the burner.

In 1846, Abraham Pineo Gesner pioneered the use of kerosene distilled from coal a substitute for whale oil for lighting. Later made from petroleum, kerosene became a popular lighting fuel. Modern

versions of the kerosene lamp were later constructed by the Polish inventor Ignacy Łukasiewicz in 1853 Lemberg.

Exercise 3. Answer the following questions:

1. What was the first source of light?
2. What materials were used in lamps' production?
3. When and why did the cost reduction occur?
4. What is a candle? Who is a candler?
5. When were argant lamps invented?
6. What fuel does a kerosene lamp use?

Exercise 4. Summarize the text in 7-8 sentences . Make use of the following phrases:

1. The article is headlined….. – Статья называется….
2. The article is about…… - Статья о…
3. The author starts by telling the reader that…. – В начале статьи автор пишет….
4. Further the author reports…. – Далее автор сообщает ….
5. In conclusion …. – В заключении…

Exercise 5. Translate these sentences from English into Russian:

1. In the future, will we really need car lights, **street lights**, horns, stoplights?
2. The trip was so hard that they were reduced to eating **tallow** candles to survive.
3. They use a 40-gallon processor to chemically convert the **vegetable oil** into fuel.
4. He hopes to add **street lights** throughout the village to increase safety after dark
5. If it isn't the outlet or bulb, then you've verified it is something in the **lamp**.
6. Light was provided either by whale-oil lamps or **tallow** candles.
7. She recalled how soot was so thick **street lights** came on during the day.
8. **Argand** lamps were manufactured in a great variety of decorative forms and quickly became popular in America.
9. Keep **candles** away from any combustible items such

as curtains, bed spreads, etc.

10. Expanding the source of raw material should also depress the price of **petroleum**.

Exercise 6. Translate from English into Russian. Explain the usage of the modal verb "can".

1. Can you park in this street on Sundays?
2. I can see you tomorrow morning for half an hour.
3. I wanted to open the window but I couldn't.
4. You can buy this book; it is on sale now.
5. I can play volleyball.
6. Soon I will be able to read German books without a dictionary.
7. You can find any kind of information on the Internet.
8. Can you wait for me in the hall?
9. Julia can climb the trees easily.
10. Can she explain you how to do this exercise?
11. I could not swim when I was little.
12. Perhaps this young man will be able to help you.
13. You can't use dictionaries.
14. My sister can't go to the Italy on her own because she 13 years old.
15. You can do this exercise.

Exercise7. Translate from Russian into English.

1. Она может выучить это правило позже.
2. В комнате темно. Он ничего не видит.
3. Я чувствую запах дыма. Что-то пригорело?
4. Питер не сможет прибрать в комнате сегодня, но он сможет сделать это завтра.
5. Ему никто не поверит. Его история не может быть правдивой.
6. Я умею играть на пианино, но я не умею плавать.
7. Можно мне немного посидеть с вами?
8. Она может нарисовать картину.
9. Можно мне стакан воды?
10. Я не мог получить водительские права 2 года назад.
11. Он умел читать, когда ему было пять лет.
12. Он может бегло говорить по-английски.
13. Я могу показать тебе новый мир.
14. Ты мог бы помочь мне с домашней работой завтра

15. Ты мог бы хотя бы предупредить меня!

Exercise 9. Read and translate the text B

A History of Electronics

Aldrin C. Bernardo date: July 6, 2011BSME 3

Military equipment, toys, communication, home electronics, computing, cars, satellites and others. This is only a partial list of products, which contain electronics. Actually electronics won our world. It is hard even to think that only a hundred years ago our world seemed different at all from this point of view.

But how did the electronics revolution begin? Theoretical and experimental studies of electricity started in the 18th and 19th centuries enabled the development of the first electrical machines and the wide use of electricity. During that time the first theory was founded and the rules of electricity was formulated. The event of identification of the electron in second half of 19th century by the English physicist J.J. Thompson and the measurement of its electric charge in 1909 by the American physicist A. Millikan were the point of turning the electronics evolution separately from that of electricity. Another coarse of interest to electronics was the observation of the American inventor Thomas A. Edison. He noticed that the current of electrons would flow from one electrode to another, if the second one was with relatively positive charge. This discovery led to the development of electron tubes.

Electron tubes became very useful for manufactory at that time. X-ray tube, the radio signal detectors and transmitters, and the first power systems was based on electron tubes. The development of the vacuum tube and later the three-electrode tube by adding the grid between the anode and the cathode (Negative and positive electrodes in the tube) improved the characteristics of the tube by far and made it more useful for different electronic applications.

The first half of the 20th century was the era of the vacuum tubes in electronics. Using the tube permitted the development of radio, long-distance telephone, television and even the first computers. The most known one was the ENIAC (Electronic Numerical Integrator and Computer) completed in 1946.The first and the second World Wars gave a considerable boost to the way the electronics science as advanced. Governments of rival countries invested a lot of money in the technology of military industry. Therefore the varieties of vacuum electron tubes were the central device in the electronics system of

that time. There are several limitations to the tube. Its big size, slow working paces, bad accuracy, and very hard and high cost of production it. These limitations of the tube motivated to the Solid-State' revolution with the invention of the transistor in 1947 by Bell Laboratories scientists. The vacuum tube hasn't disappeared from the world until today.

All kind of displays (except the liquid crystal one), laser systems, some measurement equipment include the tube and there is no alternative product to be used instead of the tube until now. Recently we have witnessed the biggest event in the history of electronics the invention of these micro conductor devices. It made a real revolution in the world of electronics. The semiconductors are small, accurate and low cost devices. Transistors and diodes are made of crystalline solid materials, which have electrical properties that are capable of variations, an extremely wide range, by the addition of little quantities of other elements like resistors, inductors and capacitors. Early semiconductors were produced using germanium as the material, but since1960 silicon quickly became the preferred material, because it was less expensive and it could operate in wide range of the temperatures. For instance, silicon diodes work at temperature up to 200°C (392°F), whereas germanium diodes cannot work above 85°C (277°F). Since 1960 transistors have quickly supplanted vacuum tubes. Electronic system became more complex and smart. Computers included hundred of thousands of transistor each. This fact, together with the need for compact, lightweight electronic missile guidance systems, led to the invention of the integrated circuit (IC). This invention was the result of independent research of Jack Kilby of Texas Instruments Incorporated in 1958 and of Jean Hoerni and Robert Noyce of Fairchild Semiconductor Corporation in 1959.

Exercise 10. Speak on the topic: "Prerequisites of light"

UNIT 2. FORMS OF LIGHTING

Exercise 1. Read and remember the words.
Merely – только, просто, лишь
Purchase – покупка
Bill – список, документ, законопроект
Photovoltaic – фотоэлектрические устройства
to deter – останавливать, удерживать

emphasize – подчеркивать, выделять
sconces – бра, подсвечник
bollard – ограждающая тумба на дороге
solar lighting – естественное освещение
emit – испускать, излучать
floodlights – прожектор
light-emitting diode - светодиод

Exercise 2. Read and translate the text A.

Architectural lighting design addresses exterior and interior lighting needs within residential and commercial spaces. Lighting can be a necessity, to light work tasks for example, or merely serve a decorative purpose. Some architectural lighting products are breaking new ground in energy conservation. Many consumers are willing to pay a higher purchase cost when buying compact-fluorescent light bulbs (CFLs) with a longer life cycle or light-emitting diode (LED) lighting to save on electric bills.

Outdoor lighting

Street lights are used to light roadways and walkways at night. Some manufacturers are designing LED and photovoltaic luminaires to provide an energy-efficient alternative to traditional street light fixtures. Floodlights can be used to illuminate outdoor playing fields or work zones during nighttime hours. The most common types of floodlights are metal halide and high pressure sodium lights. Beacon lights are positioned at the intersection of two roads to aid in navigation. Sometimes security lighting can be used along roadways in urban areas, or behind homes or commercial facilities. These are extremely bright lights used to deter crime. Security lights may include floodlights.

Among the exterior spaces of a home or building, various types of lighting address different requirements of the space and activities taking place there. For patios, courtyards, and public common areas, spotlights and floodlights are two types of archi-

tectural lighting used to emphasize decorative landscaping or natural features. Safety issues are often dealt with by outdoor lighting fixtures. Motion-sensor lights and step lights on stairs can satisfy a homeowner's safety needs or building code requirements. Either way, the architectural lighting can keep residents and visitors safely on their path.

Wall sconces or lit bollards, which are poles installed to attract attention to an area, can illuminate a municipal or business building's decorative or historical facade or safely guide pedestrians in the dark. Some lighting designers recommend solar lighting, which harnesses free power from the sun, for lighting an area during nighttime hours. Architectural area lighting must sometimes be dark sky friendly, meaning it illuminates the ground but not the sky, to meet community mandates or neighborhood covenants.

Exercise 3. Answer the following questions:

1. What types of lightning do you know?
2. What do you need to do if you want to reduce the cost of light?
3. What are CFLs and LED stand for?
4. How can floodlights save your life?
5. What do pedestrians see in the dark?

Exercise 4. Translate these sentences from English into Russian:

1. Rescuers searched for the missing all night under generator-powered **floodlights**.
2. **Wall sconces** provide the lighting, making the room invitingly dim after dark.
3. Some of these solutions are so simple, they require **merely** an absence of effort.
4. It is working with county interior designers, artists and **lighting designers**.
5. **Lighting designers** sometimes select filters by color temperature, commonly to match light that is theoretically white.

6. Do you have a set of halogen **spotlights** arranged like an airport landing strip?
7. Bridge repair, painting and sidewalk reconstruction during daylight and **nighttime hours**.
8. You will have to buy organic **light-emitting diode** bulbs that cost $50.

Exercise 5. Complete the sentences with may, might (not).

1. His phone is switched off. He _____ be on the plane now. 2. She _____ like that skirt. It's not her size. 3. What music is this? I'm not sure but it _____ be Mozart. 4. We _____ have a picnic tomorrow, but it depends on the weather. 5. I'm not sure what to do tonight. I _____ go to the cinema. 6. Take your coat. It _____ be cold. 6. It's a difficult match, but we _____ win. 7. It's an unusual film. You _____ not like it. 8. Kate wasn't in class today. She _____ be ill. 9. I _____ go to the party, but I'm not sure. 10. I _____ have time to do everything today. 11. I _____ go to the party. I haven't decided yet. 12. She isn't at home she may be working.

Exercise 6. Match the sentences and halves.

1. Take your umbrella. A. You might fall.
2. Lt's buy a lottery ticket. B. It might not have your size.
3. Phone the restaurant. C. We might get lost.
4. Don't stand on the wall. D. It might rain.
5. Let's take a map. E. It might be late.
6. Try the skirt on. F. You might cut yourself.
7. Don't wait for me. G. It might be closed on Sundays.
8. Be careful with that knife. H. We might win.

Exercise 7. Choose the right variant.

He_____(1) write in German, but he_____(2) to speak the language fluently. He_____(3) to listen to many tapes _____(4) to understand native speakers when he

_____(5) to work in Germany.

a)	b)	c)	d)
1. can	1. can	1. can	1. is able
2. isn't able	2. can't	2. isn't able	2. isn't able
3. '11 have	3. '11 have	3. '11 have	3. '11 have
4. to be able	4. to be able	4. to be able	4. to be able
5.'11 have	5. has	5. has	5. has

UNIT 3. INDOOR LIGHTING

Exercise 1. Read and learn the words

Wattage – ваттаж, мощность в ваттах
Ceiling – потолок
LED – светодиод
Pendant – подвесной кнопочный выключатель
Soffit – потолок
Pinspot – светодиодный фонарь или прожектор с узким лучом
Lightbulbs – лампочка
Socket – розетка (штепсельная)
Current – ток, амперaж
Safety – условия безопасности, обеспечение безопасности

Exercise 2. Read and translate the text

Choices abound in architectural lighting for interior spaces. A commercial building or home requires different types of lighting depending on its inhabitants' needs. Residents' daily functions and desired moods dictate which types of lighting are best. Overhead lighting comes in a multitude of styles, and can be fluorescent, incandescent, compact-fluorescent, or LED powered. Fixtures may be attached directly to the ceiling, to a track, or hang down from a ceiling base, such as with pendant lighting, chandeliers, and hanging lamps.

A lower level of illumination can emit from accent lighting such as table lamps; wall sconces; recessed lighting or can lights in ceilings, soffits, or flooring; and fixtures that showcase artwork. Even more area-specific is task lighting. Desks, reading spaces, musical instrument areas, and cooking spaces are often lit by halogen lamps, track lighting, or recessed spotlights to provide the best level of brightness for the activity.

Light affects humans' moods and ability to perform tasks.

Properly lit dwellings, businesses, and office spaces can result in the comfort and well-being of their inhabitants. The appropriate architectural lighting can contribute greatly to the safety and look of a building.

Track lighting is an alternative to traditional wired lamps and fixed recessed lighting designs. Most systems use a length of exposed electrical wiring hidden inside a plastic or aluminum track, which can be wired directly into pre-existing circuits or plugged into wall sockets for power. After the track has been mounted to the wall or ceiling, a separate lamp and socket assembly can be snapped into place anywhere along the track itself. Metal plates in the socket make contact with the charged wiring in the track, which in turn activates the lightbulb.

This type of lighting is very useful in situations where traditional lighting is problematic. It can be very effective for isolating a work of art or other prominent design element. Several pinspot lamps can be installed in a single track and pointed in any number of directions. Traditional spotlights may take up valuable space on a mantle or table, and the backlighting effect from below is often unpleasant. Track lighting allows floodlights and spotlights to be hung unobtrusively from the ceiling or upper walls.

Some home renovators also find lighting solutions for older homes to be tricky, and instead of trying to install new wiring in an old ceiling, decorators can use surface-mounted track lighting instead. Manufacturers offer a number of decorative lamps and extensions designed to work with track bases. The main trick when working with this type of system is to know which of three basic track models have been installed. This information should be listed somewhere in the instruction manual included with the lamps and track. Some systems use a two-wire connector, while others use a three-wire grounded system or a wider two-wire connection. Lamps and extenders designed for one type of track will not fit any other design.

Another important consideration is the wiring method used. Some systems use the standard line voltage of 120 volts to power high-wattage bulbs, while others have a low-voltage system that uses a transformer to reduce the current from 120 volts to around 12 volts. The two systems should never be confused — a low-voltage bulb placed in a line voltage system could cause a serious electrical fire. Most decorative lighting designs, such as pinspots, use low-voltage systems, but functional ones may use 120 volt house current and 75 watt lightbulbs. The transformer for a low-voltage track lighting system may or may not be apparent, so it's always safest for homeown-

ers to replace blown lightbulbs with those with identical wattage and purpose.

Exercise 3. Answer the following questions:
What is indoor lightning?
What is the difference between indoor and outdoor lightning?
What lamps are used in home lightning?
What is track lightning?
What system is track lightning used?
What is a wiring method?

Exercise 4 .Translate these sentences into Russian

While blue light dominates outdoors, **indoor lighting** emits very little of it.

Street lights are **lightbulbs** strung overhead.

Although there's less evidence that regular **indoor lighting** can improve mood, it might help.

Inside it was all dark wood, leather armchairs, **chandeliers** and flowers in vases.

University researcher Yao Zhao shows a demonstration rig in which he uses a short piece of carbon nanotube cable to provide **standard line voltage** to a fluorescent light bulb.

The interior is illuminated with **track lighting** and sleek glass chandeliers.

Applications of this **method** are currently limited because creating normal transistors requires enough heat to destroy any existing **wiring**.

Compact flourescent **lightbulbs** use 75% less electricity than incandescent bulbs.

Certainly, the **wattage** on a bulb box is no indication of overall energy costs.

It was made to be a stationary outdoor **lamp**, and was not intended to be portable.

Conditional Sentences
Zero Conditionals

Условные предложения данного типа всегда являются 100% истиной, они часто описывают законы природы, общеизвестные истины/факты.

If -clause	Main clause	Вероятность совершения действия
Present Indefinite	Present Indefinite	100%

*Примеры:***If** temperature **is** zero, water **freezes**. – Если температура равна нулю, вода замерзает. (100% истина) **If** you **heat** water, it **boils**. – Если вы нагреете воду, она закипит. (100% истина)

First Conditionals

Условные предложения I типа выражают реальные, возможные ситуации в настоящем или будущем.

If -clause	Main clause	Вероятность совершения действия
Present Simple	Future Simple + infinitive without to	50-75%

Примеры: **If** I **see** Mary, I **will tell** her. – Если я увижу Мери, я скажу ей. (я могу ее увидеть, а могу и не увидеть)

Second Conditionals

Выражают действия, совершение которых в определенных ситуациях *в настоящем и будущем* оказывается нереальным. Вероятность, что действие произойдет, равна нулю.

If -clause	Main clause	Вероятность совершения действия
Past Simple	would + infinitive without to	0%

Примеры: **If** I **had** a lot of money, I **would travel** round the world. – Если бы у меня было много денег, я бы путешествовал по всему свету. (но у меня нет таких денег).

If I **were** you, I **would drive** more carefully in the rain. – Если бы я был на твоем месте, я бы вел машину аккуратнее во вре-

мя дождя. (но я не на твоем месте)

Third Conditionals

Выражают воображаемые ситуации, относящиеся *к прошлому*. Вероятность, что действие произойдет, равна нулю.

If -clause	Main clause	Вероятность совершения действия
Past Perfect	would (could, should, might) have + past participle	0%

*Пример:***If** I **wouldn't drink** so much, I **wouldn't have got** a fine – Если бы я не пил так много, меня бы не оштрафовали. (утраченные возможности, я много пил в прошлом, и поэтому меня оштрафовали).

Exercise 5. Complete with the present simple or will.
Example: I'll give him your message when I __see__ __him__ (see).

a) Don't forget to turn off the lights before you _____ . (leave)
b) Go to bed when the film _____ . (finish)
c) They _____ married until they find a place to live. (not get)
d) If I see Emma, I _____ her you are looking for her. (tell)
e) I'll call you as soon as I _____ at the hotel.
f) You won't be able to park unless you _____ there early. (get)
g) As soon it stops raining, we _____ out. (go)
h) She won't like curry if she _____ spice food. (not like)
i) Don't write anything until I _____ you. (tell)
j) When she finds out what he's done, she _____ furious. (be)

Exercise 6. Write second conditional sentences.
Example: If you/ speak to your boss, I'm sure he/ understand.
If you spoke to your boss, I'm sure he would understand.

1. It/ be better for me if we/ meet tomorrow. 2. She/ not treat him like that if the really/ love him. 3. If I/ can live anywhere in the

world, I/live in New Zealand. 4. The kitchen/ look bigger if we/ paint it white. 5. I/ not buy that house if I/ be you. 6. He/ be more attractive if he/ wear nicer clothes. 7. If we/ not have children, we/ travel more. 8. What/ you do in this situation if you/ be me?

Exercise 7. First or second conditional? Complete the sentences.

Example: If you tell her anything, she will tell everybody in the office. (tell)

We'd have a dog if we had a garden. (have)

a) It'll be quicker if we _____ a taxi to the airport. (get)
b) If you stopped smoking, you _____ better. (feel)
c) What would you do if you _____ your job? (lose)
d) If you buy the food, I _____ tonight. (cook)
e) I think he'd be happier if he _____ alone. (not live)
f) I'll be very surprised if Marina _____ coming here. (not get lost)
g) Where will he live if he _____ the job in Moscow? (get)
h) If she didn't have to look after her mother, she _____ life more. (enjoy)

Exercise 8.Choose the right variant

1. Before you_____, don't forget to lock the door.
a) are leaving c) leave
b) will leave d) shall leave
2. Please do not speak to anyone before the police_____.
a) come c) '11 come
b) are coming d) came
3. His parents will be very glad if she_____the university.
a) enter c) enters
b) '11 enter d) entered
4. When you_____my brother, you_____him.
a) '11 see, won't recognize c) saw, recognize
b) see, won't recognize d) '11 see, don't recognize
5. We won't discuss the matter until the headmaster_____.
a) '11 arrive c) doesn't arrive
b) won't arrive d) arrives
6. If I_____any help I_____my friend.
a) need, '11 phone c) '11 need, phone
b) '11 need, '11 phone d) needed, '11 phone
7. Let's_____before it_____raining.

a) to go out, starts 'c) go out, '11 start
b) go out, starts d) going out, '11 start
8. I want to go shopping but if you_____to come, you
a) want, need c) don't want, needn't
b) not want, needn't d) do want, needn't
9. If you_____on this tram it'll take you to the downtown.
a) '11 get c) got
b) have got d) get
10. He_____to the country tomorrow if the weather is fine.
a) go c) '11 go
b) goes d) 'd go

Exercise 9. Read and translate the text.
Supplementary text.

What is a Pendant Lamp?

A pendant is something that hangs from something else. In jewelry, a pendant hangs from a chain or other material. A pendant lamp is any lamp that hangs from the ceiling by anything such as a cord, pole or chain. Rather than being directly attached to the electrical fixture, a pendant lamp is suspended from the fixture.

The modern pendant lamp is inspired from the clay pendant lamps that were hung off the ground in ancient times so that hands were free and light could be spread out to cover a large area. These clay-based lamps had animal fat deposits to hold a flame and were common around 2700 BC. The modern pendant lamp design began to be glass-based so that the light would shine through from the underside of the suspended lamp.

The stained glass Tiffany lamp is a well-known type of pendant lamp. The colorful Tiffany pendant lamps usually hang from an antique-finished metal chain. Chandeliers are another well-known type of pendant lamp.

Architect George Nelson designed organically-shaped plastic pendant lamps in 1952 that were hung from a plastic-coated cord. These lamps are pear-shaped, ball-shaped and cigar-shaped and their clear, plain lines are accented by details such as subtle stripes or textured, vertical ridges. Nelson's pendant lamps use pulled plastic so that light is exposed without causing a glare.

Not all pendant lamps have a single cord. Some have three or more "branches," stemming from the electrical fixture, that attach to one or more lamp shades. Some pendant lamps may be hung in a row to give an interesting effect that also adds more light to a space.

Track pendant lamps are joined like the lights in regular track lighting. However, the difference is that the shades are suspended rather than being attached right into the track that fits on the electrical fixture.

Pendant lamps tend to add a much more dramatic and stylish effect to a room than light fixtures that aren't suspended. The styles range from sophisticated, like chandeliers, to old fashioned, like Tiffany lamps, to modern, such as a row of small pendant lamps all of the same shape, but each a different color. There are now styles and colors of pendant lamps available for every room, taste and budget.

UNIT4. LIGHT-EMITTING DIODE

Exercise1. Read and remember the words and phrases.

A solid-state lighting device – твердотельное устройство освещения

A semiconductor diode – полупроводниковый диод
Positive charge – положительный заряд
Negative charge – отрицательный заряд
Halogen tungsten lamps – галогенные лампы
Energy consumption – потребление электроэнергии
Hazardous substances – опасные вещества
Ultraviolet – ультрафиолетовый

Exercise 2. Read and translate the text given below.

LIGHT EMITTING DIODES

LEDs (light emitting diodes) are solid-state lighting devices that produce light when a two ward voltage is applied. A LED consists of a semiconductor diode containing two slightly different minerals: a P-type semiconductor has "holes" created by a lack of electrons, producing a positive charge. Conversely, the N-type material has an excess of electrons, resulting in a negative charge. The P- and N-type semiconductor is placed in direct contact in the diode and the region where they meet is referred to as the PN junction.

LED is the latest technology that has surpassed all the quality standards, primarily in brighter results and energy consumption. In order to develop the LED lighting technology, developed countries have attached great importance to the test methods and the standard research of LED. High power LEDs are fast becoming the preferred lighting solution of the future.

The efficiency of incandescent and halogen tungsten lamps are 12-

24 lumens per watt, fluorescent lamps are 50-70 lumen per watt and sodium lamps are 90-140 lumen per watt. The result of this is poor efficiency as most of power consumption is a result of the heat generated by these styles of lamps. LED lighting efficiency will reach upwards of 200 lumens per watt while maintaining 90% efficiency. This will be achieved while delivering benefits such as excellent colour rendering index and narrow light spectrum.
Achieving the same light output, the power consumption of LED is only 1/8 of that for the incandescent lamp, and 1/2 of that for the fluorescent lamp.
The lifetime of LED based lighting can be 10 years or more based on hours of daily operation. Products offer advantages such as low heat emission, no heat radiation, low temperature light source, much cooler to the touch, lighting colour and angle can be controlled accurately, lighting colour is less intensive and damaging to the eye, does not cause headaches, and no mercury, sodium or other hazardous substances used.

LEDs are utilized in many industries for many things. Uses for the interior of automobiles include indicator lights on dashboard gauges, audio status lights, security status lights and warning signals. The mobile phone is the largest market of integration for SMD (surface mount diode) LEDs. As a result, mobile phones create a demand for 3.2 billion LEDs per year. The LED screen has become the new display medium for advertising and information. It is commonly used in concert, arena and trade show venues. Its popularity has prompted the rapid technological development of large-scale integrated circuits. LEDs are being used in advertising billboards, illumination of commercial building exteriors, landmark buildings, bridges, roads, town centers and landscape lighting because of the numerous advantages they offer.

LEDs' benefits are: saving future maintenance, cost, higher efficiency, lower power usage compared to incandescent. Some LEDs can be setup to dynamically change colour. LEDs have typically lower infra-red and ultraviolet output. This can also mean a lower fire risk, especially compared to halogen downlights. Faster warm up time (especially compared to fluorescent lights) is one of the advantages. They are usually more rugged. There is normally no glass to break and no filament to damage via vibration. Today, LEDs have been integrated as warning lights and indicators on most electronics. Many airports, subways, hotels, shopping centers, and individual homes feature LEDs now.

LEDs' disadvantages. They may fail prematurely in high tem-

perature conditions. Not all LED bulbs are dimmable. High powered LED downlights can be taller than halogen lights, which can be a problem if roof space is limited. Performance depends on good engineering.

Current situation and prospect of LED lighting. At present, lighting accounts for about 20% of the power consumption in the world. Reducing this figure is a crucial means of energy savings from both a financial and environmental standpoint. LEDs are already beginning to alleviate this energy burden. LEDs' unique advantages are attracting a lot of attention around the globe. In the USA, it is predicted that LEDs will replace 55% of incandescent lights and 55% fluorescent lights within the next 15 years. This will save $35 billion annually in electricity costs and prevent the emission of 7.5 hundred million pounds of carbon dioxide. In Taiwan, LEDs will substitute 25% of incandescent bulbs and 100% of fluorescent lamps in the next 10 years. In Japan, LEDs will replace 100% of fluorescent lamps within 10 years, which will generate a net reduction in electricity consumption equivalent to 1-2 nuclear power plants. This will also reduce annual crude oil consumption by over 1 billion liters.

LEDs have existed for several decades but their use in general lighting applications is still relatively new. The current rapid pace of technological development in this sector coupled with increasingly-strained natural resources will only further encourage the evolution of LEDs. The future of LED lighting is very promising: LEDs are considered the best market in this coming decade on a global scale.

Although LEDs may seem confusing to begin with, they do provide some real advantages for the environment and the technological features. Their long life, rich colour, and easily-controlled features with integrated electronics offer a scalable lighting solution. As technology continues to bring rapid improvements in luminous efficiency and as cost compression persists, applications expand rapidly.

Exercise 3. Answer the following questions:

A) What is a light emitting diode?

B) What does a LED consist of?

C) Why have developed countries paid great attention to the development of LEDs?

D) Is the power consumption of a LED more efficient than that of other types of lamps?

E) In what spheres can LEDs be used?

F) What are the main LEDs' disadvantages?

G) Can LEDs help to reduce electricity consumption?

Exercise 4. Find the equivalents of the following words and expressions in the text:

Опасные вещества, сокращение потребления электроэнергии, светодиоды, люминесцентные лампы, это позволит сэкономить, с экономической точки зрения, полупроводниковый диод, положительный заряд, предотвратить выброс углекислого газа, технологическое развитие.

Exercise 5. Translate the following words and expressions into Russian.

Light emitting diode, expand rapidly, reduction of electricity consumption, lower power usage, energy savings, the lifetime of LED, lighting solution of the future, a financial standpoint, relatively new, incandescent lamps, fluorescent lamps, annual consumption, halogen tungsten lamps.

Exercise 6. Summarize the text, make use of the following phrases:

The text under review …

The subject of the text is …

At the beginning of the text the author describes … (explains, touches upon, analyses, comments …)

Then (after that, further on) the author passes to …, gives a detailed analyses of …)

To finish with, the author describes …

In conclusion the author …

Exercise 7. Remember the Infinitive forms, and translate the following sentences.

Infinitive	Active	Passive
Indefinite	to ask	to be asked
Continuous	to be asked	---
Perfect	to have asked	to have been asked
Perfect Continuous	to have been asking	---

1. To solve main problem of photon computer you can use the chips based on molybdenum disulfide. 2. Optical transistor will enable to control the propagation of an optical signal beam. 3. On the bases of this discovery, it is planned to create new devices. 4. There is nor-

mally no glass to break and no filament to damage via vibration. 5. Russia was the first country to start the cosmic era. 6. Induction lamps create light by using electromagnetic field to excite mercury particles mixed in an inert gas. 7. Mendeleyev's periodic law to have been accepted as a universal law of nature is of great importance nowadays. 8. Computers to have been designed originally for arithmetic purposes are applicable for great variety of tasks at present.

Exercise 8. Choose the right variant.

1.1 have seen the film._____.
a) I am to c) Neither have I
b) So am I. d) So have I.

2.1 haven't seen the film._____.
a) Neither have I c) So have I
b) So I have d) Neither I have

3. I'm tired._____.
a) So do I c) Neither I am
b) So am I d) Neither am I

4.1 am not tired._____.
a) So am I c) Neither am I
b) Neither do I d) Neither I am

5. I've been living in Kiev for ten years._____.
a) So do I c) Neither have I
b) So am I d) So have I

6.1 haven't been living in Kiev for ten years._____.
a) I haven't too c) Neither was I
b) Neither have I d) So have I

7.1 was at the theatre yesterday._____.
a) Neither was I c) So was I
b) Neither am I d) So am I

8.1 wasn't at the theatre yesterday._____.
a) Neither was I c) So do I
b) Neither am I d) So was I

9.1 am reading a book now._____.
a) Neither am I c) So do I
b) So am I d) So I am

10. I am not reading a book now._____.
a) Neither am I c) Neither do I
b) So do I d) I am not

UNIT 5. OPTICAL FIBER

Exercise1. Read and remember the words and phrases.

optical fiber – оптическое волокно
internal reflection – внутреннее отражение
fiber with two modes – волокна с двумя режимами
single-mode fiber – одномодовое волокно
index of reflection – индекс отражения
fiber-optic communication – волоконно-оптические линии связи
quartz glass – кварцевое стекло

Exercise 2. Read and translate the text given below.

THE STRUCTURE OF OPTICAL FIBER AND ITS USE IN MODERN TECHNOLOGIES

Imagine that your high-speed Internet, digital television, or even a cell phone work through a thin glass tube. Everything you type on your computer or talk on the phone moves to the goal with the help of glass fibers which are called optical fibers. Actually in recent years copper Internet cables begin recede into the past. Not without reason, because fiber optic cables have a much better advantages compared to conventional cable.

Optical fiber is a thread which is made from an optically transparent material (glass, plastic).It is used to transfer the light.

The principle of light transmission with the help of fiber was described in the 19th century, but because of the lack of technology this idea did not come true. In 1934 the American Norman R. French received a patent for an optical telephone system, where the speech signals were transmitted with the help of light through the bars of pure glass. For a long time, due to the large attenuation of the light signal, optical fiber technology could not be used everywhere, so copper cables were the only signal transmitters.

Only in 1970 it was possible to establish industrial production of optical fiber with low attenuation.

The benefits of optical fibers are:

It makes possible to transmit data with significantly higher speed than with copper twisted cable;

Optical cables are not susceptible to interference of electromagnetic nature;

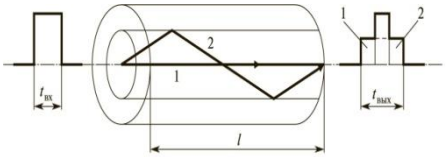
The distance on which data can be transferred without a re-

peater increases.

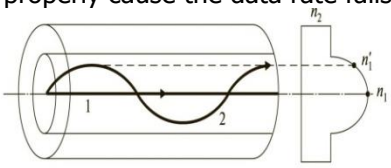
Illegal data transfer becomes technically more difficult.

The light guide works thanks to a physical phenomenon which is called total internal reflection. Rays falling from a zone of a denser medium onto a boundary with a less dense medium reflect completely, moreover the angle of incidence must be greater than some critical value.

Usually optical fiber consists of two layers: core and covered around the optical cladding. Usually pure quartz glass is used in the manufacture of optical fiber. In the production of optical cladding companies use quartz glass too, but with the addition of certain additives such as oxides of germanium, phosphorous, boron, erbium to achieve another refractive index than the core. This process is called doping. Actually due to the difference between the refractive indexes, total internal reflection occurs. Then, in order to protect the optical fiber from mechanical damage, which may influence on the light conductivity, two polymer layers cover the product. Nowadays there are two types of fiber optic cables in modern industry: multimode and single-mode fibers. Multimode cable is used in networks of not great length up to 2 km. The diameter of the cable core is from 50 to 62.5 microns. However precisely because of such a large diameter, the light signal fades with increasing distance. This effect is called mode dispersion. [1]



Mode is a path along which light spreads in the optical fiber. Let's say that we have a fiber with two modes. Ray number one extends along the longitudinal axis while the second ray is reflected . Precisely because of multiple reflections, the trajectory of the second ray will be larger and it will reach the receiver later. This is the reason for the signal attenuation. Therefore, these cables cannot transmit information over vast distances properly cause the data rate falls.



H However, the solution to this problem is the creation of multimode fiber with a gradient refractive index of light beams. Unlike a fiber with a stepped index of refraction, the core with a gradient in- dex contains numerous layers of

glass which, as you move away from the fiber axis, have a lower refractive index than the previous layer. The result of the formation of gradient of the refractive index is that the light beams are accelerated in the outer layers, and although they travel long distances, their propagation time in the fiber is comparable to the propagation time of the beams passing along shorter paths near the axis.

But there are some advantages of multimode fiber:

It is easier during assembly.

Radiator for multimode fiber is cheaper and more accessible.

The cable itself is cheaper to produce.

In single-mode fibers there is no modal dispersion due to which the signal does not decay. The light signal can negotiate a distance about 10 to 100 km in this fiber. The diameter of these fibers is 7-12 microns. Exactly this diameter is comparable with the wavelength of light. The working wavelengths are λ1 = 1.31 μm and λ2 = 1.55 μm.

The advantages of single-mode fibers are:

The light attenuation is minimum.

The distance of the transmitted signal increases.

However, single-mode light sources are much more expensive. Also installation of a cable with single-mode fiber is more complicated.

As was mentioned earlier, optical fiber is used in the fiber-optic communication. They are used at different levels from intercontinental links to home computer networks. The reason of such popularity of fiber optical communication lines is not only in high signal transmission rate but in the fact that they have high security against unauthorized access. For example, the largest number of fiber-optic communication lines was conducted between Europe and the US on the bottom of the Atlantic Ocean. In 2006, the speed of 40 Mbit / s became quite standard for one optical fiber. In this case, each fiber, using the technology of spectral multiplexing of channels, can transmit up to several hundred channels simultaneously providing a common information transfer rate, calculated by terabits per second. In 2014, the highest data transfer rate for optical fiber was installed. It was 255 tbit / s.

The optical fiber is also used as a sensor for measuring voltage, temperature, pressure and other parameters. The small size and the virtual absence of the need for electrical power give fiber optic sensors an advantage over traditional electric.

Optical fiber is used in seismic or sonar devices. Systems with a fiber optical sensor are used in the oil industry, as well as in the fleet of some countries.

Fiber-optic sensors, measuring temperatures and pressures, are designed for measurements in oil wells. They are well suited for such

environments, working at temperatures too high for semiconductor sensors.

With the use of polymeric optical fibers, new chemical sensors are created which are used in the protection of environment, for example, for the detection of ammonium in aqueous territories.

The optical fiber is used in the laser gyro. Such technology is used in Boeing and in some cars for navigation.

Optical fibers are widely used in lighting. They are used as light guides for medical and other purposes, where bright light must be delivered to a hard-to-reach zone. In some buildings, optical fibers direct sunlight from the roof to the part of the building. Fiber-optic lighting is also used for decorative purposes, including commercial advertising, art and artificial Christmas trees.

Exercise 3. Answer the following questions:

What is optical fiber?

When was the principle of light transmission with the help of fiber described?

What are optical fibers benefits?

What layers does optical fiber usually consists of?

What are fiber two types of fiber optic cable in modern industry?

What are the advantages of single-mode fiber?

What are the advantages of multimode fiber?

Exercise 4. Find in the text the equivalents of the following words and expressions.

Незаконная передача данных, световод, внутреннее отражение, угол падения, оптическое волокно состоит их двух слоев, кварцевое стекло, германий, фосфор, бор, легирование, разница рефракционных индексов, медный витой кабель, помехи электромагнитного характера.

Exercise 5. Translate into Russian.

Fiber-optic lighting, polymeric optical fiber, conventional cable, significantly higher speed, single-mode fiber, multimode fiber, calculate by terabits per second, intercontinental links, bars of pure glass, more accessible, index of reflection, outer layers, propagation time, wavelength of light.

Exercise 7. Summarize the text in 7-8 sentences. Make use of the following phrases:

The text under discussion reports on …
The main objective (purpose, aim) of the text is …
The text discusses (considers, deals, analyses, emphasize) …
Much attention is given to …

Exercise 8. Remember the Passive Voice forms, and translate the following sentences.

	Present	Past	Future	Future in-the-Past
Indef-inite	Am is are V_3	was were V_3	shall be V_3 will	should would be V_3
Con-tinu-ous	Am is are be-ing V_3	was were being V_3		
Per-fect	have has been V_3	had been V_3	shall will have been V_3	should would have V_3

Exercise 9. Complete the sentences using the Present Simple Passive.

Optical fibers _____ (to use) in lighting. 2) Fiber-optic lighting _____ (to use) in decorative purposes, including commercial advertising. 3) Eyes _____ (to damage) if you use light emitting diodes. 4) LEDs _____ (to utilize) in many industries for many things. 5) LEDs _____ (to supply) with the voltage above the threshold and a current below the rating. 6) It _____ (to predict) that LEDs will replace 55% of incandescent lights. 7) LEDs _____ (to consider) the best market in this coming decade on a global scale. 8) High performance _____ (to achieve) by deep parallelization of both the program and at the structural level. 9) _____optical fibers _____ (to design) for measuring temperature and pressure? 10) The information _____ (not to translate) to long distances properly. 11) Energy _____ (to transfer) from

the magnet to the mercury in the tube.

Exercise 9. Complete the sentences using the Past Simple Passive.

1.As it _____ (to mention), optical fiber is used as a sensor for measuring voltage. 2) The induction lamp _____ (to invent) by Nobel laureate J. Thompson. 3) Whom _____ the induction lamp (to invent) by? 4) The first electrodeless lamp _____ (to demonstrate) by Nikola Tesla in 1893. 5) The lamp _____ (to power) by electromagnetic field of a nearby large "Tesla Coil". 6) A light bulb _____ (to produce) by Edison's team. 7) The first electric meter _____ (to invent) to track how much electricity each customer was using. 8) The history of the electric bulb _____ (to fill) with rivalry, failures and great achievements. 9) The lamp _____ (to bring) into the public eye and _____ (to improve) by Tesla. 10) The tungsten filament _____ (to invent) by European inventors in 1904. 11) Optical fiber industrial production _____ (to establish) in 1970.

Exercise 10. Complete the sentences using different forms of the Passive Voice.

1.The electric bulb _____ (to call) the most important invention since man made fire. 2) 55% fluorescent lights _____ (to replace) with light emitting diodes. 3) A demand for 3.2 billion LEDs _____ (to create) next year. 4) Until law and order becomes a norm, consumers _____ (to leave) with the difficult challenge of trying to determine which products are best suited for their applications. 5) Optical fiber _____ (to use) in seismic and sonar devices next decade. 6) Who _____ the first electric bulb _____ (to invent) by? 7) The main problem of photon computer _____ (to solve) in the nearest future. 8) The properties of a silicon nanoparticle _____ (to change) by irradiating it with intense and ultrashort laser pulse. 9) LEDs _____ easily _____ (to broke). 10) In the nearest future all light bulbs _____ (not to replace) with LEDs, because they produce light in only one direction.

UNIT 6. TYPES OF LAMPS

Exercise1. Read and remember the words and phrases.

Artificial luminous radiation – искусственное светящееся излучение

Temperature elevation – повышение температуры

Electrical current – электрический ток
Incandescence – лампы накаливания
Luminescence - люминесцентные лампы
Luminous radiation – световое излучение
High Intensity Discharge – разряд высокой интенсивности
Mercury vapours – пары ртути
Low pressure sodium lamp – натриевая лампа низкого давления
High pressure sodium lamp – натриевая лампа высокого давления
Metal halide lamp – металлическая галоидная лампа

Exercise 2.Read and translate the following text.

TYPES OF LAMPS

Artificial luminous radiation can be produced from electrical energy according to two principles:

Incandescence: It is the production of light via temperature elevation. The most common example is a filament heated to white state by the circulation of an electrical current. The energy supplied is transformed into heat by the Joule effect and into luminous flux.

Luminescence: It is the phenomenon of emission by a material of visible or almost visible luminous radiation. A gas (or vapours) subjected to an electrical discharge emits luminous radiation (Electroluminescence of gases). Since this gas does not conduct at normal temperature and pressure, the discharge is produced by generating charged particles which permit ionization of the gas.

The nature, pressure and temperature of the gas determine the light spectrum. Photoluminescence is the luminescence of a material exposed to visible or almost visible radiation (ultraviolet, infrared).When the substance absorbs ultraviolet radiation and emits visible radiation which stops a short time after energization, this is fluorescence.

Incandescent lamps:

Incandescent lamps are historically the oldest and the most often found in common use. They are based on the principle of a filament rendered incandescent in a vacuum or neutral atmosphere which prevents combustion. A distinction is made between: standard incandescent bulbs and halogen incandescent bulbs. Standard incandescent bulbs contain a tungsten filament and are filled with an inert gas (nitrogen and argon or krypton).Halogen Incandescent bulbs also contain a tungsten filament, but are filled with a halogen compound

and an inert gas (krypton or xenon). This halogen compound is responsible for the phenomenon of filament regeneration, which increases the service life of the lamps and avoids them blackening. It also enables a higher filament temperature and therefore greater luminosity in smaller-size bulbs.
The main disadvantage of incandescent lamps is their significant heat dissipation, resulting in poor luminous efficiency.

Fluorescent lamps

This family covers fluorescent tubes and compact fluorescent lamps. Their technology is usually known as "low-pressure mercury". In fluorescent tubes, an electrical discharge causes electrons to collide with ions of mercury vapor, resulting in ultraviolet radiation due to energization of the mercury atoms.

The fluorescent material, which covers the inside of the tubes, then transforms this radiation into visible light. Fluorescent tubes dissipate less heat and have a longer service life than incandescent lamps, but they do need an ignition device called a "starter" and a device to limit the current in the arc after ignition. This device called "ballast" is usually a choke placed in series with the arc.

Compact fluorescent lamps are based on the same principle as a fluorescent tube. The starter and ballast functions are provided by an electronic circuit (integrated in the lamp) which enables the use of smaller tubes folded back on themselves.

Type of HID (High Intensity Discharge) Lamp:

The term High Intensity Discharge or HID describes lighting systems that produce light through an electrical discharge which typically occurs inside a pressurized arc tube between two electrodes. In general, these systems feature long life, high light output for the size of the lamp and increased efficiency compared to fluorescent and incandescent technologies. HID lamps are named by the type of gas and metal contained within the arc tube. There are five different families of HID: Mercury Vapor, High Pressure Sodium, Quartz Metal Halide, Pulse Start Quartz Metal Halide, and Ceramic Metal Halide.

HID lamps require a ballast to operate. Typically, the HID ballast (sometimes with the addition of a capacitor and igniters) serves to start and operate the lamp in a controlled manner.

HID lamps take several minutes to warm-up. Full light output is reached after the arc tube temperature rises and the metal vapours reach final operating pressure. A power interruption or voltage drop will cause the lamp to extinguish. Before the lamp will re-light, it must

cool to the point where the lamp's arc will re strike.

There are four basic types of lamps considered as HID light sources:

Mercury vapour,
Low pressure sodium,
High pressure sodium and
Metal halide.

All are arc discharge lamps. Light is produced by an arc discharge between two electrodes at opposite ends of the arc tube within the lamp.

Each HID lamp type has its own characteristics that must be individually considered for any lighting application.

(1) High Pressure Sodium

Efficacy: 80 to 140 lumens per watt.

Life: A long lamp life of 20,000 to 24,000 hours, and the best lumen maintenance of all HID sources.

Wattages: 35W to 1000W and the warm-up time is from 2 to 4 minutes.

Re-strike time: Approximately 1 minute.

Applications: Roadway lighting

High pressure sodium and metal halide lamps comprise the majority of HID lighting applications.

The biggest drawback of high pressure sodium is the yellowish colour light output, but it is acceptable for use in many industrial and outdoor applications (e.g. Roadway lighting).

(2) Low Pressure Sodium

Low pressure sodium (LPS) lamps are grouped with HID lamps, but in fact do not have a compact, high intensity arc. They are more like a fluorescent lamp with a long stretched-out arc.

Colour: LPS lamps have no colour rendering index as the colour output is monochromatic yellow.

Efficacy: 100 to 185 lumens per watt

Wattages: 18W to 180W

Life: Average 14,000 to 18,000 hour lifetimes.

Re-strike time: shortest re-strike time among HID sources only 3 to 12 seconds.

Applications: LPS has few viable applications beyond street, parking lot and tunnel lighting.

They have excellent lumen maintenance but the longest warm up times, from 7 to 15 minutes.

(3) Metal Halide

Efficiency: Efficacy of 60 to 110 lumens per watt

Warm-up Time: 2 to 5 minutes.

Re-strike time: 10 to 20 Minutes.

Wattages: 20W to 1000W

Life: 6,000 to 20,000 hours.

Applications: This technology is ideal for Lamp applications requiring truer colour as in fruit, vegetable, Clothing and other accent lighting in retail displays.

Wattages from 1500W to 2000W are specialty lamps used for sports lighting, and have lamp life ratings of only 3000 to 5000 hours.

Advantages: The advantage of metal halide lighting is its bright crisp, white light output suitable for commercial, retail, and industrial installations where light quality is important. However, lumen maintenance over the life of the lamps is less than optimal relative to other HID sources.

The arc tube material for metal halide lamps was quartz until 1995 when ceramic arc tube technology was developed.

Ceramic arc tubes are now predominantly used in low wattage (20W to 150W) lamps, though new designs up to 400W have emerged in recent years.

GENERAL BALLAST DESCRIPTION:

HID lamps provide light from an electric discharge or arc and have a negative resistance characteristic that would cause them to

draw excessive current leading to instant lamp destruction if operated directly from line voltage.

The ballast is a power supply for arc discharge lamps. Its purpose in HID lighting is to provide the proper starting voltage to initiate and maintain the lamp arc and to sustain and control lamp current once the arc is established.

Ballasts and lamps are designed to meet standards for interchange ability between lamps and ballasts of the same type and wattage. A lamp must be operated by the ballast designed for that lamp, as improper matching of lamp and ballast may cause damage to the lamp or ballast or both.

For many years all HID ballasts were magnetic ballasts operating at the power line frequency of 50 or 60 Hertz to provide proper lamp operation.

In the past few years electronic ballasts have been developed, primarily for metal halide lamps, using integrated circuits that monitor and control lamp operation. Electronic ballast circuits sense lamp operation characteristics and regulate lamp current to operate the lamp at constant wattage, thus providing a more uniform light output and color rendition throughout lamp life.

They also sense lamp end of life and other circuit conditions and shut down the ballast when the lamp operating characteristics fail to meet operating specifications

Exercise 3. Answer the following questions

What are the principles luminous radiation can be produced?

What is the most common example of incandescence?

How does luminescence light is produced?

Is there any difference between photoluminescence and the luminescence?

What principle are incandescence lamps based on?

Which kind of lamps is usually known as "low-pressure mercury" technology?

What types of High Intensity Discharge Lamps do you know?

Exercise 4. Find in the text the equivalents of the following words and expressions.

Металлическая галоидная лампа, интегральные схемы, эксплуатационные характеристики, постоянная мощность, равномерный световой поток, цветопередача, электрический разряд, мгновенное разрушение лампы, источник питания.

Exercise 5. Translate into Russian.

Metal halide, artificial luminous radiation, high intensity discharge, temperature evaluation, efficiency, high pressure sodium, lighting application, fluorescent tubes, bright crisp, ceramic arc tube technology, krypton or xenon, visible luminous radiation.

Exercise 6. Remember the Gerund forms, and translate the following sentences

Participle	Active	Passive
Present	using	being used
Perfect	having used	having been used

Exercise 7. Find the gerund. Translate the sentences.

1) He succeeded in translating this difficult text. 2) Producing light is a profitable business. 3) The machine needs cleaning. 4) I am quite serious in saying that I don't want to go abroad. 5) My trying to convince him is of no use. 6) The librarian didn't object to the reader keeping the book one day longer. 7) Reading a good book gives me a lot of pleasure. 8) He never agreed to their going on that dangerous voyage. 9) He thinks of reading his report at the next conference. 10) After reading the article he made a short summary of it. 11) By reading much we learn much. 12) I'm glad to have the opportunity of reading this book. 13) Reading English is necessary for every engineer. 14) His having read that article helped him with his term work. 15) I don't remember asking this question by anybody.

Exercise 8. Complete the sentences using the gerund.

1) _____ (to find) gas and oil deposits at large depth is not an easy technological task. 2) He is good at _____ (to solve) mathematical equations. 3) His favorite pastime is _____ (to play) computer games. 4) A young scientist is very proud of _____ (to choose) to represent his university at the international conference. 5) He gave up the idea of _____ (to buy) new equipment. 6) He has always dreamt of _____ (to visit) other countries. 7) He persisted in _____ (to try) to solve that difficult problem. 8) He seems sorry for _____ (to be) inattentive at the lectures. 9) After thoroughly _____ (to examine) the student, the professor gave him a satisfactory mark. 10) After thoroughly _____ (by the examination commission, the student was given a satisfactory mark. 11) This job is not worth _____ (to take). 12) After (to look) through and _____ (to mark) the students' papers, the teacher handed them back. 13) She was proud of _____ (to

award) the first prize. 14) The teacher was surprised at the students _____ (to do) the task so quickly. 15) You have never mentioned your _____ (to be) in Greece.