МИНИСТЕРСТВО ОБРАЗОВАНИЯ РЕСПУБЛИКИ БЕЛАРУСЬ

УЧРЕЖДЕНИЕ ОБРАЗОВАНИЯ
<< БРЕСТСКИЙ ГОСУДАРСТВЕННЫЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ >>

КАФЕДРА ИНОСТРАННЫХ ЯЗЫКОВ ПО ТЕХНИЧЕСКИМ СПЕЦИАЛЬНОСТЯМ

МЕТОДИЧЕСКИЕ УКАЗАНИЯ ДЛЯ САМОСТОЯТЕЛЬНОЙ АУДИТОРНОЙ РАБОТЫ ПО АНГЛИЙСКОМУ ЯЗЫКУ

для студентов специальности:
1-70 04 02 – «Теплогазоснабжение, вентиляция и охрана воздушного бассейна»

Часть 2

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Методические указания предназначены для студентов специальности «Теплогазоснабжение, вентиляция и охрана воздушного бассейна».

Данные методические указания составлены в соответствии с требованиями Программы по иностранным языкам.

Методические указания нацелены на подготовку студентов к самостоятельной работе со специальной литературой, совершенствование навыков чтения и понимания оригинальной научно-технической литературы по специальности, развитие навыков перевода, реферирования, обучение устным формам общения по научной тематике на материале предложенных текстов, системное развитие коммуникативных способностей студентов, расширение их активного и пассивного лексического запаса.

Данные методические указания одобрены на заседании кафедры иностранных языков по техническим специальностям и рекомендованы к изданию.

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Содержание

Unit 3. Ventilation

Text 12

1. *Найдите русские эквиваленты английских слов.*

1. ventilation	a. кратность воздухообмена
2. vents / flues	b. загрязняющее вещество
3. exhaust	c. летучие органические соединения
4. to expel	d. воздухоотводная труба, дымоход; дым, пыль
5. to cause harm	e. воздухообмен
6. occupant	f. интенсивность подачи, скорость потока, расход
7. contaminant	g. рециркулирующий (возвратный) воздух
8. to dilute	h. освежитель воздуха
9. respirable suspended particles	i. увлажнять
10. volatile organic compounds	j. вытяжка
11. to heat	k. вентиляция, проветривание, движение воздуха
12. to cool	l. котел, бойлер
13. to humidify	m. вдыхаемые взвешенные частицы
14. to treat	n. нагревать. согревать
15. to circulate	o. житель, жилец
16. to prevent	p. водонагреватель
17. return air	q. мера, единица измерения; предел
18. boiler	r. причинять, наносить вред
19. volumetric flow rate	s. обрабатывать, подвергать действию
20. air change	t. предотвращать, не допускать
21. air changes per hour / ventilation rate	u. удалять, убирать, выводить (из)
	v. запрещать
22. measure	w. разбавлять, разводить, разжижать
23. air freshener	x. циркулировать, двигаться по кругу
24. water heater	y. охлаждать
25. to ban	

2. *Прочитайте и переведите текст.*

VENTILATION

Ventilation is the intentional movement of air from outside a building to the inside. It is the *V* in HVAC. The exhausts of clothes dryers and combustion equipment such as water heaters, boilers, fireplaces, and woodstoves are called vents or flues. The vents or flues carry the products of combustion which have to be expelled from a building not causing harm to the occupants

of the building. The movement of air between indoor spaces, and not to the outside, is called air transfer.

When people or animals are present in buildings, ventilation is necessary to dilute odours and limit the concentration of carbon dioxide and airborne pollutants such as respirable suspended particles (RSPs) and volatile organic compounds (VOCs). Ventilation air is often delivered to spaces by mechanical systems which may heat, cool, humidify and dehumidify the space. Air movement into buildings can occur due to uncontrolled infiltration of outside air through the building fabric or the use of deliberate natural ventilation strategies. Advanced air filtration and treatment processes such as scrubbing, can provide ventilation by cleaning and recirculating a proportion of the air inside a building.

In certain applications, such as submarines, pressurized aircraft, and spacecraft, ventilation air is also needed to provide oxygen, and to dilute carbon dioxide for survival. Buildings normally have sufficient air leakage to prevent dangerous levels of carbon dioxide. Inadequate ventilation in a densely occupied room can cause the level of carbon dioxide to increase which leads to sleepiness and reduced working efficiency. This is a matter of concern in schools where attentiveness and learning ability may be adversely affected.

In commercial, industrial, and institutional (CII) buildings, and modern jet aircraft, return air is often recirculated to the air handler. A portion of the supply air is normally exfiltrated through the building envelope or exhausted from the building (e.g., toilet or kitchen exhaust) and is replaced by outside air introduced into the return air stream.

The ventilation rate, for CII buildings, is normally expressed by the volumetric flow rate of outside air being introduced to the building. The typical units used are cubic feet per minute (commonly abbreviated as CFM), or, in metric units, liters per second (L/s). The ventilation rate can also be expressed on a per person or per unit floor area basis, such as CFM/p or CFM/ft², or as air changes per hour.

For residential buildings, which mostly rely on infiltration for meeting their ventilation needs, the common ventilation rate measure is the number of times the whole interior volume of air is replaced per hour, and is called air changes per hour (I or ACH; units of 1/h). ACHs of 0.5 to 1.5 are common in modern U.S. homes under winter design weather conditions.

If smoking is allowed indoors, ventilation air is needed in sufficient quantities to dilute the airborne contaminants. Banning indoor tobacco smoking and the use of candles, air fresheners, incense, and other generators of air contaminants is much more effective for improving indoor air quality.

Combustion (e.g., fireplace, gas heater, candle, oil lamp, etc.) consumes oxygen and produces replaced by carbon dioxide other unhealthy gases and smoke), requiring ventilation air. An open chimney promotes infiltration (i.e. natural ventilation) because of the negative pressure change induced by the buoyant, warmer air leaving through the chimney. The warm air is replaced by heavier, cold air.

Ventilation in a structure is also needed for removing water vapour, produced by respiration, burning, and cooking, and for removing odours, e.g., from a toilet or kitchen. If water vapour is permitted to accumulate, it may damage the structure, insulation, or finishes. When operating, an air conditioner usually removes excess moisture from the air. A dehumidifier may also be appropriate for removing airborne moisture.

3. *Найдите пары слов, имеющих сходное значение.*

pollution	suitable
to ventilate	to expel
appropriate	to air
to remove	contamination
measure	unit

4. *Подберите слова, имеющие противоположное значение со следующими словами и словосочетаниями.*

to heat
to clean
to reduce
inside
to allow
to humidify

5. *Образуйте имена существительные от следующих слов.*

to teat	moist
to ventilate	to move
to filtrate	to measure
to circulate	to sleep
to contaminate	humid
to combust	to press

6. *Найдите в тексте и переведите на русский язык:*

a) существительные, которые обозначают названия химических веществ;
b) аббревиатуры и их значения;
c) единицы измерения кратности воздухообмена.

7. *Найдите в тексте и переведите на русский язык предложения, содержащие причастия.*

8. *Определите, соответствуют ли следующие предложения содержанию текста. Обоснуйте свой ответ. Используйте следующие выражения: I can't agree with this, it's false, that may be true, but…, on the contrary, vice versa, I suppose it's true, that's right, I entirely agree with this statement.*

1. Air transfer is the movement of air between indoor spaces.
2. Scrubbing provides ventilation by cleaning and recirculating a proportion of the air inside a building.
3. The ventilation rate for residential buildings is based on a per person or per unit floor area basis.
4. Air conditioners remove water vapour from the air.
5. A dehumidifier is used to make the air less dry.

9. *Ответьте на вопросы:*

1. What is ventilation?
2. What types of pollutants have to be expelled from buildings?
3. What is called “transfer air”?
4. How can air movements into buildings occur?
5. How does scrubbing provide ventilation air?
6. Where and why is ventilation needed?
7. How does ventilation occur in CII buildings?
8. What units are used to express ventilation rate for buildings of different functions?
9. What measures are necessary to undertake for improving indoor air quality?
10. Why is ventilation important?

10. *Дополните приведенный ниже план текста.*

1. The definition of ventilation.
2. Types of contaminants and their influence on people:
a) … ;
b) airborne pollutants (…, VOCs).
3. The way ventilation occurs
    a) in CII buildings;
    b) …
4. …
    a) for CII buildings;
    b) …
5. Measures to improve indoor air quality.
6. The importance of ventilation.

11. *Перескажите текст на английском языке, используя план упражнения 10.*

12. *Прочтите текст, при необходимости воспользуйтесь словарем. Ответьте на вопросы:*

1. What does the term "indoor air quality" mean?
2. What influences air quality?
3. What methods are used to improve indoor air quality?
4. How is indoor air quality determined?

Indoor Air Quality

Indoor air quality (IAQ) is a term which refers to the air quality within and around buildings and structures, especially as it relates to the health and comfort of occupants.

IAQ can be affected by gases (including carbon monoxide, radon, volatile organic compounds), particulates, allergens, microbial contaminants (mould, bacteria) or any mass or energy stressor that can induce adverse health conditions and diseases.

Source control, filtration and the use of ventilation to dilute contaminants are the primary methods for improving indoor air quality in most buildings.

Determination of IAQ involves the collection of air samples, monitoring human exposure to pollutants, collection of samples on building surfaces and computer modelling of air flow inside buildings. These investigations can lead to the understanding of the sources of the contaminants and ultimately to strategies for removing unwanted elements from the air.

The "green design" movement in the commercial and residential HVAC industry emphasizes paying attention to the issue of indoor air quality throughout the design and construction stages of a building life cycle.

One technique to reduce energy consumption while maintaining adequate air quality is demand controlled ventilation. Instead of setting throughput at a fixed air replacement rate, carbon dioxide sensors are used to control the rate dynamically, based on the emissions of actual building occupants.

One of the ways to ensure healthy indoor air is to provide frequent turnover of interior air by replacement with outside air. In some countries such as the UK, for example, classrooms are required to have 2.5 outdoor air changes per hour. In halls, gym, dining, and physiotherapy spaces, the ventilation should be sufficient to limit carbon dioxide to 1,500 ppm. In the USA, ventilation in classrooms is based on the amount of outdoor air per occupant, not air changes per hour. Dilution of indoor pollutants with outdoor air is effective to the extent that outdoor air is free of harmful pollutants.

The use of air filters can trap some of the air pollutants. Air filters are used to reduce the amount of dust that reaches the wet coils. Dust can serve as food to grow molds on the wet coils and ducts and can reduce the efficiency of the coils.

13. *Прореферируйте текст, используя клише приложения 1.*

Text 13

1. *Найдите русские эквиваленты английских слов.*

1. airborne	a. обработка воздуха; перемещение воздуха; кондиционирование
2. acceptable	b. прямое нагнетание, поступление
3. indoor air quality	c. передвигать(ся) по кругу
4. air handling	d. загрязняющее вещество
5. unit	e. переносимый по воздуху
6. direct injection	f. экономайзер со стороны поступления воздуха
7. exhaust fan	g. устройство, установка, прибор
8. air flow rate	h. качество воздуха внутри помещения
9. contaminant	i. поддерживать, удерживать, сохранять
10. dilution	j. вытяжной вентилятор, вытяжка
11. to circulate	k. приемлемый; допустимый; удовлетворительный
12. wind driven ventilation	l. клапан, заслонка
13. stack	m. адаптивная система вентиляции
14. air-side economizer	n. вентиляционная труба
15. damper	o. расход воздуха
16. demand controlled ventilation	p. разбавление, разжижение
17. mechanical / forced ventilation	q. естественная вентиляция
18. natural ventilation	r. ветровая вентиляция
19. to maintain	s. искусственная (механическая) вентиляция

2. *Прочитайте и переведите текст.*

TYPES OF VENTILATION

Ventilation is required so that the human occupants in buildings are provided with fresh air. The purpose is to provide oxygen and dilute other gases such as CO_2 and human odours. Ventilating is the process of “changing” or replacing air in any space to control temperature or remove moisture, odours, smoke, heat, dust and airborne bacteria. Ventilation includes both the exchange of air to the outside and circulation of air within the building. It is one of the most important factors for maintaining acceptable indoor air quality in buildings. Methods for ventilating a building may be divided into mechanical / forced and natural types. Ventilation is used to remove unpleasant smells and excessive moisture, introduce outside air, and to keep interior building air circulating, to prevent stagnation of the interior air.

Mechanical or forced ventilation occurs through an air handling unit or direct injection into a space by a fan. An exhaust fan can enhance infiltration or natural ventilation, thus increasing the ventilation air flow rate.

Mechanical or forced ventilation is used to control indoor air quality. Excess humidity, odours, and contaminants can often be controlled via dilution or replacement with outside air. However, in humid climates much energy is required to remove excess moisture from ventilation air.

Kitchens and bathrooms typically have mechanical exhaust to control odours and sometimes humidity.

Ceiling fans and table/floor fans circulate air within a room for the purpose of reducing the perceived temperature because of evaporation of perspiration on the skin of the occupants. Because hot air rises, ceiling fans may be used to keep a room warmer in the winter by circulating the warm stratified air from the ceiling to the floor. Ceiling fans do not provide outside air supply.

Natural ventilation occurs when the inside air is changed with outdoor air without using fans or other mechanical systems. Most often natural ventilation is supplied through windows but it can also be achieved by temperature and pressure differences between spaces. Open windows or vents are not a good choice for ventilating a basement or other below ground structures. Allowing outside air into a cooler space below ground can cause problems with humidity and condensation. Natural ventilation is the process of supplying and removing air through indoor space by natural means. There are two types of natural ventilation in buildings: wind driven ventilation and stack ventilation.

These systems use very little energy but care must be taken to ensure the occupants' comfort. In warm or humid months maintaining thermal comfort via natural ventilation can not be possible that's why conventional air conditioning systems are used as backups. Air-side economizers perform the same function as natural ventilation, but they use mechanical systems: fans, ducts, dampers, and control systems to introduce and distribute cool outdoor air.

Demand controlled ventilation (DCV) makes it possible to maintain proper ventilation and improve air quality while saving energy. Demand-controlled ventilation adjusts outside ventilation air based on the number of occupants and the ventilation demands that those occupants create. DCV is part of a building's ventilation system control strategy. It may include hardware, software, sensors and control strategy and is an integral part of a building's ventilation design. Large assembly spaces such as gymnasiums, auditoriums, lecture halls, conference rooms, churches, and theaters are good candidates for DCV. These spaces are designed for large numbers of people with high outside air requirements. DCV is a ventilation control strategy that provides just the right amount of outside air that is needed by the occupants. Active control of the ventilation system can provide the opportunity to control indoor air quality.

Infiltration is separate from ventilation, but is often used to provide ventilation air.

3. *Найдите в тексте английские эквиваленты следующих словосочетаний.*

Воздух в помещении, устранять неприятные запахи, чрезмерная влажность, испарение, потоотделение, запасной вариант, обеспечивать комфорт, устройство регулирования движения воздуха, аппарат для кондиционирования воздуха, датчик, наружный воздух, экономить энергию, жильцы, контролировать качество воздуха.

4. *Подберите определения к приведённым слева словам.*

1. bacteria	a) a quantity representing the amount of water vapour in the atmosphere
2. odour	b) very small organisms causing diseases
3. humidity	c) fine, dry powder consisting of tiny particles of earth or waste matter lying on the ground or on surfaces or carried in the air
4. dust	d) a distinctive smell, especially an unpleasant one

5. *Найдите пары слов, имеющих сходное значение.*

via	correct
space	to take place
proper	room
to improve	by means of
to occur	to make better

6. *Закончите предложения в соответствии с содержанием текста.*

1. Ventilation includes ….
2. Methods for ventilating a building may be divided into ….
3. Ventilation is used ….
4. Mechanical or forced ventilation occurs ….
5. …. are used to control odours and humidity, …. are used to reduce the perceived temperature.
6. Natural ventilation is supplied ….
7. There are two types of natural ventilation in buildings: ….
8. DCV makes it possible ….

7. *Ответьте на вопросы.*

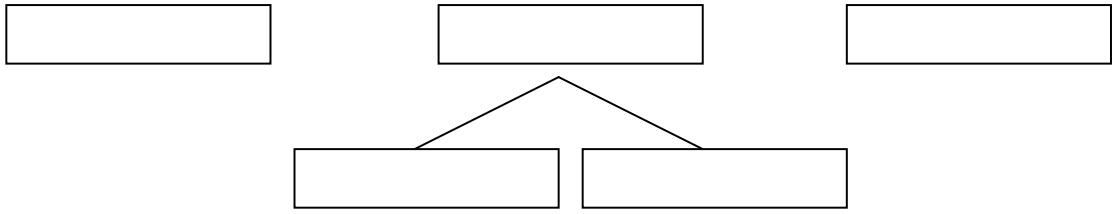
1. What is ventilation?
2. What is ventilation aimed at?
3. What types of ventilation do you know?

4. What is the difference between natural and mechanical systems of ventilation?

5. What spaces is demand controlled ventilation meant for? How does it operate?

8. *Заполните таблицу в соответствии с содержанием текста.*

Types of Ventilation



9. *Перескажите текст на английском языке, используя таблицу упражнения 8.*

10. *a) Переведите следующие слова и словосочетания на русский язык, при необходимости воспользуйтесь словарем:* a fume hood, hazardous, exposure to smth, epoxy coated mild steel, to feed back into, a counter-flow heat exchanger, inbound air flow, outbound air flow, energy recovery ventilators, a stand-alone device.

b) Прочтите текст и перечислите вопросы, освещаемые в нем.

Ventilation Equipment

A fume hood (a fume cupboard) is a large scientific device used in chemistry laboratories and designed to limit people's exposure to hazardous, toxic and unpleasant fumes. Fume hoods were originally manufactured from timber, but now epoxy coated mild steel is the main construction material fume hoods are made of. There are two main types of this unit, ducted and recirculating ones. The principle is the same for both types: air is drawn in from the front (open) side of the cabinet by a fan, and either expelled outside the building or made safe through filtration and fed back into the room. Recirculating fume hoods are used where the design of a building does not permit the fitting of external ductwork, these units generally have a fan mounted on the top (soffit) of the hood, or beneath the worktop. Air is sucked through the front opening of the hood and through a filter, before passing through the fan and being fed back into the workplace.

Heat recovery ventilation (also known as a heat exchanger, air exchanger or air-to-air exchanger) is a ventilation system that employs a counter-flow heat exchanger between the inbound and outbound air flow. HRV provide fresh air and improved climate control, while also saving energy by reducing the heating (or cooling) requirements.

Energy recovery ventilators (ERVs) are closely related; however ERVs also transfer the humidity level of the exhaust air to the intake air.

HRVs and ERVs can be stand-alone devices that operate independently, or they can be built-in, or added to existing HVAC systems. For a small building in which nearly every room has an exterior wall, the HRV/ERV device can be small and provide ventilation for a single room. A larger building would require either many small units, or a large central unit. The only requirements for the building are an air supply, either direct from an exterior wall or ducted to one, and an energy supply for air circulation, such as wind energy or electricity which is necessary for a fan. When used with central HVAC systems, the system is of the forced-air type.

c) Ответьте на вопросы:

1. What types of ventilation equipment do you know? What are they used for?
2. What is the difference between them?
3. What features do they have in common?

Text 14

1. *Найдите русские эквиваленты английских слов.*

1. enclosure	a. равновесие, баланс
2. HVAC design engineer	b. средний
3. heat conduction	c. огороженное пространство
4. evaporative heat loss	d. воздушные течения, потоки
5. equilibrium	e. потеря тепла при испарении
6. mean	f. термический стресс, тепловой стресс
7. velocity	g. инженер по отоплению, вентиляции и кондиционированию воздуха
8. air movement	h. скорость; быстрота
9. insulating clothing	i. сквозняк
10. thermal stress	j. изолирующая спецодежда
11. operative temperature	k. температура воздуха по сухому термометру
12. air dry-bulb temperature	l. расчётная комфортная температура (с учётом рационального и конвективного теплообмена)
13. draught	m. теплопроводность
14. radiant temperature	n. (эквивалентная) температура излучения

2. *Прочитайте и переведите текст.*

THERMAL COMFORT

Human thermal comfort is defined as the state of mind that expresses satisfaction with the surrounding environment. Maintaining thermal comfort for oc-

cupants of buildings or other enclosures is one of the important goals of HVAC design engineers.

Thermal comfort is affected by heat conduction, convection, radiation, and evaporative heat loss. Thermal comfort is maintained when the heat generated by human metabolism is allowed to dissipate, thus maintaining thermal equilibrium with the surroundings. Any heat gain or loss beyond this generates the sensation of discomfort. It has been long recognized that the sensation of feeling hot or cold is not just dependent on air temperature alone.

Factors determining thermal comfort include: air temperature, mean radiant temperature, air movement / velocity, relative humidity, insulating clothing, activity levels.

The concept of thermal comfort is closely related to thermal stress. This attempts to predict the impact of solar radiation, air movement, and humidity for military personnel undergoing training exercises or athletes during competitive events.

The ideal standard for thermal comfort can be defined by the operative temperature. This is the average of the air dry-bulb temperature and of the mean radiant temperature at the given place in a room. In addition, there should be low air velocities and no draughts, little variation in the radiant temperatures from different directions in the room, humidity within a comfortable range, and air temperatures at a height of 0.1 m above the floor should not be more than 2 °C lower than the temperature at the place of the occupants' head. The temperatures should also not change too rapidly across either space or time.

In addition to environmental conditions, thermal comfort depends on the clothing and activity level of a person. The amount of clothing is measured against a standard amount that is roughly equivalent to a typical business suit, shirt, and undergarments. Activity level is compared to being seated quietly, such as in a classroom.

3. *Найдите пары слов, имеющих сходное значение.*

equilibrium	equal
surroundings	to acknowledge
equivalent	balance
to change	idea
to recognize	to alter
concept	environment

4. *Найдите соответствующие определения к приведённым слева словам.*

1. operative temperature	a) the temperature of air measured by a thermometer freely exposed to the air but shielded from radiation and moisture

2. radiant temperature	b) a uniform temperature of a radiantly black enclosure in which an occupant would exchange the same amount of heat by radiation plus convection as in the actual nonuniform environment
3. temperature	c) a concept arising from the fact that the net exchange of radiant energy between two objects is approximately proportional to their temperature difference multiplied by their ability to emit and absorb heat
4. dry-bulb temperature	d) the degree or intensity of heat present in a substance or object, esp. as expressed according to a comparative scale and shown by a thermometer

5. *Определите, соответствуют ли следующие предложения содержанию текста. Обоснуйте свой ответ. Используйте следующие выражения: I can't agree with this, it's false, that may be true, but…, on the contrary, vice versa, I suppose it's true, that's right, I entirely agree with this statement.*

1. Maintaining thermal comfort for occupants of buildings or other enclosures is one of the important goals of mechanical engineers.
2. Thermal comfort maintains thermal equilibrium with the surroundings.
3. The sensation of feeling hot or cold is dependent on air temperature, air movement and its velocity, relative humidity, insulating clothing, activity levels.
4. The temperatures should change very rapidly across space and time. It helps to harden the body and spirit.
5. The ideal standard for thermal comfort can be defined by humidity.
6. The amount of clothing is roughly equivalent to a typical fur coat, skirt, and tights.
7. Activity level is compared to running quickly or jumping in a classroom.

6. *Ответьте на вопросы.*

1. What affects thermal comfort?
2. What factors determine thermal comfort?
3. Can you give examples of thermal stress?
4. What is operative temperature? How is it calculated?
5. People feel much better if there are draughts in a room and if the air at their head is hotter than the air temperature at their feet, don’t they?
6. What are the main characteristics of thermal comfort? How are they determined?

7. *Составьте план текста для пересказа.*

8. *Перескажите текст на английском языке, используя план.*

9. *Прочтите текст, при необходимости воспользуйтесь словарем. Ответьте на вопросы:*

1. What is called room air distribution?

2. How is HVAC airflow classified?

3. What is the difference between mixing and displacement ventilation systems?

4. What is underfloor air distribution?

Room Air Distribution

Characterizing how air is introduced to, flows through, and is removed from spaces is called room air distribution. HVAC airflow in spaces generally can be classified by two different types: mixing (or dilution) and displacement.

Mixing systems generally supply air in a manner that the air in the entire room is fully mixed. In cooling mode, the cool supply air, typically around 55°F (saturated) at design conditions, exits an outlet at high velocity, inducing room air to provide mixing and temperature equalization. Because the entire room air is mixed, temperature variations are small while the contaminant concentration is fairly uniform throughout the entire room. To enhance the mixing, diffusers are normally used as the air outlets. Most often, the air outlets and inlets are placed in the ceiling, via a ceiling plenum; this arrangement is known as conventional room air distribution.

Displacement ventilation systems supply air directly to the occupied zone. The air is supplied at low velocities to cause minimal induction and mixing. This system is used for the cooling and ventilation of large high spaces, such as auditoria and atria, where energy may be saved if only the occupied zone is treated rather than trying to control the conditions in the entire space. Displacement room airflow presents an opportunity to improve both the thermal comfort and indoor air quality (IAQ) of the occupied space. The displacement outlets are usually located at or near the floor. The system utilizes buoyancy forces (generated by heat sources such as people, lighting, computers, electrical equipment, etc.) in a room to move contaminants and heat from the occupied zone to the return or exhaust grilles above. By doing so, the air quality in the occupied zone is generally superior to that achieved with mixing room air distribution.

If air mixing is encouraged at the floor level, this type of floor-to-ceiling room air distribution is known as underfloor air distribution (UFAD); if mixing is discouraged, it is displacement.

10. *Прореферируйте текст, используя клише приложения 1.*

Итоговые задания к разделу 3

1. ***Назовите английские эквиваленты следующих слов и словосочетаний:***

Загрязняющее вещество, освежитель воздуха, увлажнять, котёл, вдыхаемые взвешенные частицы, жильцы, воздухоотводная труба, качество воздуха внутри помещения, переносимый по воздуху, установка, вытяжка, вентиляционная труба, естественная вентиляция, искусственная вентиляция, газоуловитель, автономное устройство, тепловой комфорт, воздухораспределение.

2. ***Выберите правильный вариант ответа.***

1. The intentional movement of air from outside a building to the inside is called ….
a) heating b) cooling c) ventilation d) humidity

2. … is very effective for improving indoor air quality.
a) indoor tobacco smoking b) the use of air fresheners
c) the use of air contaminants d) banning all the above

3. The ventilation rate for residential buildings is expressed on ….
a) a per person basis b) on a per unit floor area basis
c) a temperature basis d) the basis of air changes per hour

4. Indoor air quality is connected with ….
a) moisture content in the air b) the health and comfort of occupants
c) the quantity of contaminants in the air outside a building
d) all the above

5. Mechanical ventilation is used to control ….
a) evaporation b) indoor temperature
c) indoor air quality d) humidity

6. According to the requirements for thermal comfort, the temperature at a height of 0.1m above the floor ….
a) should be 2 °C lower than the temperature at the place of the occupants' head
b) should be 2 °C higher than the temperature at the place of the occupants' head
c) should not be more than 2 °C higher than the temperature at the place of the occupants' head
d) should not be more than 2 °C lower than the temperature at the place of the occupants' head

3. ***На основе материалов раздела 3 подготовьте на английском языке***

а) сообщение на тему «Ventilation, its types, ventilation equipment»;

б) сообщение на тему «Thermal comfort and indoor air quality».

4. ***Подготовьте проекты по следующим темам:***

1. The design of modern ventilation systems.
2. Air ventilation quality requirements.
3. Access, spatial, visual, aural and thermal comfort needs of the occupants.
4. Sketch and describe the arrangements for natural and mechanical ventilation of buildings. Consider two applications for each system.
5. Describe the appropriate combination of natural and mechanical ventilation for the following: a residence, a basement, a boiler room, an entertainment theatre.

Unit 4. Air-Conditioning

Text 15

1. *Найдите русские эквиваленты английских слов.*

1. air conditioner	a. влажность, сырость
2. contraption	b. установка
3. to consume	c. изобретение
4. to cool	d. снижать, уменьшать
5. humidity	e. регулируемый
6. installation	f. кондиционер воздуха
7. to replace	g. сушить, иссушать, обжигать
8. coolant	h. охлаждать
9. ammonia	i. ослаблять, понижать
10. to lower	j. изобретение, устройство, приспособление
11. adjustable	k. аммиак
12. to reduce	l. заменять, замещать
13. to sear	m. охлаждающее вещество
14. invention	n. потреблять, расходовать
15. to treat	o. обрабатывать, подвергать воздействию

2. *Прочитайте и переведите текст.*

THE HISTORY OF AIR CONDITIONING

The idea of air conditioning started before a machine was created to produce the cooling effect desired. The first attempt at building an air conditioner was made by Dr. John Gorrie (1803-1855), an American physician, in Apalachicola, Florida. During his practice there in the 1830s, Dr. Gorrie created an ice-making machine that essentially blew air over a bucket of ice for cooling hospital rooms of patients suffering from malaria and yellow fever.

In 1881, when President James Garfield was dying, naval engineers constructed a box-like structure containing cloths saturated with melted ice water, where a fan blew hot air overhead. This contraption was able to lower temperature in a room by 20 degrees Fahrenheit but consumed half a million pounds of ice in two months' time.

A close ancestor to the modern air conditioner units was first made in 1902 by an American engineer Willis Carrier. The machine at that time was called the "Apparatus for Treating Air" and was built for the Sackett-Wilhelms Lithographing and Publishing Co. in Brooklyn, New York. Chilled coils were used in the machine to cool air and lower humidity to 55%, although the apparatus was precise enough and the humidity level desired was adjustable.

After the invention by Carrier, air conditioners began to bloom. They first appeared in industrial buildings such as printing plants, textile mills, pharmaceutical manufacturers, and a few hospitals. The first air-conditioned home was that of Charles Gates in Minneapolis in 1914. However, during the first wave of their installation, Carrier's air conditioning units were large, expensive, and dangerous due to the toxic ammonia that was used as a coolant.

In 1922 Carrier had two breakthroughs - he replaced the ammonia with the benign coolant dielene and added a central compressor to reduce the size of the unit. The next advance was when Carrier sold his invention to movie-theater operators in 1925 at the Rivoli on Broadway in New York City. Soon air conditioners were installed in office buildings, department stores and railroad cars. The United States House of Representatives had air conditioners installed in 1928, with the Senate, White House and Supreme Court following suit in the years after. After World War II, window air conditioners appeared.

Today, air conditioners have been said to be a partial cause for the changes in the South, and for most of us who have experienced its cooling benefits in times of searing heat waves, it is an invention that is hard to live without.

3. *Найдите в тексте английские эквиваленты следующих слов и словосочетаний.*

Снизить влажность до 55%, снизить температуру на 20 градусов по Фаренгейту, первая попытка создания кондиционера, заменить аммиак другой охлаждающей жидкостью, причина изменений.

4. *Найдите в тексте и переведите на русский язык предложения, содержащие глаголы в форме страдательного залога.*

5. *Найдите пары слов, имеющих сходное значение.*

contraption	adaptable
to construct	finding
to consume	to come about
invention	device
adjustable	to use
to appear	to create
to put in	to install

6. *Подберите определения к приведённым слева словам.*

1. coolant	a) an appliance, system, or mechanism designed to extract heat from an area via a refrigeration cycle
2. ammonia	b) the amount of water vapour in the air
3. humidity	c) a fluid which flows through a device in order to prevent its overheating, transferring the heat produced by the device to other devices that utilize or dissipate it
4. air conditioner	d) a compound with the formula NH3. It is normally encountered as a gas with a characteristic pungent odour

7. *Определите, какие утверждения не соответствуют содержанию текста. Дайте обоснование своего ответа. Используйте следующие выражения: I can't agree with this, it's false, that may be true, but…, on the contrary, vice versa, I suppose it's true, that's right, I entirely agree with this statement.*

1. It is Dr. Gorrie who was the first to build an air conditioner to cool hospital rooms.
2. The apparatus for treating air was constructed by a Frenchman.
3. Chilled coils were used in the apparatus for treating air to increase humidity by 45 %.
4. First air conditioners were small, cheap and safe.
5. The first air-conditioned home was Bill Gates's.
6. Air conditioners were first installed at schools.
7. In 1922 the size of air conditioning units was reduced due to a central compressor and conditioners became safer.
8. Window air conditioners appeared in 1928.
9. People can easily do without air conditioners.

8. *Спросите и дайте ответы на поставленные вопросы:*

1. when, where and by whom the first attempt at building an air conditioner was made;
2. what advantages and disadvantages the first air conditioners had;
3. if Dr. Gorrie constructed a prototype of the modern conditioner;
4. why Willis Carrier replaced the ammonia with another coolant and added a compressor;
5. how and where people use air conditioning units;
6. why air conditioners are the invention which is hard to live without.

9. *Заполните таблицу фактами из текста.*

Date	Inventors' names	Inventions	Aims of using the invention
…	…	…	…

10. *Перескажите текст, используя таблицу и следующие вводные фразы: As you can see from the title the text touches upon…, according to the text…, as far as I can understand…, if to put all the facts in the chronological order you'll see that….*

11. *Прочтите текст, при необходимости воспользуйтесь словарем. Ответьте на вопросы:*

1. What is an air-conditioner?
2. What do air-conditioners use chemicals for?
3. What are the differences and similarities between refrigerators and air conditioners?
4. What parts do all air-conditioners have? What are their functions?
5. Can you describe the way the working fluid goes through an air-conditioner?

Air-Conditioner

An air-conditioner is an appliance, system, or mechanism designed to extract heat from an area via a refrigeration cycle. In construction, a complete system of heating, ventilation, and air-conditioning is referred to as "HVAC." Its purpose, in a building or an automobile, is to provide comfort during either hot or cold weather.

Air-conditioners and refrigerators work the same way. Instead of cooling just the small, insulated space inside of a refrigerator, an air-conditioner cools a room, a whole house, or an entire business.

Air-conditioners use chemicals that easily convert from a gas to a liquid and back again. This chemical is used to transfer heat from the air inside of a home to the outside air.

The machine has three main parts. They are a compressor, a condenser and an evaporator. The compressor and condenser are usually located on the outside air part of the air conditioner. The evaporator is located on the inside

of the house, sometimes as a part of a furnace. That's the part that heats your house.

The working fluid arrives at the compressor as a cool, low-pressure gas. The compressor squeezes the fluid. This packs the molecule of the fluid closer together. The closer the molecules are together, the higher the energy and the temperature of the fluid are. Then the working fluid leaves the compressor as a hot, high pressure gas and flows into the condenser. The fins of the air-conditioner act just like a radiator in a car and help the heat go away, or dissipate, more quickly. When the working fluid leaves the condenser, its temperature is much cooler and it changes from a gas to a liquid under high pressure. The liquid goes into the evaporator through a very tiny, narrow hole. On the other side, the liquid's pressure drops and it begins to evaporate into a gas.

As the liquid changes to gas and evaporates, it extracts heat from the air around it. The heat in the air is needed to separate the molecules of the fluid from a liquid to a gas.

The evaporator also has metal fins which help to exchange the thermal energy with the surrounding air.

By the time the working fluid leaves the evaporator, it is a cool, low pressure gas. It then returns to the compressor to begin its cycle all over again.

Connected to the evaporator is a fan that circulates the air inside the house to blow across the evaporator fins. Hot air is lighter than cold air, so the hot air in the room rises to the top of a room.

There is a vent there where air is sucked into the air-conditioner and goes down the ducts. The hot air is used to cool the gas in the evaporator. As the heat is removed from the air, the air is cooled. It is then blown into the house through other ducts usually at the floor level.

This continues over and over until the room reaches the temperature you need. The thermostat senses that the temperature has reached the right setting and turns off the air conditioner. As the room warms up, the thermostat turns the air conditioner back on until the room reaches the temperature.

12. *Прореферируйте текст, используя клише приложения 1.*

Text 16

1. *Найдите русские эквиваленты английских слов.*

1. comfort	a. фильтр
2. comfortable	b. замысел, план, проект
3. process	c. процесс
4. specification	d. скорость
5. design	e. место жительства
6. filter	f. детализация
7. diffusion	g. кондиционирование воздуха
8. uniform temperature	h. действовать, поступать

9. residence	i. уютный, удобный
10. submarine	j. обеспечивать
11. to ensure	k. отдых, комфорт
12. apparatus	l. подводная лодка
13. velocity	m. распространение
14. to distribute	n. прибор, инструмент
15. to act	o. одинаковая температура
16. air-conditioning	p. распределять

2. *Прочитайте и переведите текст.*

AIR-CONDITIONING

Air-conditioning is the ensuring of purity and humidity throughout the year to maintain healthy and comfortable atmosphere in a building.

Air-conditioning may be divided into two main branches one of which is connected with the processing of materials in industry; the other with human comfort. It has been found that there is an optimum condition of temperature and humidity at which the processing of different materials may be carried out with the minimum of wastage and the maximum quantity of goods of specification quality. The system is therefore designed to produce air of predetermined temperature and moisture content despite all external influences. Such air is filtered free of foreign materials.

Air-conditioning for human comfort may also be divided into two main sections – winter and summer. The systems installed in office buildings can provide control during both seasons. Complete air-conditioning systems provide the following services:

Firstly, they provide air filtration both in winter and summer and remove dust.

Secondly, they provide circulation of the air at low velocity and with proper diffusion to prevent draughts and maintain a uniform temperature and humidity at all parts of the inhabited space.

Thirdly, they supply fresh air from the outside atmosphere.

Fourthly, they heat the air in winter.

Fifthly, they cool the inside air in summer below the level of the outside atmosphere.

Sixthly, they humidify the air in winter to a relative humidity of at least 20-25 per cent.

Seventhly, they dehumidify the air in summer to a relative humidity not exceeding 55 per cent.

The basic pieces of air-conditioning equipment are the filters; preheat coils, humidifiers, reheating coils, additional cooling coils, fans and controls. Since the air purity must be controlled, some sort of filtering must be provided at the entrance of the air-conditioning system.

Air-conditioning for human comfort is used in both large and small spaces, such as theatres, office buildings, department stores, residences, airplanes, railways, cars and submarines.

People feel comfortable when they are neither too cold, nor too warm and when the air around them is not too dry, damp, stuffy or dusty. To bring about these desirable conditions heating or air conditioning apparatus must be able to maintain certain conditions inside the house, whatever the conditions outside may be.

To avoid stuffiness, the air should be given a certain amount of motion. Under winter conditions it must be sufficient enough to distribute heat uniformly throughout the rooms. It must not be too cold at the floor, and it must not be too hot at the ceiling. Warm-air registers bring heated air into a room with a certain velocity which imparts movement to the inside air. An outlet for this air should be provided in order to have good ventilation. In summer it is necessary to provide much greater air motion to change the air in a room from three to ten times per hour. Sometimes a fan is placed in the attic to blow the warm air out and bring the cooler night air through open windows. When it is done, the air in the house can be expected to be changed completely every two or three minutes.

3. *Найдите в тексте английские эквиваленты следующих слов и словосочетаний.*

Товары со спецификацией качества, заданная температура, содержание влаги, посторонние материалы, удалять пыль, предотвращать, офисные здания, жилое пространство, нагревательная катушка, чистота воздуха, фильтрующее устройство, осуществлять, выход для воздуха.

4. *Переведите предложения, обращая внимание на разные функции инфинитива и инфинитивные конструкции.*

1. Air filtration in winter and summer is necessary to remove dust.
2. To avoid stuffiness, the air should be given a certain amount of motion.
3. Under winter conditions there must be sufficient motion to distribute the heat uniformly throughout the rooms.
4. An outlet for this air should be provided in order to have good ventilation.
5. In summer it is necessary to provide much greater air motion to change the air in a room from three to ten times per hour.
6. Sometimes a fan is placed in the attic to blow the warm air out and bring the cooler night air through open windows.
7. If there is a fan in the attic, the air in the house is changed completely every two or three hours.

5. *Закончите следующие предложения в соответствии с содержанием текста.*

1. Air-conditioning is ….
2. Air-conditioning may be divided into two main branches: … .
3. Conditioning for human comfort may also be divided into two main sections ….
4. The basic pieces of air-conditioning equipment are ….
5. Air-conditioning for human comfort is used ….

6. *Определите, соответствуют ли следующие предложения содержанию текста. Обоснуйте свой ответ. Используйте следующие выражения: I can't agree with this, it's false, that may be true, but…, on the contrary, vice versa, I suppose it's true, that's right, I entirely agree with this statement.*

1. Air-conditioning is the ensuring of purity and humidity throughout the year to maintain healthy and comfortable atmosphere in a building.
2. Air-conditioning may be divided into five main sections.
3. Complete air-conditioning provides seven services.
4. The control of air purity can not be achieved.
5. As a minimum control some sort of filtering must be done at the entrance of the air-conditioning system.
6. To avoid stuffiness, the air should be given a certain amount of odour.

7. *В соответствии с содержанием текста найдите правильные ответы на вопросы.*

1. When do air-conditioning systems installed in office buildings provide the control of air supply?
2. What is necessary to provide complete air-conditioning?
3. What is necessary for a minimum control of air purity?
4. When do people feel comfortable in a building?
5. What is necessary to avoid stuffiness in a building?
6. What is it necessary to do to change air every 2 or 3 minutes?

8. *Изложите краткое содержание текста на английском языке.*

9. *а) Переведите следующие слова и словосочетания на русский язык, при необходимости воспользуйтесь словарем:* to accumulate, ductwork, a clog, infestation, dust, debris, to switch off, to breathe in, built-in filters, to remove, to plug in, to insert, a screwdriver.

b) Прочтите текст.

How to Clean Ventilation Ducts

Cleaning your air ducts is important. It helps maintain your heating and air conditioning unit. Over time, dust can accumulate within your ductwork and can cause a clog. It can cause your unit to work much harder than it usually

would, which can lead to higher energy bills. In addition, the dust is blown all around your house, and you can experience some allergy related reactions to the excess dust. Under other circumstances - like a rodent or bug infestation - it is recommended that you consult a professional duct cleaning service. However, for simple dust removal, you can perform this task on your own.

You'll need the following things: a broom, a duct cleaning vacuum, screwdrivers.

Instructions

1. Turn off the heat and air unit by switching the thermostat control to the off position. This will ensure that no dust or debris blows out while you are cleaning.

2. Put on a face mask. This will help you from breathing in any dust from the ducts.

3. Remove the vent covers in the rooms where you want to clean the ducts using the screwdrivers. It is recommended that you clean each duct in all the rooms. Under most vent covers there is a vent hole, some have built-in filters. If you have the filters, you must be careful not to damage them while cleaning. Remove the filter out with a flat headed screwdriver and gently brush any built-up dust off of it. Replace each filter after vacuuming each vent.

4. Plug in the duct vacuum and attach all the hoses. The hose lengths can reach 10 to 20 feet. Attaching all the hose lengths together is your best bet as you can feed in as much hose as the vent will take.

5. Turn on the duct vacuum and slowly insert the hose down the duct.

6. Repeat the vacuuming for all of the ducts in every room. This is necessary to ensure that you are getting the maximum amount of removal for the entire length of your duct work.

7. Reattach your vent covers (filters first if there were any) and thoroughly vacuum the areas around the vent covers to make sure you didn't track any dust out while you were working.

c) Ответьте на вопросы:

1. Why is cleaning air ducts important?
2. Why is it necessary to put on a face mask when cleaning air ducts?
3. What instruments are used for cleaning air ducts?
4. When is it recommended that you consult a professional duct cleaning service?

Text 17

1. *Подберите русские эквиваленты к следующим английским словам и словосочетаниям.*

1. pipe	a. жилые дома
2. environment	b. тщательное регулирование
3. close control	c. отопление помещения
4. to provide	d. установки

5. supply of air	e. окружающая среда
6. removal of air	f. труба
7. contaminated air	g. обеспечивать
8. space heating	h. вывод воздуха
9. residential buildings	i. загрязненный воздух
10. installations	j. подача воздуха
11. humidity	k. увлажнять
12. purity	l. универсальные магазины
13. department stores	m. чистота
14. sound knowledge	n. влагопоглотитель; воздухоосушитель
15. excess heat	o. использование, употребление, утилизация
16. utilization	p. экономичный источник
17. fumes	q. коммерческие здания
18. hazardous to health	r. запахи, испарения
19. modern amenities	s. опасный для здоровья
20. economical source	t. современные удобства
21. commercial buildings	u. влажность
22. to humidify	v. избыточное тепло
23. dehumidifier	w. глубокие знания

2. *Прочтите следующие интернациональные слова и, основываясь на значениях слов русского языка, определите их значения.*

Modern, human, technology, comfort, residence, tendency, associate, special, natural.

3. *Прочитайте и переведите текст.*

ALL-YEAR CONDITIONING, VENTILATION, GAS SUPPLY

(1) Air-conditioning implies the control of temperature, humidity, purity and motion of the air in an enclosed space. In our modern world of science and highly developed technology air conditioning is of great importance for industrial processes and for human comfort.

(2) Air-conditioning for human comfort is employed in large and small installations, such as theatres, office buildings, department stores, residences, airplanes, railways, cars and submarines. According to their purpose air conditioning systems may be described as winter, summer and all-year systems.

(3) All year-conditioning systems must provide means for performing all the processes required for winter and summer air conditioning. The basic pieces of equipment are the filters, preheat coils, humidifiers, dehumidifiers, reheat coils, additional cooling coils, fans and controls.

(4) In order to establish the size and operation requirements of an air-conditioning system, the maximum probable heating and co-demands have to

be calculated. The maximum probable heating demand is usually for winter air conditioning and it involves heating and humidifying. The maximum probable cooling demand is generally for summer applications and requires cooling and dehumidifying. The inside design conditions depend upon the purpose for which air conditioning is used. Certain industrial process requirements and human comfort are the two major factors to be considered. With ever increasing tendency to use air-conditioning a building engineer must have good knowledge of the subject.

(5) As far as ventilation is concerned the purpose of ventilation is to carry away excess heat and odours. In buildings such as homes, the leakage of air through cracks on doors and windows is usually sufficient to meet this requirement. Although ventilation was formerly concerned with the supply of fresh air and the removal of hot and contaminated air from the space it is also associated with air cleaning.

(6) Industrial buildings often present special problems for ventilation. There are certain industrial processes that are accompanied by the production of airborn dust, fumes, toxic vapours and gases which are hazardous to the health of workers. Three types of ventilation are in use to control dangerous gases and dusts: exhaust systems, dilution systems and combination of both.

(7) Another indispensable part of modern amenities is gas supply. At the present time natural gas is put to large-scale economic use. The principal utilization of natural gas is as a clean, convenient, economical source of heat. In homes it is used for cooking, water heating, and refrigeration for food as well as for space heating. Nowadays most of buildings are heated by natural gas and the number of gas-supplied homes is increasing at a rate limited chiefly by the ability of steel industry to produce pipes through which the gas is transported. Natural gas supply is also used as a heat source in commercial establishments, for cooking in restaurants and bakeries, for heating and comfort cooling in stores, offices and other buildings.

4. *Укажите, к каким абзацам текста могут служить заголовками данные предложения. Расположите их согласно последовательности изложения.*

1. Gas supply as an important part of modern amenities.
2. Ventilation for industrial buildings.
3. The importance of air-conditioning for human comfort.
4. The basic parts of equipment for an all-year air-conditioning system.

5. *В соответствии с содержанием текста дополните незаконченные предложения одним из данных вариантов (a, b, c, d).*

1. Air-conditioning implies...

a) ... rapid loss of heat, b) ... the transmission of energy in the form of waves, c) ... provision for the expansion of the water, d) ... the control of temperature, humidity, purity and motion of the air.

2. The purpose of ventilation is...

a) ... to produce a desired temperature for maintaining comfort, b) ...to supply heat for cooking and space heating, c) ...to maintain air purity at an extremely high level, d) ...to carry away excess heat and odours.

3. The basic pieces of air-conditioning equipment are...

a) ... stokers, coal furnaces and boilers, b) ... filters, preheat coils, humidifiers, reheat coils, fans and controls, c) ... boilers and a system of pipes, d) ... systems of steel and copper pipes.

6. *Сгруппируйте следующие предложения по трем темам:*

A. Air-Conditioning
B. Gas Supply
C. Ventilation

1. Gas supply has come to be widely used. 2. In industrial buildings three types of ventilation are in use to control dangerous gases and dusts. 3. In such buildings as homes, the leakage of air through cracks in doors and windows is usually sufficient. 4. According to the purpose of usage, air-conditioning systems may be described as winter, summer and all-year ones. 5. The main utilization of natural gas is as a clean, convenient, economical source of heat. 6. Natural gas supply is used also as a heat source in commercial establishments. 7. Certain industrial process requirements and human comfort are the two major factors to be considered when designing air-conditioning systems. 8. Air-conditioning is meant for controlling the temperature, humidity, purity and motion of the air in an enclosed space.

7. *Определите, соответствуют ли следующие предложения содержанию текста. Обоснуйте свой ответ. Используйте следующие выражения: I can't agree with this, it's false, that may be true, but…, on the contrary, vice versa, I suppose it's true, that's right, I entirely agree with this statement.*

1. Air-conditioning implies the controlling of temperature, humidity, purity and motion of the air in an enclosed space.

2. According to their purpose, air-conditioning systems may be described only as winter systems.

3. All-year air-conditioning systems must provide means for performing all the processes required for winter and summer air-conditioning.

4. Industrial buildings often present special problems for heating.

5. At present natural gas is put into a large-scale economic use.

6. The principal utilization of natural gas is as a clean, convenient, economical source of heat.

8. *Изложите краткое содержание текста на английском языке.*

9. *Прочтите текст, при необходимости воспользуйтесь словарем. Ответьте на вопросы:*

1. What is the function of refrigeration air-conditioning equipment?
2. What is a dehumidifier?
3. What is the difference between an air-conditioner and a dehumidifier?
4. Where are dehumidifiers commonly used and why?

Humidity Control

Refrigeration air-conditioning equipment usually reduces the absolute humidity of the air processed by the system. The relatively cold (below the dew point) evaporator coil condenses water vapour from the processed air (much like an ice-cold drink will condense water on the outside of a glass), sending the water to a drain and removing water vapour from the cooled space and lowering the relative humidity in the room. Since humans perspire to provide natural cooling by the evaporation of perspiration from the skin, drier air (up to a point) improves the comfort provided. The comfort air-conditioner is designed to create a 40% to 60% relative humidity in the occupied space. In food-retailing establishments, large open chiller cabinets act as highly effective air dehumidifying units.

A specific type of air-conditioner that is used only for dehumidifying is called a dehumidifier. A dehumidifier is different from a regular air conditioner in that both the evaporator and condenser coils are placed in the same air path, and the entire unit is placed in the environment that is intended to be conditioned (in this case dehumidified), rather than requiring the condenser coil to be outdoors. Having the condenser coil in the same air path as the evaporator coil produces warm, dehumidified air. The evaporator (cold) coil is placed first in the air path, dehumidifying the air exactly as a regular air conditioner does. The air next passes over the condenser coil, rewarming the now dehumidified air. Having the condenser coil in the main air path rather than in a separate, outdoor air path (as with a regular air conditioner) results in two consequences: the output air is warm rather than cold, and the unit is able to be placed anywhere in the environment to be conditioned, without a need to have the condenser outdoors.

Unlike a regular air-conditioner, a dehumidifier will actually heat a room just as an electric heater that draws the same amount of power (watts) as the dehumidifier would. A regular air conditioner transfers energy out of the room by means of the condenser coil, which is outside the room (outdoors). Conversely, with a dehumidifier, no energy is transferred out of the thermodynamic system (room) because the air conditioning unit (dehumidifier) is entirely inside the room. Therefore all of the power consumed by the dehumidifier is energy that is input into the thermodynamic system (the room) and remains in the

room (as heat). In addition, if the condensed water has been removed from the room, the amount of heat needed to boil that water has been added to the room. This is the inverse of adding water to the room with an evaporative cooler.

Dehumidifiers are commonly used in cold, damp climates to prevent mold growth indoors, especially in basements. They are also used to protect sensitive equipment from the adverse effects of excessive humidity in tropical countries.

10. *Прореферируйте текст, используя клише приложения 1.*

Text 18

1. *Найдите русские эквиваленты английских слов.*

1. plumbing	a. увеличение тепла
2. economical installation	b. точная регулировка
3. reheater	c. площадь застекления
4. accurate control	d. водоизмерительные счетчики
5. commercial installation	e. текущие (эксплуатационные) расходы
6. small residence	f. время охлаждения
7. heat gain	g. проект с установкой оборудования в центре
8. glass area	h. устройство меньше заданного размера
9. pump	i. устройство кондиционирования воздуха
10. central core plan	j. водопроводное дело
11. air conditioning unit	k. насос
12. oversize unit	l. уровень комфорта
13. undersize unit	m. подогреватель
14. cooling period	n. небольшой жилой дом
15. comfort balance	o. устройство больше заданного размера
16. operating costs	p. заводская установка
17. water saving device	q. экономичная установка

2. *Прочтите следующие интернациональные слова и, основываясь на значениях слов русского языка, определите их значения.*

Economical, control, filter, adequate, accurate, commercial, residence, efficiently, efficiency, efficient, design, orientation, natural, utilization, structure, minimize, conditioning, limit.

3. *Прочитайте и переведите текст.*

CENTRAL AIR-CONDITIONING FOR SMALL RESIDENCES

When designing a small home that is to be air-conditioned, many factors must be considered to achieve economical installation and low operating costs.

A system controlling the temperature, humidity and filtering of the air is adequate for home conditioning.

Units with very accurate controls, like those ones used in industrial or large commercial installations are not required for small residences.

A house to be efficiently and economically air-conditioned should be designed so that the heat gain is as low as possible. This is achieved by proper orientation, location of glass areas, insulation and roof ventilation. Natural elements such as trees, planting and water areas should be utilized to provide shade and cooling.

For the sake of economy and efficiency in small houses the central core plan is often advised. The central service core has the following advantages:

1. Economical structure. 2. Grouped plumbing. 3. Efficient ductwork. 4. Flexibility of plan around core to utilize orientation.

The air-conditioning unit should be located in the center of the plan to minimize ductwork and insulation. Oversize units are as inefficient as undersized conditioning units. The proper unit that operates steadily in cool period surges will provide better results because humidity builds up and destroys the comfort balance during such surges. The ideal interior humidity is 50%.

The cost and availability of electricity and water should be obtained to estimate operating costs of equipment. If water supply is limited or expensive, conditioning systems with water saving devices are necessary.

4. *Ответьте на вопросы.*

1. What system is adequate for home conditioning?
2. How is heat gain achieved?
3. What are the advantages of the plan where air conditioning units are located in the centre?
4. What is the ideal interior humidity?
5. What is necessary to do if the supply of water is limited?

5. *Прочтите текст, при необходимости воспользуйтесь словарем. Ответьте на вопросы:*

1. What occurs when there is excess humidity in one's house?

2. What level of humidity is considered to be ideal?

3. What parts do dehumidifiers have? What are their functions?

Dehumidifier

When people complain about humidity, for the most part they're talking about relative humidity**.** Depending on temperature, air can hold a fixed

amount of water vapour; relative humidity is the ratio of actual vapour in the air to this fixed amount. For example, at a temperature of 68 degrees Fahrenheit (20 degrees Celsius), one cubic meter (35 cubic feet) of air can hold about 18 grams (.6 ounces) of water. This would be a state of saturation, otherwise known as 100 per cent relative humidity.

When humidity seeps into your home, it can make rooms stuffy and perhaps even smell musty. Beyond these superficial discomforts, too much humidity can have some more serious disadvantages, too. An overly humid home can lose its structural integrity, attract pests like silverfish and centipedes, and even make you sick.

In an average home in which the temperature is 68 degrees Fahrenheit, the relative humidity should ideally be between 30 and 50 per cent. If you're struggling to reach that range, a dehumidifier may come in handy. Dehumidifiers remove excess moisture from the air, improving the comfort and health of your home.

Most dehumidifiers can be broken down into five component parts: a fan compressor (it compresses and expands a refrigerant gas like freon to cool the dehumidifier's coils.); a reheater (it captures and collects heat that the cooling process generates.); compressor cooling coils; a reservoir.

How do all these parts fit together to pull moisture from the air? It's fairly simple and very effective:

1. A fan collects air from the surrounding area and pulls it into the dehumidifier.
2. As the air passes through, it comes into contact with the dehumidifier's cooled coils. These coils use condensation to pull moisture from the air. The collected moisture remains on the coils and drips into the dehumidifier's reservoir.
3. The dehumidifier reheats the air and exhausts it back into the room.

A dehumidifier usually has a removable plastic bucket for a reservoir; most buckets also have a place where you can hook up a hose so the collected water can drain straight into a floor drain or pump. This frees you from having to remember to dump out the water. But don't worry too much about the reservoir overflowing - most dehumidifiers also have an automatic shut-off. If you're using a dehumidifier in extremely moist conditions, or if you need to keep your dehumidifier on all the time, you should look into a unit with a built-in condensate pump, which regularly pumps water out of the unit's reservoir rather than simply relying on gravity to empty it as a hose does.

Many dehumidifiers also have a humidistat, which allows you to set your desired level of relative humidity. A humidistat has two parts: a sensing element and a relay amplifier. The sensing element includes two alternate metal conductors, and changes in relative humidity will cause electrical resistance between those conductors. The relay amplifier measures this resistance and sends a signal to turn the dehumidifier on or off. These basic components add up to a device that may make your home feel a whole lot better.

6. *Прореферируйте текст, используя клише приложения 1.*

Итоговые задания к разделу 4

1. ***Назовите английские эквиваленты следующих слов и словосочетаний:***

Влажность, охлаждающее вещество, потреблять (расходовать), регулируемый, кондиционер воздуха, испаряться, давление, труба (трубопровод), распределять, одинаковая температура, фильтр, духота, засор, удаление пыли, снять крышку, присоединить, отвод воздуха, подача воздуха, опасный для здоровья, избыток тепла, современные удобства, водоизмерительный счетчик, время охлаждения, водопроводное дело, пахнуть плесенью, пар, шланг, усилитель.

2. ***Выберите правильный вариант ответа.***

1. The basic pieces of air conditioners are ….
a) fins, coils, a compressor
b) an evaporator, a condenser, a heater
c) a compressor, a condenser, an evaporator
d) a fan, a compressor, a condenser

2. The basic pieces of dehumidifiers are ….
a) a fan, a compressor, a reheater, cooling coils, a reservoir
b) a radiator, a compressor, a reheater, cooling coils, a reservoir
c) a cooler, a compressor, a reheater, cooling coils, a reservoir
d) an engine, a reheater, cooling coils, a fan

3. Air conditioners, dehumidifiers are used to provide ….

a) heating inside buildings
b) humidity control inside buildings
c) ventilation
d) all the above

4. Cleaning air ducts must be done ….
a) for people not to experience allergy reactions
b) so that dust can’t cause a clog in your ductwork
c) to prevent a rodent or bug infestation
d) to prevent all the above

5. Air conditioners first appeared ….
a) in industrial buildings
b) in hospitals
c) in Charles Gates’s house
d) in office buildings

6. The ideal interior humidity is ….

a) 40 % b) 50 %
c) 60 % d) 70 %

3. ***На основе материалов раздела 4 подготовьте на английском языке***

а) сообщение на тему «Air conditioning. Air conditioners»;
б) сообщение на тему «Humidity control. Dehumidifiers».

4. ***Подготовьте проекты на тему:***

1. The control of air moisture content and fresh-air recirculation in buildings.
2. Contemporary inventions in the sphere of air-conditioning systems.
3. How heating, cooling and humidity control systems interact within the building to provide a comfortable environment.
4. The monitoring of heating, cooling and humidity control systems.

Unit 5. Environmental Problems

Text 19

1. *Найдите русские эквиваленты английских слов.*

1. ozone layer	a. ликвидация отходов
2. to take care (of)	b. общественная организация
3. to emit	c. невысокая (приемлемая) себестоимость
4. generations to come	d. поверхностные воды
5. motor vehicle	e. воспаление дыхательных путей
6. manufacturing facilities	f. заботиться (о)
7. to take responsibility	g. огромное количество
8. safe	h. испускать, выделять
9. sulfur dioxide	i. сердечная недостаточность
10. nitrogen dioxide	j. двуокись серы
11. surface water	k. будущие поколения
12. respiratory irritation	l. компания коммунального обслуживания
13. heart failure	m. нести ответственность
14. public body	n. пепел, который нужно зарыть в землю
15. reasonable cost	o. озоновый слой
16. utility company	p. транспортное средство
17. vast amount	q. производственное оборудование
18. waste disposal	r. безопасный
19. ash to be buried	s. двуокись азота
20. soot	t. целлюлозно-бумажный завод
21. threat	u. угроза
22. pulp-and-paper facto-	

ry	v. проблема, вопрос
23. to dump into	w. сажа, копоть
24. issue	x. выбрасывать

2. *Прочтите следующие слова и, основываясь на значениях слов русского языка, определите их значения.*

Nature, dramatic, nations, generate, location, carbon monoxide, hydrocarbons, geography, authority, operate, condition, industry, individual, atmosphere, substance, problem, harmony, electricity, planet, global, situation.

3. *Прочитайте и переведите текст.*

ENVIRONMENTAL PROBLEMS

1. Introduction. Many years ago man lived in harmony with nature, because industry was not much developed. Today, the contradictions between man and nature are dramatic. Every year world industry emits into the atmosphere about 1000 million tons of soot and other harmful substances. The acid-rain problem has spread rapidly in recent years, and experts fear the situation will worsen if the nations begin to burn more coal to generate electricity. People of many countries suffer from smog. Forests are disappearing. Water pollution in oceans, seas, lakes and rivers, air pollution and the destruction of the ozone layer could lead our planet to a global disaster. The Earth is our home, that's why we must take care of it, for ourselves and for generations to come. We must keep our environment clean.

2. Air pollution. Usually two or three factors combine to form air pollution in any given location. The first factor is large amounts of carbon monoxide and hydrocarbons emitted by motor vehicles concentrated in a relatively small area. The second is the smoke and other pollutants emitted by manufacturing facilities. These two factors can be partially eliminated through pollution-control devices on cars, trucks, and smokestacks.

The third factor that contributes to air pollution – one that cannot be changed – is the combination of weather and geography.

How effective is air pollution control? Most authorities agree that there has been progress since the mid 1980s. A number of countries have cleaner air today than they had twenty years ago. Numerous chemical companies have recognized that they must take responsibility for operating their plants in an environmentally safe manner. Some of them now devote as much as 20 per cent of their capital expenditures to purchasing antipollution devices. However, air levels of sulfur dioxide and nitrogen dioxide – the main elements that cause acid rain – as well as of soot continue to increase.

3. Water pollution. Surface water on our planet remains severely polluted. Currently, the most serious water-quality problems result from the high level of toxic pollutants found in these waters.

Among the serious threats to people posed by these pollutants and respiratory irritation are cancer, kidney and liver damage, anemia, and heat failure. Toxic pollutants also damage fish and other forms of wildlife.

A pulp-and-paper factory was built on the shores of Lake Baikal. As a result, because of water pollution, the world's purest water has been spoiled. The whole ecological system of the lake has changed greatly. Some organisms that can be found only in Lake Baikal are disappearing; trees are dying from soot and gas emissions from the factories.

The Aral Sea was a bright blue sea with a lot of fish. The Amudarya and Syrdarya rivers supplied it with water. But then the water of the rivers was diverted to cotton plantations. As a result the Aral now is in a very dangerous condition. If no immediate measures are taken, the Aral Sea will soon disappear.

The Mediterranean Sea and the North Sea are half dead because great amounts of chemical and nuclear waste were dumped into them.

4. Land Pollution. Air and water quality may be improving, but land pollution is still a serious problem in many areas. The fundamental issues are how to restore damaged or contaminated land at a reasonable cost and how to protect unpolluted land from future damage.

The land pollution problem has been worsening over the past few years, as modern technology has continued to produce increasing amounts of chemical and radioactive waste.

Manufacturers produce and dump more than 100 million tons of contaminated oil, solvents, acids, and sludges each year. Service businesses, utility companies, hospitals, and other industries also dump vast amounts of wastes into the environment.

Individuals contribute to the waste disposal problem. On the average, each of us accounts for approximately 1,547 pounds of garbage each year. A shortage of landfills makes garbage disposal an especially serious predicament. Incinerators are a possible solution to the problem of a landfill shortage, but they bring their own problems with them. They reduce the amounts of garbage but also leave tons of ash to be buried – ash that has a high concentration of harmful substances.

5. Nuclear Power. They say that nuclear power is "cheap, clean and safe". The explosion in Chernobyl shows that it can go wrong. Nuclear weapons could destroy the world. Nuclear weapon tests increase the amount of radiation in the atmosphere. Nuclear power produces high-level radioactive waste which can be dangerous for thousands of years.

Before it's too late, people have to change their way of life. We have to stop ruining the land, water and air.

We can help clean up the planet. Our planet needs immediate help. Each of us must do everything possible to save it.

4. *Переведите на английский язык следующие слова и выражения.*

Окружающая среда, загрязнение, вредные вещества, выбросы в атмосферу, химические и радиоактивные (ядерные) отходы, загрязнение земли, загрязнение воздуха, огромное количество отходов, проблема ликвидации отходов, бытовые отбросы, выбрасывать в атмосферу, сжигать уголь, производить электричество, сбрасывать химические и радиоактивные отходы, наносить ущерб, спасать нашу планету, качество воды и воздуха, зараженная земля, опасное состояние, густой туман, кислотный дождь, разрушать мир, поверхностные воды, производственное оборудование, заботиться о живой природе, ухудшаться.

5. *Закончите следующие предложения в соответствии с содержанием текста.*

1. Every year world industry … into the atmosphere soot and other harmful substances.
2. The acid rain problem will worsen if the nations begin to … more coal to … electricity.
3. The first factor of air pollution is large amounts of … and … emitted by motor vehicles.
4. The second is the … and other pollutants emitted by manufacturing factories.
5. The third factor is the combination of … and … .
6. One of the most serious water quality problems is high level of toxic … found in these waters.
7. Toxic pollutants damage fish and other forms of … .
8. The land pollution problem has been worsening over the past few years, as modern technology has continued to produce a great number of … and … waste.
9. Service businesses utility companies and other … also dump vast amounts of … into the environment.
10. A shortage of landfills makes garbage … an especially serious predicament.
11. … are a possible solution to the problem of a landfill shortage but they leave tons of ash to be buried.
12. Nuclear power produces high-level … which can be dangerous for thousands of years.

6. *Дайте ответы на следующие вопросы в соответствии с текстом.*

1. Why did man live in harmony with nature many years ago?
2. What environmental problems do you know?
3. What causes the acid-rain problem?
4. What are the main factors of air pollution in any given locality?
5. What does one of the most serious water quality problems result from?

6. Why is Lake Baikal in danger?
7. What can you say about the Mediterranean Sea and the North Sea?
8. In what condition is the Aral Sea now and why?
9. What are the two fundamental issues of land pollution?
10. What makes garbage disposal an especially serious predicament?
11. What problems do incinerators bring with them?
12. Why is radioactive and nuclear waste dangerous?

7. *Изложите краткое содержание текста на английском языке.*

8. *a) Переведите следующие слова и словосочетания на русский язык, при необходимости воспользуйтесь словарем:* to troubleshoot, a thorough understanding, computer-aided design, network analysis, mechanical design, heat transference, air flow, to acquire skills, problem-solving, to gain professional experience, to pass exams, to manage projects.

b) Прочтите текст.

HVAC design engineers

An HVAC technician specializes in the installation, maintenance and repair of heating, refrigeration and cooling systems for both residential and industrial buildings.

A licensed HVAC technician specializes in the systems that regulate temperature and humidity in buildings. An HVAC tech is responsible for installing and maintaining heating, air-conditioning and ventilation equipment. The technician also needs to know how to troubleshoot problems that might arise with these systems.

HVAC design engineers create and modify cooling and heating systems in commercial and residential buildings. In some instances, they are responsible for managing other HVAC designers, technicians and mechanics to make sure they're correctly installing the systems and that there aren't any problems. They have to keep projects running smoothly and efficiently to complete them in a timely manner.

Becoming an HVAC design engineer requires a thorough understanding of math, science and technology as well as at least a bachelor's degree in mechanical engineering if you are going to work abroad. Through this degree program, they study electronics, computer-aided design, physics, calculus, network analysis, mechanical design and control engineering. Some classes address basic computer skills, while others go into depth regarding heat transference and air flow.

With this background, you'll acquire skills in creative design, design analysis, problem-solving, mechanics, and management. An HVAC technician should have a good grasp of mechanics in order to understand the components involved with the job, such as pipes, ducts, schematics, compressors and wires.

You'll also need a Professional Engineering licensure if you offer services directly to the public. This requires passing your state's Fundamentals of En-

gineering exam, gaining professional experience and then passing the Principles and Practice of Engineering exam.

Employees are typically looking for someone who can improve HVAC designs using modern standards and techniques. They often want people with a bachelor's degree in mechanical engineering and some experience working with HVAC systems and equipment. Employers also prefer people with skills in communication and teamwork because HVAC engineers attend meetings with clients and manage projects.

c) Ответьте на вопросы:

1. What are HVAC engineers responsible for?
2. What knowledge, skills and experience should they have?
3. What requirements of employers should HVAC engineers meet?

d) Прореферируйте текст, используя клише приложения 1.

Text 20

1. *Найдите русские эквиваленты английских слов.*

1. pollution control stations	a. очень загрязненный район
2. industrial effluents	b. теплоэлектростанции
3. processed water	c. выхлопные газы
4. to treat with chlorine	d. подвергаться очистке
5. to purify	e. современные требования
6. water supply system	f. очистительные сооружения
7. to undergo purification	g. централизованное теплоснабжение
8. heating systems	h. промышленные сточные воды
9. sewer	i. острота проблемы
10. modern requirements	j. обрабатывать хлором
11. a heavily polluted area	k. система водоснабжения
12. district heating	l. канализация
13. heat and power plants	m. системы отопления
14. exhaust fumes	n. обработанная вода
15. to pipe steam underground	o. подавать пар по подземным трубам
16. acuteness of a problem	p. очищать
17. to destroy	q. отравлять
18. to poison	r. разрушать

2. *Прочитайте и переведите текст.*

WATER AND AIR POLLUTION PROBLEMS

Water and air pollution are the two main factors that destroy the environment in big cities. Paris has no industry; the Seine is not polluted by industrial effluents but by sewer waters. However, this problem is being solved by build-

ing pollution control stations in a Paris suburb. The sewage is channeled into them and cleansed before it goes into the Seine. When visiting these installations, one can often see how pure the processed water is – the engineers who work there drink it quite cheerfully.

Water is purified by mechanical and biological methods. The purified water is treated with chlorine and released into the rivers, whence it enters the water supply systems where it undergoes further and finer treatment.

Air is mainly polluted by heating systems and cars. When you look at a modern city from a hill top you get the impression of vapour (smog) lingering over the city especially when there are no winds which can air the city. However, when there is no wind there is smog. As regarding heating, mazut and gas are used more often than coal and the result is poisoned air in the most modern quarters of the city.

District heating is an effective method. Several heat-and-power plants generate steam, which is piped underground all round the city.

As for cars you know how heavy traffic is in big cities. The slower the traffic, the more exhaust fumes are emitted. The acuteness of the problem depends on how well the country is developed and on the number of cars in cities.

Environmental problems are international in nature. Air masses, water in rivers mix and as a result all people breathe the same air, eat the same contaminated seafood and crops, and drink the same polluted water.

3. *Определите, какие из данных предложений относятся к загрязнению воды, а какие к загрязнению воздуха. Предложения переведите на русский язык.*

1. Air is polluted mainly by heating and cars.
2. The slower the traffic is, the more exhaust fumes are emitted.
3. The problem of air pollution in Paris is being solved by building pollution-control stations.
4. The purified water is treated with chlorine and released into rivers.
5. As regarding heating they have started to use more gas rather than coal.
6. When water enters a water supply system it undergoes finer purification.

4. *Укажите, какое из данных предложений отражает главную мысль текста. Предложения переведите на русский язык.*

1. The problem of air and water pollution will not be solved in future.
2. Water is purified by mechanical and biological methods.
3. The acuteness of the air pollution problem depends on how well the country is developed and on the number of cars.
4. Water and air pollution are the two main factors that destroy the environment in big cities.

5. *Определите, соответствуют ли следующие предложения содержанию текста. Обоснуйте свой ответ. Используйте следующие выражения: I can't agree with this, it's false, that may be true, but…, on the contrary, vice versa, I suppose it's true, that's right, I entirely agree with this statement.*

1. Water and air pollution are the two main factors that destroy the environment in big cities.
2. Water is purified by mechanical and biological methods only.
3. The purified water is treated with chlorine and released into rivers.
4. Air is mainly polluted by cars.
5. There is no smog in cities when there is no wind.
6. Water and air pollution problems are a matter of concern of Belarus only.

6. *Ответьте на вопросы.*

1. What are the two main factors that destroy the environment in big cities?
2. How is the problem of pollution being solved in Paris suburbs?
3. What methods are used to purify water?
4. What can you see when you look at a modern city from a hill top?
5. Why is the problem of pollution international?

7. *Изложите краткое содержание текста на английском языке.*

8. *а) Прочитайте текст, озаглавьте его.*

Environmental protection, especially air pollution prevention is one of the main issues of the energy sector today. Acidification of soil and water and the threat of climate change are well-known examples of the environmental challenges that energy companies are facing today.

The development of environmental technology, increasing environmental awareness and improved scientific knowledge of the environmental effects of different pollutants have lead to international and national effects to avoid or reduce the problems.

The acidic deposition still exceeds the critical loads even in the areas of the lowest deposition, i.e. in the Nordic countries. In the southern parts of the Baltic Sea region this factor is higher. The origin of these unbalance including energy resources, is different in different parts of the Baltic Sea region. The northern parts have a lot of clean hydro and safe nuclear power whereas fossil fuels play a dominant role in the southern parts. However the economy in the eastern and southern parts of the Baltic Sea region does not allow undertaking all necessary environmental protection measures, which would be needed. In Estonia, Latvia, Lithuania and Poland 30 per cent reduction of SO_2 emissions and the freezing of No emissions would require investments of 10 billion USD. The critical question is to find the money needed for huge environmental and energy efficiency investments. An increased energy exchange can serve

as a solution to this problem when trying to reach a more balanced situation in environmental protection between the two different areas of the Baltic Sea region.

Because atmospheric pollutants do not recognize national borders, international cooperation is the only way to solve the problem. It is the matter of electricity companies to find practical ways of cooperation. This can be realized in many ways, not only by creating funding systems but also by developing international and national rules in environmental protection measures over a larger area, by stimulating and intensifying the cooperation in field.

b) Определите, соответствуют ли следующие предложения содержанию текста. Обоснуйте свой ответ. Используйте следующие выражения: I can't agree with this, it's false, that may be true, but…, on the contrary, vice versa, I suppose it's true, that's right, I entirely agree with this statement.

1. Environmental protection, especially air pollution prevention is one of the main issues of the energy sector today.
2. There is no difference in environmental protection activities between different regions.
3. The origin of unbalance including energy resources is different in different parts of the Baltic Sea region.
4. The economy of the southern part of the Baltic Sea region allows doing all necessary environmental protection measures.
5. An increased energy exchange can be a solution when trying to reach a more balanced situation in environmental protection between the two different areas of the Baltic Sea region.
6. International cooperation is the only way to solve the problems of pollution.

c) Дайте ответы на следующие вопросы:

1. What environmental challenges are energy companies facing today?
2. Are there any differences between measures taken by different countries and regions in environmental protection?
3. In what countries is the lowest acidic deposition?
4. Can you explain the origin of environmental unbalance in different parts of the Baltic Sea region?
5. What is the decisive factor behind it?
6. What is the only way to solve the problems of atmospheric pollutions now?
7. What is needed to improve the environmental situation in the southern and eastern parts of the Baltic Sea region?
8. Can an increased energy exchange between countries solve this problem?
9. What are the ways to improve the situation?

d) Изложите краткое содержание текста на английском языке.

Text 21

1. *Найдите русские эквиваленты следующих английских слов и словосочетаний.*

1. former state	a. местные власти
2. organic environment	b. удаление сточных вод
3. dangerous pollutant	c. много причин
4. polluting sources	d. очистительное сооружение
5. chemical substance	e. грунтовая вода, подпочвенные воды
6. everyday life	f. коммунальная водопроводная система
7. ground water	g. свалка
8. a great variety of reasons	h. прежнее состояние
9. waste dumps	i. экологически чистая окружающая среда
10. disposal of sewage	j. вторичная очистка
11. underground boring well	k. выкопанный колодец под землей
12. purifying facility	l. непоправимый, безнадёжный
13. public water supply	m. повседневная жизнь
14. local authorities	n. источники загрязнения
15. secondary purification	o. химическое вещество
16. irremediable	p. опасный загрязняющий агент

2. *Прочтите следующие слова и, основываясь на значениях слов русского языка, определите их значения.*

Reservoir, type, stable, identify, accumulate, combat, accurately, formation, expansion, urban, production, complex, composition, drainage, individual, base, transformation, conflict, private, utilization, reproduction, progress.

3. *Прочитайте и переведите текст.*

WATER POLLUTION IN THE USA

Solving the problem of pollution from the technical view-point has turned out to be more difficult than expected.

First of all, it became evident that in certain reservoirs such great qualitative changes had taken place that it was practically very difficult to return them to their former state. Irreversible changes have taken place in the Great Lakes, because the disturbances in the organic environment of the lakes are irremediable.

New types of pollution are being discovered. Not so long ago a stable and dangerous pollutant called PChB (polychlorinated biophenyl) was identified. The danger is doubled because of the fact that PchB accumulates in the bottom sediments and is preserved in rivers for many years after it is no longer dumped into them. The concentration of this pollutant is very great in the

Great Lakes, in such rivers as the Hudson, the Connecticut, the Mississippi, the Missouri, the Ohio, the Sacramento, the Rio Grande, and the Yukon.

The difficulties in combatting PChB also lie in the fact that so far it has not been accurately established what kinds of pollutants bring about its formation in reservoirs. The variety of polluting sources is growing. The expansion of urban territories with asphalt-covered roads, the increase in the production and complex composition of chemical substances and their combinations used in everyday life have led to the increased pollution of water resources by the drainage from the territory of cities, towns and villages. Besides that, the sphere of water pollution is broadening. Recently there has appeared a new problem – the pollution of ground water. The pollution of ground water is caused by a great variety of reasons: numerous waste dumps scattered all over the area and exposed to the influence of rainwater, polluted surface reservoirs, the disposal of sewage from factories (waste matter as well), and the use of water on oil-fields.

Water supply at the expense of ground water plays an important role in the lives of many towns and cities and in the production of foodstuffs. The water supply of 12-15 million families depends upon individual underground boring wells, which have no purifying facilities. 71 per cent of the public water supply is based upon the ground water. The complexity of the issue is in the fact that the physico-chemical processes of the ground water transformation are still not fully explored.

Internal economic and political problems are impediments to solving the pollution problem. For several years conflicts have been taking place between private companies, the federal government and the authorities of separate states. Quite often local authorities do not plan building a system of secondary treatment. Discussions are in the progress, while polluted water runs into reservoirs creating a threat to the health of the people, and complicating the secondary utilization of sewage.

The arms race and the energy crisis have an impact on the problem of reproduction of water resources. Attempts to overcome the energy crisis have brought about the postponement of many water purification measures.

The problem of providing the country with water resources is still far from being solved.

4. *Дополните незаконченные предложения одним из данных вариантов в соответствии с содержанием текста. Полученные предложения переведите на русский язык.*

1. Water pollution in the USA because of technological development is … than expected.

a) more difficult
b) the most difficult
c) very difficult

2. The problem of pollution became evident because there were … changes in some reservoirs.
a) some
b) great
c) no

3. New types of pollution ….
a) were being discovered
b) are not so dangerous
c) are being discovered

4. The most dangerous pollutant was PChB because its concentration in rivers ….
a) is not increased for many years
b) is doubled
c) is very great

5. The variety of polluting sources ….
a) is not so great
b) is growing
c) is reducing

6. The pollution of ground water is caused ….
a) by many reasons
b) by production industries
c) only by one reason

7. Public water supply is mostly based upon ….
a) ground water
b) transformation of ground water
c) individual underground boring wells.

8. Quite often local authorities … building a system of secondary purification.
a) plan
b) do not plan
c) planned

9. The arms race and energy crisis have influence on ….
a) secondary water purification
b) water purification measures
c) reproduction of water resources

5. *Определите, соответствуют ли следующие предложения содержанию текста. Обоснуйте свой ответ. Используйте следующие вы-*

ражения: I can't agree with this, it's false, that may be true, but…, on the contrary, vice versa, I suppose it's true, that's right, I entirely agree with this statement.

1. Solving the problem of pollution from the technical view-point has turned out to be more difficult than expected.
2. No changes have taken place in the Great Lakes.
3. New types of pollution are being discovered.
4. The variety of polluting sources is keeping going down.
5. Recently there has appeared a new problem – the pollution of ground water in the region.
6. The problem of providing the country with water resources is still far from being solved.

6. *Ответьте на вопросы.*

1. Why have irreversible changes taken place in the Great Lakes?
2. What can you say about PChB?
3. The number of polluting sources is growing, isn't it?
4. What can you say about the pollution of ground water?
5. What plays an important role in the lives of many towns and cities and in the production of foodstuffs?
6. The problem of providing the country with water resources is still far from being solved, isn't it?

7. *Изложите краткое содержание текста на английском языке.*

8. *a) Переведите следующие слова и словосочетания на русский язык, при необходимости воспользуйтесь словарем:* marshlands, nesting places, species, natural habitat, rare, nuclear fallout, salification, potash industry, woodland, biodiversity, to ratify, floods, snow pack, overflow, to cause damage, consequences.

b) Прочтите текст.

Water and Air Pollution Problems in Belarus

Belarus is the land of more than 10 thousand lakes and 20 thousand rivers. Forests take one third of the territory and are considered the national wealth, while swamps account for 13% of it and are of significant climatic and hydrologic importance. Belarusian marshlands are called "the lungs of Europe", since they produce an enormous amount of oxygen. Besides, they serve as nesting places for rare species of birds and as a natural habitat for rare plants.

As for environmental challenges in Belarus, the most serious environmental issue that Belarus still faces is the 1986 accident of the Chernobyl nuclear power plant. Almost 70% of the nuclear fallout from the plant landed on Belarusian territory and about 20% of the land remains contaminated.

Belarus faces significant air pollution largely because of the development of heavy industries. The most common pollutants are formaldehyde, carbon dioxide, and petroleum-related chemicals. Some cities in Belarus are heavily polluted, especially industrial centers such as Salihorsk and Navapolatsk. In recent years automobile exhaust is becoming the source of about half the air pollution in the cities.

As for water pollution, a serious problem is posed by salification of the water supply by the potash industry. However, all urban and rural dwellers have access to safe drinking water.

The soils also contain unsafe levels of lead, zinc, copper and the agricultural chemical DDT.

Belarus has vast forest areas but little of the country's woodland is protected, in total 4.2 percent of Belarus's land area. Biodiversity, soil pollution and the number of threatened species are areas of concern. The government has ratified international environmental agreements concerning air pollution, biodiversity, environmental modification, and ozone layer protection.

Being situated between other European countries and having flat terrain that is suitable for agricultural use, Belarus is already suffering from consequences of climate changes influencing yield, river flow and average annual temperature rise. Floods represent a significant problem for the country. Sudden and premature dramatic seasonal changes cause snow pack to melt and rivers to overflow, flooding the surrounding terrain. Heavy storms occasionally occur, forcing evacuations that cause great damage on electric grids and great financial damage in general.

c) Ответьте на вопросы:

1. Why is Belarus a unique country?
2. What air (water, soil) pollution problems does Belarus have?
3. What causes environmental pollution problems in Belarus?
4. What are the consequences of climate changes in Belarus?

d) Прореферируйте текст, используя клише приложения 1.

Итоговые задания к разделу 5

1. ***Назовите английские эквиваленты следующих слов и словосочетаний:***

Проблемы загрязнения окружающей среды, угроза, ликвидация отходов, сажа, пепел, загрязнение, нести ответственность, безопасный, поверхностные воды, основной вопрос, ухудшаться, улучшать, кислотный дождь, наносить ущерб, разрушать, отравлять, заботиться, очищать, обрабатывать хлором, выхлопные газы, промышленные отходы, решение проблемы, защита окружающей среды, грунтовые воды, непоправимый, очистительное сооружение.

2. *На основе материалов раздела 5 подготовьте на английском языке*

а) сообщение на тему «Environmental problems, their causes and consequences»;

б) сообщение на тему «An HVAC engineer».

3. *Подготовьте проекты на тему:*

1. The projects of modern water treatment installations.
2. The most serious environmental issues in Belarus.
3. Environmental protection and rational use of natural resources.

4. *Выполните контрольную работу.*

I. Read the text and do the following tasks:

Heating and Cooling Systems

1. The development of refrigeration machines for food storage played a role but the key element was Willis Carrier's 1906 patent that solved the problem of humidity removal by condensing the water vapour on droplets of cold water sprayed into an air-stream. Starting with humidity control in tobacco and textile factories, Carrier slowly developed his system of "man-made weather" finally applying it together with heating, cooling, and control devices as a complete system in Graumann's Metropolitan Theatre, Los Angeles, in 1922.

2. The first office building air-conditioned by Carrier was the 21-story Milam Building (1928) in San Antonio, Texas. It had a central refrigeration plant in the basement that supplied cold water to small air-handling units on every other floor: these supplied conditioned air to each office space through ducts in the ceiling. The air was returned through grills in doors to the corridors and then back to the air-handling units.

3. A somewhat different system was adopted by Carrier for the 32-story Philadelphia Savings Fund Society Building (1932).

The central air-handling units were placed with the refrigeration plant on the 20th floor, and conditioned air was distributed through vertical ducts to the occupied floors and horisontally to each room and returned through the corridors to vertical exhaust ducts that carried it back to the central plant. Both systems of air handing (local and central) are still used in high-rise buildings.

4. The Great Depression and Word War II reduced the demand for air conditioning systems. It was not until the building of the United Nations Secretariat in New York City in 1949 that Carrier produced a method of air conditioning that could deal effectively with the large heat loads improsed by the building's all-glass curtain walls. The conditioned air was delivered not only from the ceiling but also through pipe coil convector units just inside the glass wall.

1. Specify if the following statements are true or false.

1) Carrier was a pioneer in the field of air-conditioning.
a) True
b) False
c) No information is given in the text

2) The conditioned air passed through wall ducts in the 21-story Milam Building.
a) True
b) False
c) No information is given in the text

3) Ventilation in industrial buildings was done with operable windows.
a) True
b) False
c) No information is given in the text

4) The building of the United Nations was equipped with unique air conditioning systems.
a) True
b) False
c) No information is given in the text

2. Find the appropriate text paragraph (1, 2, 3, 4):

1) The method of vertical exhaust ducts played an important role in building atmosphere controlling.
2) Carrier's first experience was connected with the system of factory humidity control.

3. Choose the right answer to the question:

1. What was the peculiarity of air-conditioning system in Metropolitan Theatre?
a) It was a complete system combining heating, cooling, and control devices.
b) The conditioned air was supplied through ducts in the ceiling.
c) The conditioned air was delivered through pipe coil convector units just inside the glass wall.
d) The central air-handling units were located on the upper floor.

4. Define the main idea of the text:

a) The Great Depression and World War II decreased the demand for air-conditioning systems.

b) It was an American engineer who made a great contribution to an artificial system of air conditioning.

c) The first office building air-conditioned by Carrier was the 21-story Milam Building.

d) Both local and central system of air-handling are employed in high-rise buildings nowadays.

II. Translate the text in writing. Use a dictionary if necessary.

How Heating and Cooling Systems Work

All climate-control devices or systems have three basic components: a source of warmed or cooled air, a means of distributing the air to the rooms being heated or cooled, and a control used to regulate the system (e.g., a thermostat). The sources of warm air, such as a furnace, and cool air, such as an air conditioner, in a house often use the same distribution and control systems. If your house has central air-conditioning, cool air probably flows through the same ducts that heat does and is regulated by the same thermostat. When a heating or cooling system malfunctions, any of these three basic components may cause problems.

Both heating and air-conditioning work on the principle that heat always moves from a warm object to a cooler one, just as water flows from a higher to a lower level. Furnaces and heaters put heat into the air to make your home warmer; air conditioners remove heat to make your home cooler.

All heating and cooling units burn fuel. Air-conditioners use electricity. Most home heating systems use gas or fuel oil; other systems use electricity. The heat pump - an electrically powered climate control unit - both heats and cools air. In summer it extracts heat from the air inside your home. In winter it pulls heat from the air outside and uses this heat to warm the air inside.

When the furnace is turned on, it consumes the fuel that powers it, whether it is gas, oil, or electricity. As fuel is burned, heat is produced and channeled to the living areas of your home through ducts, pipes, or wires and then is blown out of registers, radiators, or heating panels. Older systems use the heat they produce to heat water, which in turn heats the air in your home. These systems use a boiler to store and heat the water supply, which is then circulated as hot water through pipes embedded in the wall, floor, or ceiling.

When an air-conditioner is turned on, electrical power is used to cool a gas in a coil to its liquid state. Warm air in your home is cooled by contact with the cooling coil, and this cooled air is channeled to the rooms of your home through ducts and out of registers or - in the case of room air-conditioners - directly from the unit itself.

III. Translate the text from Russian into English, using a dictionary:*

A) Системы отопления загородного дома.

Виды систем отопления

Отопительные приборы (тепловые панели, радиаторы, котлы, теплые полы) являются элементом системы отопления, предназначенным для передачи теплоты от теплоносителя воздуху ограждающим конструкциям обслуживаемого помещения.

Расход топлива обуславливается теплопотерями помещений и правильностью настройки оборудования. При оптимальном режиме работы расход топлива составляет 5-8 литров на м3 отапливаемого помещения в год в зависимости от теплопотерь помещения. Для приблизительного выбора отопительного оборудования (без проведения точных расчетов теплопотерь) возможен подбор необходимой мощности котла по усредненным данным: 0.035 кВт на 1 $м^3$ объема отапливаемых помещений.

К отопительным приборам выдвигается ряд следующих требований:

Санитарно-гигиенические:

отопительные приборы должны обладать более низкой температурой корпуса, иметь наименьшую площадь горизонтальной поверхности для уменьшения отложений пыли, позволять беспрепятственно удалять пыль с корпуса и ограждающих поверхностей помещения вокруг них.

Экономические:

отопительные приборы должны иметь наименьшие затраты на их изготовление, монтаж, эксплуатацию, а также обладать наименьшим расходом металла.

Архитектурно-строительные:

внешний вид отопительного прибора должен соответствовать интерьеру помещения, а занимаемый ими объём должен быть наименьшим.

Производственно-монтажные:

Отопительные приборы должны обладать достаточной механической прочностью.

Эксплуатационные:

отопительные приборы должны обеспечить управляемость их теплоотдачей и обеспечивать теплоустойчивость и водонепроницаемость при максимальном давлении внутри прибора.

Теплотехнические:

отопительные приборы должны обеспечивать наибольшую плотность удельного теплового потока, приходящегося на единицу площади.

В) Обзор электрических систем отопления:

Конвективные

Эти обогреватели могут быть с естественным теплообменом (простейшие конвекторы, настенные панели) или с принудительным обдувом (тепловентиляторы и т. п.).

Лучистые

Лучистая система отопления принципиально отличается от конвективных систем. Ее достоинства:

• высокий КПД – 90%, связанный с прямым преобразованием электроэнергии в тепловую энергию, требуемую на отопление.

Лишь около 10% энергии уходит на бесполезный прогрев воздуха под потолком;

• быстрый нагрев помещения по сравнению с общепринятыми системами обогрева;

• поддержание температуры при отключенной системе за счет аккумуляции тепла в элементах конструкции помещения и предметах;

• отсутствие интенсивных воздушных потоков, увеличивающих циркуляцию в воздухе пыли и других загрязнений;

• удобство терморегулирования;

• бесшумность;

• мобильность: быстрый монтаж, перенос, демонтаж и т. д.;

• экономия затрат на эксплуатацию, включая затраты на электроэнергию. Потребление электроэнергии снижается на 30-70% по сравнению с традиционными обогревателями. Этот тип обогревателей делится на два подкласса: длинноволновые; инфракрасные.

Инфракрасные обогреватели отличаются от длинноволновых спектром излучения в связи с разной температурой нагрева рабочего элемента. У инфракрасных обогревателей до 700-800 градусов, у длинноволновых до 200-250 градусов. В связи с этим использование инфракрасных обогревателей в закрытых помещениях, а тем более в жилых, является невозможным. Именно длинноволновый обогреватель (иногда его ошибочно называют инфракрасным) является пожаробезопасным прибором и дающим «мягкое» тепло, благоприятное для человеческого восприятия.

С) «Теплые полы»

Существует еще один тип отопления, который нельзя однозначно отнести ни к первому, ни к второму подклассу – это «теплые полы». Эффективность «теплого пола» гораздо выше, чем у конвективных обогревателей, более того, она близка к эффективности лучистых систем обогрева.

Но «теплые полы» очень дороги в монтаже, который требует полностью вскрывать полы для укладки теплокабеля и проводить ремонт в помещении. Кроме того, система «теплый пол» немобильна (демонтаж, перенос, перераспределение системы невозможны).

Излучающие пленки

Это низкотемпературные излучающие пленки с напыленным сетчатым инфракрасным нагревателем. Они являются своеобразной альтернативой «теплому полу». Температура на поверхности от 50 до 90°. Энергоэффективность этих изделий гораздо ниже, чем у длинноволновых обогревателей той же мощности. Ограничение высоты до 3 метров снижает область их применения.

Приложение 1

В процессе реферирования происходит существенная переработка содержания, композиции языка оригинала: выделяются главные факты и излагаются в краткой форме.

Язык и стиль оригинала претерпевают изменения в сторону нормативности, нейтральности, простоты и лаконичности. Реферат - это не простой набор ключевых фрагментов текста, на базе которого он строится, а новый самостоятельный текст.

Последовательность этапов реферирования статьи

Шаг 1. Прочитать статью внимательно и неторопливо два раза.

Шаг 2. Сделать заметки. При помощи заметок на полях составить для себя первое общее представление о внутреннем содержании и внешнем построении статьи: какие темы обсуждаются, сколько и какие абзацы связаны друг с другом логически или по содержанию. Важная информация (имена, названия мест, даты, статистические данные) также записываются на полях.

Шаг 3. Зафиксировать структуру статьи (план будущего реферата).

Шаг 4. Составить новый текст своими словами, сократив исходный вариант.

Реферат должен содержать ключевые слова и повторять последовательность изложения информации в тексте.

Содержание статьи при реферировании излагается объективно, без критической оценки содержания с позиции реферирующего.

Чтобы текст был связным, т.е. чтобы была соблюдена когерентность текста, необходимо знать стереотипные выражения и фразы, связующие текст (напр., and, also, but, besides, however, nevertheless, still, as a result, in particular, etc.).

Реферат должен составлять примерно ⅓ - ¼ исходного текста. Предельным объемом реферата принято считать 1200 слов при сокращении текста оригинала от 3 до 10 раз.

Приблизительный объем реферата:

вступление - 2-4 предложения,

основное содержание - 12-15 предложений,

заключение - 2-4 предложения + заключительное предложение.

Клише и связующие фразы для реферирования

The title of the text (article) is …	Текст (статья) называется …
I'm going to draw you attention to … to present the article headlined (under the headline) …	Хочу обратить Ваше внимание на представить статью под заголовком …

The text (article) is devoted to the problem of …	Текст (статья) посвящена проблеме …
The following problems are raised in the text (article)	В тексте (статье) поднимаются следующие проблемы
The primary task of the published article is ...	Основная задача опубликованной статьи ...
The main aim of the article is ...	Основной целью данной статьи является ...
The article under review aims at …	Рассматриваемая статья направлена на …
In the modern world the problem of/ the issue of'....' gains special significance / great importance.	В современном мире проблема …./ проблемы....'приобретает особую значимость / большое значение.
The article deals with dwells on / upon comments on runs / reads / says that...	В статье рассматривается статья останавливается на комментирует говорит, что...
The reporter focuses his attention on highlights points out stresses / emphasizes reveals / discloses reviews summarizes	Репортер акцентирует внимание на освещает указывает подчеркивает статья раскрывает дает обзор подводит итог, суммирует
The article starts with ...	Статья начинается с
The article under consideration points out...	В статье рассматривается / указывается …
Great attention in the article is paid to	Большое внимание в статье уделяется …
Much effort is undertaken to analyse	Много усилий предпринимается для анализа …
A special concern of the reporter is ...	Вопросом, требующим особого решения, по мнению автора, является …
The article goes on to say ...	Далее в статье говорится …
The paper argues / maintains / claims ...	Статья оспаривает / поддерживает/ заявляет …

The reporter finds a good deal to say in support of/ against...	Автор находит многое сказать в поддержку / против ...
The paper finds it significant that...	В статье сяитается важным, что ...
The reporter is confident that...	Автор уверен, что …
The article agrees / strong believes / expresses approval of /	В статье выражается согласие / одобрение
The author insists on .. ing / bitterly affects	Автор настаивает на …/ выступает с яростными нападками на …
The paper is sharply critical of...	Документ резко критикует …
The article (the reporter) expresses concern / alarm at (Ving) ...	выражает обеспокоенность / трево-гу по поводу
The paper puts / places the responsi-bility for smth on smb.	Возлагается ответственность за … на кого-л.
Many people think … but others do not agree.	Многие люди думают, (что) ... , но другие не согласны.
Let us consider what the advantages and disadvantages of … are.	Давайте рассмотрим некоторые плюсы и минусы (этого).
Let's consider some pros and cons of it. / Let us start by considering pros and cons of it.	Начнем с рассмотрения плюсов и минусов этого вопроса.
Let us start by considering the facts.	Начнем с рассмотрения фактов.
It is generally agreed today that …	Сегодня общепризнано, что ... .
To begin with, … .	Начнем с того, что ... .
Firstly, ... / Secondly, ... / Finally, ...	Во-первых, ... / Во-вторых, .../ Нако-нец, ...
One argument in support of	Один из аргументов в поддержку
The first thing that needs to be said is	Первое, что нужно сказать, это то, что ... . (Прежде всего, следует ска-зать, что … .)
First and foremost … .	В первую очередь … .

It is true that ... / clear that ... / noticeable that	Это правда, что ... / Ясно, что ... / Примечательно, что ...
One should note here that	Здесь следует отметить, что ... .
Another good thing about … is that …	Еще один положительный момент … заключается в (том, что) ... .
The second reason for ...	Вторая причина ... .
It is often said that ...	Часто говорят, что ...
It is undeniable that ...	Нельзя отрицать, что ...
It is a well-known fact that ...	Хорошо известно, что ... .
For the great majority of people ...	Для подавляющего большинства людей ...
A number of key issues arise from the statement. For instance, ...	Это утверждение затрагивает ряд ключевых вопросов. Например, ...
One of the most striking features of this problem is	Один из самых поразительных аспектов этой проблемы ... .
First of all, let us try to understand ...	Прежде всего, давайте попытаемся понять ... .
The public in general tend to believe that	Общественность в целом склонна полагать, что ... .
What is more, …	Более того, ...
Besides, … because it is … .	Кроме того, ... потому что ... .
Doubtless, ...	Несомненно, ...
One cannot deny that	Нельзя отрицать, что ...
It is (very) clear from these observations that	Из этих наблюдений (абсолютно) ясно, что ... .
On the other hand, we can observe that	С другой стороны, мы можем наблюдать, что ... .
The other side of the coin is, however, that	Однако, с другой стороны, ...
Another way of looking at this question is to	Чтобы взглянуть на эту проблему с другой стороны, надо ... .
One should, nevertheless, consider the problem from another angle.	Тем не менее, следует взглянуть на эту проблему с другой стороны.
One should, however, not forget that	Тем не менее, не следует забывать, что ... .
If on the one hand it can be said that ... the same is not true for	И если с одной стороны, можно сказать, что ... , то же самое нельзя сказать о ... .
On the other hand, … .	С другой стороны, ...

Although … .	Хотя ... .
Besides, … .	Кроме того, ...
Moreover, … .	Более того, … .
Furthermore, one should not forget that	Кроме того, не следует забывать, что ... .
In addition to	Кроме (того, что) ... .
Nevertheless, one should accept that	Тем не менее, следует признать, что ... .
However, we also agree that	Однако, мы также согласны с тем, что ... .
Experts... ... believe that … . ... say that … . ... suggest that … . ... are convinced that … . ... point out that … . ... emphasize that … .	Эксперты ... ... считают, что … . ... говорят, что … . ... предполагают, что … . ... убеждены, что … . ... отмечают, что … . ... подчеркивают, что … .
According to some experts ...	По мнению некоторых экспертов, ...
Perhaps we should also point out the fact that	Возможно, нам также следует отметить тот факт, что ... .
It would be unfair not to mention that fact that	Было бы несправедливо не упомянуть тот факт, что ... .
One must admit that	Надо признать, что ... .
We cannot ignore the fact that	Мы не можем игнорировать тот факт, что ... .
One cannot possibly accept the fact that	Трудно смириться с тем фактом, что ... .
From these facts, one may conclude that	Из этих фактов, можно сделать вывод (о том), что ... .
which seems to confirm the idea that	Что, по-видимому, подтверждает мысль (о том), что ...
Thus, ... / Therefore,...	Таким образом, ... / Поэтому ... .
The most common argument against this is that	Наиболее распространенным аргументом против этого является то, что ...
In conclusion, I can say that although … , … .	В заключение я могу сказать, что, хотя ... , ...
To draw the conclusion, one can say that …	Подводя итог, можно сказать, что

So it’s up to everybody to decide whether … or not.	Так что каждый должен решить для себя ... ли … , или нет.
The arguments we have presented ... suggest that ... / prove that ... / would indicate that ...	Представленные нами аргументы ... предполагают, что ... / доказывают, что ... / указывают на то, что
From these arguments one must ... / could... / might... conclude that	Исходя из этих аргументов, надо ... / можно ... / можно было бы ... прийти к заключению о том, что ...
That’s all I wanted to say.	Это все, что я хотел сказать.
That’s it as far as this article is concerned.	Что касается этой статьи, у меня всё.

Учебное издание

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