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«Кунгурский колледж агротехнологий и управления»



МЕТОДИЧЕСКИЕ РЕКОМЕНДАЦИИ ПО ВЫПОЛНЕНИЮ
ПРАКТИЧЕСКИХ РАБОТ

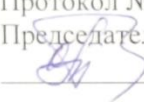
ПО ДИСЦИПЛИНЕ

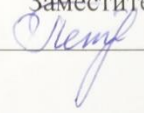
СГ.02 Иностранный язык в профессиональной деятельности

по специальности

35.02.16 Эксплуатация и ремонт сельскохозяйственной техники и
оборудования

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ПОЯСНИТЕЛЬНАЯ ЗАПИСКА

Методические рекомендации к выполнению практических работ по дисциплине «Иностранный язык в профессиональной деятельности» предназначены для организации работы студентов второго курса очного отделения по специальности 35.02.16 Эксплуатация и ремонт сельскохозяйственной техники и оборудования.

Согласно учебного плана обязательная аудиторная учебная нагрузка составляет 36 часов, в том числе 30 часов составляют практические занятия. В связи с практической направленностью дисциплины разработано 15 практических работ.

Практические работы позволяют закрепить, систематизировать и определить уровень знаний и умений.

В рамках программы учебной дисциплины обучающимися осваиваются умения изнания:

Код ОК	Умения	Знания
ОК 01 ОК 02 ОК 04 ОК 09	общаться (устно и письменно) на иностранном языке на профессиональные и повседневные темы; переводить (со словарем) иностранные тексты профессиональной направленности; самостоятельно совершенствовать устную и письменную речь, пополнять словарный запас.	– лексический (1200-1400 лексических единиц) и грамматический минимум, необходимый для чтения и перевода (со словарем) иностранных текстов профессиональной направленности.

Результаты (основные общие компетенции)	Основные показатели результатов подготовки
ОК 01. Выбирать способы решения задач профессиональной деятельности применительно к различным контекстам	- проявлять интерес к различным сферам профессиональной деятельности, -определять цели деятельности, задавать параметры и критерии их достижения; - выявлять причинно-следственные связи и актуализировать задачу, выдвигать гипотезу ее решения, находить аргументы для доказательства своих утверждений, задавать параметры и критерии решения;

<p>ОК 02. Использовать современные средства поиска, анализа и интерпретации информации, и информационные технологии для выполнения задач профессиональной деятельности</p>	<p>- владеть навыками получения информации из источников разных типов, самостоятельно осуществлять поиск, анализ, систематизацию и интерпретацию информации различных видов и форм представления; - оценивать достоверность, легитимность информации, ее соответствие правовым и морально-этическим нормам; - владеть навыками распознавания и защиты информации, информационной безопасности личности</p>
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КРИТЕРИИ ОЦЕНИВАНИЯ

Критерии оценки выполнения фонетических, лексических и грамматических упражнений (тестов)

- Отметка «5»** Задания выполнены на 90-100%
Отметка «4» Задания выполнены на 75-89%
Отметка «3» Задания выполнены на 50-74%
Отметка «2» Задания выполнены менее чем на 50%

Критерии оценки письменных развернутых ответов

- Отметка «5»** Коммуникативная задача решена полностью, применение лексики адекватно коммуникативной задаче, грамматические ошибки либо отсутствуют, либо не препятствуют решению коммуникативной задачи
Отметка «4» Коммуникативная задача решена полностью, но понимание текста незначительно затруднено наличием грамматических и/или лексических ошибок.
Отметка «3» Коммуникативная задача решена, но понимание текста затруднено наличием грубых грамматических ошибок или неадекватным употреблением лексики.
Отметка «2» Коммуникативная задача не решена ввиду большого количества лексико-грамматических ошибок или недостаточного объема текста.

Критерии оценки техники чтения

- «5»** Речь воспринимается легко: необоснованные паузы отсутствуют; фразовое ударение и интонационные контуры, произношение слов практически без нарушений нормы; допускается не более 2-х фонетических ошибок;
«4» Речь воспринимается достаточно легко, однако присутствуют необоснованные паузы; фразовое ударение и интонационные контуры практически без нарушений нормы; допускается от 3 до 5 фонетических ошибок, в том числе 1-2 ошибки, искажающие смысл;
«3» Речь воспринимается достаточно легко, однако присутствуют необоснованные паузы; есть ошибки в фразовых ударениях и интонационных контурах; допускается от 5 до 7 фонетических ошибок, в том числе 3 ошибки, искажающие смысл;
«2» Речь не воспринимается из-за необоснованных пауз; неправильных фразовых ударений и искаженных интонационных контуров И\ИЛИ 8 и более фонетических ошибок.

Критерии оценки перевода текста

Оценка «отлично»

- Перевод полный, без пропусков и произвольных сокращений текста оригинала, не содержит фактических ошибок. Терминология использована правильно.
 Перевод отвечает системно-языковым нормам и стилю языка перевода.
 Адекватно переданы культурные и функциональные параметры исходного текста.

Допускаются некоторые погрешности в форме предъявления перевода.

Оценка «хорошо»

Перевод полный, без пропусков и произвольных сокращений текста оригинала, допускается одна фактическая ошибка, при условии отсутствия потерь информации и стилистических погрешностей на других фрагментах текста.

Имеются несущественные погрешности в использовании терминологии.

Перевод в достаточной степени отвечает системно-языковым нормам и стилю языка перевода.

Культурные и функциональные параметры исходного текста в основном адекватно переданы.

Коммуникативное задание реализовано, но недостаточно оптимально.

Допускаются некоторые нарушения в форме предъявления перевода.

Оценка «удовлетворительно»

Перевод содержит фактические ошибки.

Низкая коммуникативность и плохая «читабельность» текста затрудняют его понимание рецептором.

При переводе терминологического аппарата не соблюден принцип единообразия.

В переводе нарушены системно-языковые нормы и стиль языка перевода.

Неадекватно решены проблемы реализации коммуникативного задания.

Имеются нарушения в форме предъявления перевода.

Оценка «неудовлетворительно»

Перевод содержит много фактических ошибок.

Нарушена полнота перевода, его эквивалентность и адекватность.

В переводе грубо нарушены системно-языковые нормы и стиль языка перевода.

Коммуникативное задание не выполнено.

Грубые нарушения в форме предъявления перевода.

Критерии оценки монологического и диалогического высказываний:

«5»

Соблюден объем высказывания. Высказывание соответствует теме, отражены все аспекты, указанные в задании, стилевое оформление речи соответствует типу задания, аргументация на уровне, нормы вежливости соблюдены.

Адекватная естественная реакция на реплики собеседника. Проявляется речевая инициатива для решения поставленных коммуникативных задач.

Лексика адекватна поставленной задаче и требованиям данного года обучения языку.

Использованы разные грамматические конструкции в соответствии с задачей и требованиям данного года обучения языку. Редкие грамматические ошибки не мешают коммуникации.

Речь звучит в естественном темпе, нет грубых фонетических ошибок.

«4»

Не полный объем высказывания. Высказывание соответствует теме; не отражены некоторые аспекты, указанные в задании, стилевое оформление речи соответствует типу задания, аргументация не всегда на соответствующем уровне, но нормы вежливости соблюдены.

Коммуникация немного затруднена.

Лексические ошибки незначительно влияют на восприятие речи учащегося.

Грамматические незначительно влияют на восприятие речи учащегося.

Речь иногда неоправданно паузирована. В отдельных словах допускаются фонетические ошибки (замена, английских фонем сходными русскими). Общая интонация обусловлена влиянием родного языка.

«3»

Незначительный объем высказывания, которое не в полной мере соответствует теме; не отражены некоторые аспекты, указанные в задании, стилевое оформление речи не в полной мере соответствует типу задания, аргументация не на соответствующем уровне, нормы вежливости не соблюдены.

Коммуникация существенно затруднена, учащийся не проявляет речевой инициативы. Учащийся делает большое количество грубых лексических ошибок.

Учащийся делает большое количество грубых грамматических ошибок.

Речь воспринимается с трудом из-за большого количества фонетических ошибок. Интонация обусловлена влиянием родного языка.

«2»

Учащийся не понимает смысла задания. Аспекты указанные в задании не учтены.

Коммуникативная задача не решена. Учащийся не может построить высказывание.

Учащийся не может грамматически верно построить высказывание. Речь понять не возможно.

Практическая работа № 1.

Practice of the technical translation / **Практика технического перевода**

Industry / Промышленность

1. Read and translate the text in written form.

Industry

Iron ore is mined in Northamptonshire and Humberside.

Cornwall is the only county in England that provides the nation with tin ore.

Sand, gravel, widely available, provide raw materials for the construction industry.

Clay and salt are found in the northwestern England, and china clays available in Cornwall.

More than two-thirds of those employed in England work in the service industries.

London is a major financial, banking, and insurance centre.

Cambridge, Ipswich and Norwich are important service and high-tech centres.

Nearly a quarter of England's workers are employed in manufacturing. Major industries located in the northern counties include food processing, brewing, and the manufacture of chemicals, textiles, computers, automobiles, aircraft, clothing, glass, and paper products.

Leading industries in Southeastern England are pharmaceuticals, computers, microelectronics, aircraft parts, and automobiles. England produces 90 % of Britain's coal.

TASK TO THE TEXT

A. Translate into English in written form.

1. Англия производит 90 % британского угля.
2. Включая пищевую, обрабатывающую промышленность, пивоварение, производство химикатов, текстиля, компьютеров, автомобилей, самолетов, одежды, стекла, бумаги и бумажной продукции.
3. Ипсвич, Норвич являются важными центрами обслуживания и высоких технологий.

4. Ведущие промышленности в Юго-Восточной Англии – фармацевтика, производство компьютеров, микро-электроники, деталей к самолетам, автомобилей. 5. Фарфоровая глина распространена в Корнуолле. 6. Более двух третей работников. 7. Работать в сфере обслуживания. 8. Лондон – основной финансовый, банковский и страховой центр. 9. Широко распространенный песок и гравий дают сырьё. 10. Около четверти английских рабочих заняты в обрабатывающей промышленности. 11. Основные промышленные центры находятся в северных графствах. 12. Это единственное графство в Англии, которое обеспечивает нацию оловянной рудой. 13. Глину и соль добывают в Северо-Западной Англии. 14. Железная руда добывается в Хамберсайде.

2. Read and translate the text in written form.

Future profession

There are very many noble and interesting professions. I want to be a doctor – it is my dream. I like this profession and I am going to get a medical education and then to work at a hospital. Many members of our family are working in the domain of medicine. It is one of the traditions in our big family. My mother is a children's doctor, my father is a surgeon and my grandfather is a dentist. I also want to become a doctor.

As a child I spent much time at the city hospital, because my father worked there in the surgical department. Now he works in the surgical department of another hospital. It was very interesting to look him working. From day to day he takes care of his patients. My father is an excellent expert and treats his patients well. He always attends to their needs. Every day he asks all his patients about their complaints during his ward round. He wants his patients to become able-bodied as soon as possible and he tries to treat them in a proper way. My father is a skilled surgeon. His main task is to operate on innards. Every day he operates on his patients in the operating room of the hospital. After the operation every patient is under his care. He helps the patients to recover. My father is proud and glad when he can say that his patient is quite recovered. My father always instructs his patients what they have to do after the operation for better recovering. It is very important to keep to the right diet, to do mild physical jerks and so on. My father often tells us different stories about patients and doctors, about the importance of this profession for people. He also speaks in praise of sports, because regular exercises give our lungs, heart, and muscles a good workout and keep us able-bodied. I like the profession of my father. My dream is to become a skilled physician.

TASK TO THE TEXT

A. Translate into English in written form.

1. Существует много благородных и интересных профессий. 2. Я хочу быть водителем – это моя мечта. 3. Мне нравится эта специальность, и я намереваюсь получить высшее образование и затем работать на большом заводе. 4. Многие члены нашей семьи работают в области металлургии. 5. Это одна из традиций в нашей большой семье. 6. Моя мама – педиатр, мой папа – электрик, а мой дедушка – шахтер. 7. Я хочу стать ювелиром.

8. В детстве я много времени проводил в школе, поскольку там работала моя мама. 9. Сейчас она работает в другой школе. 10. Было очень интересно смотреть, как она работает. 11. Из дня в день она учит своих учеников. 12. Моя мама – отличный специалист и хорошо учит своих учеников. 13. Она всегда со вниманием относится к каждому из них. 14. Она хочет, чтобы ее ученики получили достойное образование.

15. Мой отец является опытным водителем. 16. Его основной задачей выступают операции на внутренних органах человека. 17. Мой отец всегда инструктирует своих пациентов относительно того, что им нужно делать после операции для лучшего восстановления. 18. Очень важно придерживаться правильной диеты, делать легкие физические упражнения и так далее. 19. Мой дед часто рассказывает нам разные истории из своей жизни.

20. Она также говорит о пользе спорта, потому что регулярные физические упражнения дают нашим легким, сердцу и мускулам хорошую тренировку и поддерживают нас крепкими и здоровыми. 21. Мне нравятся профессии моих родителей. Моя мечта заключается в том, чтобы стать опытным специалистом.

Практическая работа № 2.

Read and translate the text in written form.

My future profession

Plans for future is a problem that worries not only me, but my friends, classmates, parents and teachers. The reason is that at the age of 17 we have to make a very important choice in our life – the choice of a profession. On the one hand, I'm adult enough to have an opinion of my own about what I'm interested in and what I'm good at. On the other hand, at this age we **lack** life experience and our **desires** sometimes don't **coincide** with our **possibilities**. That's why it's very important to have somebody to give us **a piece of advice**. Such people are our parents, teachers and friends.

As for me, I want to be an economist. I like to read books of economics, **research** articles and analyze them. Nowadays this profession has become one of the most useful, modern and interesting. Also, I want to study **economics** as I'm very interested in **current** economic processes both in our country and in other countries. It's not a secret that our country (Russia, Ukraine, Belorussia, Kazakhstan) is now through a difficult periods of times. That's why it's very important for our country to have **efficient** economists to raise our economy at a high level.

I hope that I'll be a good economist. Like many other people I would like to spend a year abroad working as an economist. It would give me an **opportunity** to **borrow** the experience and to see the world.

So, I'll do everything to become a good economist and I'm sure I'll never **regret** my **decision** to follow this career.

TASK TO THE TEXT

A. Using a PC, create an English presentation «My future profession». Present it as an English monologue.

B. Put the sentences in correct order and translate them into English.

1. Таким образом, я сделаю все возможное, чтобы стать хорошим экономистом и я уверен, что никогда не пожалею о своем выборе.

2. Я надеюсь, что я буду хорошим экономистом. 3. Также я хочу изучать экономику, так как я интересуюсь текущими экономическими процессами и в нашей стране, и в других странах. 4. С другой стороны, в этом возрасте нам все же не хватает жизненного опыта, и наши желания не всегда совпадают с нашими возможностями. 5. Вот почему очень важно, чтобы кто-то дал полезный совет. 6. Такие люди – это наши родители, учителя и друзья.

7. Не секрет, что наша страна (Россия, Украина, Белоруссия, Казахстан) сейчас переживает трудные времена. 8. Мне нравится читать книги по экономике, изучать статьи и анализировать их. 9. Сегодня эта профессия стала одной из самых полезных, современных и интересных. 10. С одной стороны, я достаточно взрослый, чтобы иметь свое мнение о том, что мне интересно и что у меня получается. 11. Что касается меня, то я хочу быть экономистом. 12. Это дало бы мне возможность перенять опыт и увидеть мир.

13. Дело в том, что в возрасте 17 лет мы должны сделать очень важный выбор в своей жизни – выбор профессии. 14. Как многие другие люди, я хотел бы провести год за границей, работая экономистом. 15. Вот почему очень важно для нашей страны иметь квалифицированных экономистов, чтобы поднять экономику нашей страны на более высокий уровень.

16. Планы на будущее – это проблема, которая волнует не только меня, но и моих друзей, одноклассников, родителей и учителей.

VOCABULARY TO THE THEME

To lack [læk] – испытывать недостаток, нехватать

Desire [dɪ'zʌɪə] – желание

To coincide [ˌkəʊɪn'saɪd] – совпадать

Possibility [ˌpɒsɪ'bɪlɪti] – возможность

A piece of advice [ə'pi:s ɒv əd'vaɪs] – совет

To research [rɪ'sə:tʃ] – изучать, исследовать

Economics [i:kə'nɒmɪks] – экономика

Current ['kʌr(ə)nt] – текущий

Efficient [ɪ'fɪʃ(ə)nt] – квалифицированный

Opportunity [ɒpə'tju:nɪti] – возможность

To borrow ['bɒrəʊ] – заимствовать, перенимать

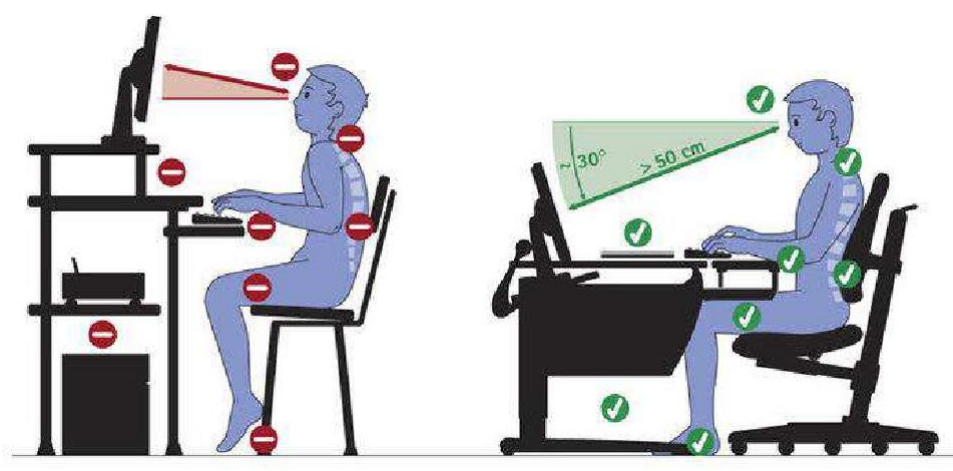
To regret [rɪ'ɡret] – сожалеть

Decision [dɪˈsɪz(ə)n] – решение, выбор

Практическая работа № 3.

Read and translate the text in written form.

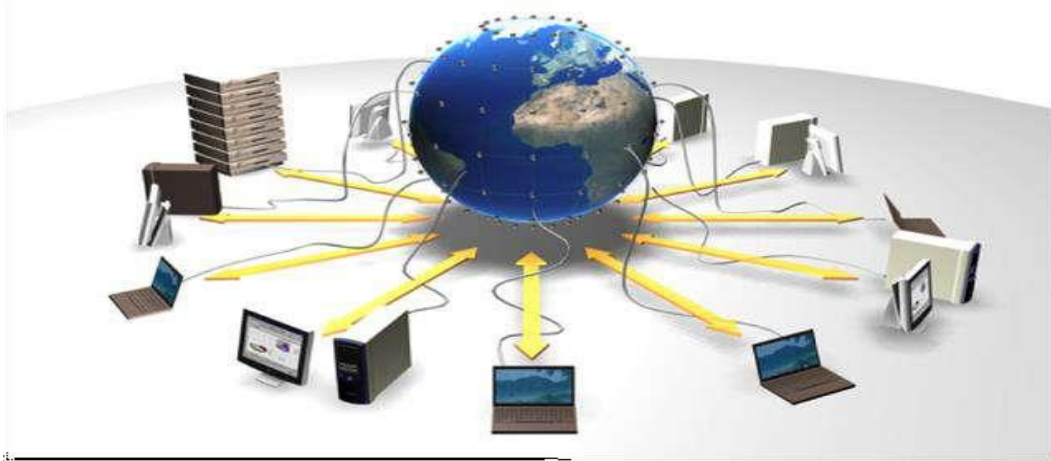
Computer



Computers have drastically changed everyone's lives. Several decades ago people haven't even known anything about these electronic devices, whereas nowadays even a small child can operate this machine. Almost all modern technology depends on computers, which are used for data storage: files, secret information, bank transactions and else. Computer technology belongs to the fastest-growing industry. Computers of different types and sizes are used by modern society. It is interesting that the first computer was the size of a minibus and weighed almost a ton. Whereas now it can be a small chip the size of a pin. And computer technology is not standing still, it's rapidly progressing. Soon we might have the computers which will be built-in our glasses, earrings, and other objects. Perhaps, the next generation of computers will have the ability to talk and think just as people do. Many people find computers dangerous and time-consuming. On the other hand, computers are very fast and they seldom make mistakes. They save lots of time, and besides all the necessary information can be found on Internet. So, instead of going to the libraries or other institutions, we can simply surf the worldwide web. Another advantage is the instant possibility to send letters, whereas some time ago we had to wait for weeks and months to have them delivered. Moreover, with the help of computers and Internet, shopping has become much easier. Firstly, we can find what we exactly want, secondly we can choose the affordable price, and thirdly, we can have the chosen items delivered. After all, computers have become the most useful tool in everyone's homes nowadays and they have certainly changed our lives for the better.

Read and translate the text in written form.

Computerization



I would like to tell you about my attitude towards computerization. Less than a century ago people thought that computers were typical fiction, and the same concerned the Internet. Of course, there were typewriters and calculators, but computers seemed tales. But later the forefathers of modern computers, so-called computers (electronic computers) of the first generation were invented. As the name implies they were electric and worked on the basis of electric lamps. Then came the second generation of computers running on transistors. Transistors were another breakthrough in the field of computing; they were much smaller than lamps and therefore did many more operations.

A few years later the computers of the third-generation were created. They used Small Integrated Circuits (SIC), which increased the compactness, performance, and availability of computers thus reducing the price of computers. A few years later the computers of the fourth generation were created. These computers used large-scale integrated circuits (LIC), which once again reduced the size and the cost of computers.

Starting with the second-generation computers started to be used at research institutions and at workplaces. They were used not only in the scientific but, first of all, in the military, and then in the medical and industrial purposes. They made it easier for people to work.

Soon after the fourth generation of computers personal computers (PCs) appeared. PCs could perform more complicated calculations and bigger complex of another tasks. PCs greatly extended the possibilities of the user.

Now computers are practically everywhere: in the washing machine, in many kitchen electrical appliances, cars, and even in some shower cabins, and that's not all – a cell phone is a computer to a certain extent too. The size has become smaller than a palm. The computer is certainly a very handy thing, but now it has become the part of our everyday life. And if computers disappear from our life some people will not know what to do. But just think – phones will

disappear, shops won't work, banks and services that work with electronic money will suffer huge losses. It will slow down the work of many departments and agencies, not to mention various military equipment.

So I've expressed my point of view, and you can certainly have your own ideas.

Практическая работа № 4.

2.1. Metals and alloys / Металлы и сплавы

Metals and alloys – Металлы и сплавы

	алюминий - aluminium [æljə'miniəm]		латунь - brass [brɔ:s]		свинец - lead [led]
	бронза - bronze [brɔnz]		магний - magnesium [mæg'ni:ziəm]		серебро - silver ['silvə]
	железо - iron ['aiən]		медь - copper ['kɔpə]		сталь - steel [sti:l]
	жесть - tin [tin]		никель - nickel ['nikl]		титан - titanium [ti'teiniəm, tal'te:niəm]
	золото - gold [gəʊld]		олово - tin [tin]		цинк - zinc [ziŋk]
	калий - potassium [pə'tæsiəm]		платина - platinum ['plætiŋəm]		цирконий - zirconium [zɜ:'kəʊniəm]
	кальций - calcium ['kælsiəm]		ртуть - mercury ['mɜ:kjəri, 'mɜ:kjuri]		чугун - cast iron ['kɑ:st,aiən]

1. Read and translate the text in written form.

Metals

In general, metals are solids with a metallic luster, conductors of electricity, malleable, and of high physical strength. In compound form the metals have positive valences. Probably their most important characteristic is that when used as metals they are predominately in elemental form or alloyed with other metals. The metals long used by mankind – iron, copper, zinc, tin, lead, mercury, silver and gold – are those which exist as easily recognized minerals in large deposits and which are easily reduced from compound to elemental form.

The most important metal, iron, is both prevalent and easily reduced to metallic form. In more recent times some of the most naturally prevalent metals that are difficult to reduce have become common and readily available due to the development of electrochemical processes for their production. These include aluminum, magnesium and sodium.

The metals occur most commonly as oxides or sulphides in ores that contain variable amounts of gangue materials like clay, silica, granite, etc., from which the metallic compounds must be separated.

Since only a few of the metals, such as copper, gold, silver, platinum and bismuth, exist naturally in elemental form, the chief problem is that of reducing them from compound to elemental form.

Some of the more common reduction methods include: a) hydrometallurgical, b) electrolytic, c) metal replacement.

TASKS TO THE TEXT

A. Answer the questions in written form.

1. What are metals? 2. Which is the most important characteristic of metals? 3. What metals have long been used by mankind? 4. How do these metals exist? 5. What metals have become common in more recent times? 6. What metals exist naturally in elemental form? 7. State the more common reduction methods.

B. Find the translation of the English and Russian sentences. English

equivalents

1. Metals are a group of elements that share certain properties. 2. They conduct heat and electricity well, which is why cooking pans and electrical wires are made of metal. 3. They are also strong and can be shaped easily; this is why they are used to make structures such as bridges. 4. They are usually mixed with other metals or nonmetals to form combinations known as alloys.

5. Although there are many similarities between metals, there are also differences that determine how suitable a metal is for a particular use. 6. Of the 109 elements known today, 87 are metals. 7. They are rarely used in their pure state.

Russian equivalents

1. Хотя разные металлы имеют много общего, они также имеют различия, которые определяют, насколько тот или иной металл пригоден для определенных целей. 2. Из 109 известных на сегодняшний день элементов 87 – металлы. 3. Они редко используются в чистом виде. 4. Они хорошо проводят тепло и электричество, поэтому сковородки и электропровода делаются из металла. 5. Обычно они смешаны с другими металлами или не-металлами, создавая комбинации, известные как сплавы. 6. Металлы – это группа элементов, которые наделены определенными свойствами. 7. Кроме того, они прочные и легко могут принимать любую форму, поэтому они используются в строительстве таких сооружений, как мосты.

VOCABULARY TO THE THEME

Alloys ['æloiz] – сплав; лигатура, примесь

Although [ɔ:l'dəu] – хотя, если бы даже; несмотря на то, что

Certain ['sə:t(ə)n] – точный, определенный

Conduct (conducted, conducted) [kən'dʌkt ([kən'dʌktɪd])] – проводить; служить проводником

Electrical wires [ɪ'lektrik(ə)l 'waɪəz] – электропроводка

Electricity [ɪlek'trɪsɪti] – электричество

Particular [pə'tɪkjʊlə] – редкий, особенный, специфический

Property ['prɒpəti] – свойство, качество

Pure [pjʊə] – чистый; беспримесный

Rarely ['re:li] – редко, нечасто

Shape (shaped, shaped) [ʃeɪp ([ʃeɪpt])] – придавать форму; делать по какому-либо образцу

Share (shared, shared) [ʃe:([ʃeəd])] – делить

Similarity [sɪmə'larəti] – подобие, сходство

State [steɪt] – состояние, положение

Structure ['strʌktʃə] – строение, структура; конструкция, устройство

Suitable ['su:təb(ə)l] – годный, подходящий, пригодный, применимый, соответствующий

Use (used, used) ['ju:s ([ju:zd])] – использовать, применять, употреблять

2. Read and translate the text in written form.

Current flow in metal

A metal such as copper is an elemental substance, which is composed of copper atoms. The formation of the **gross substance** copper involves relatively tight packing of these atoms. The atoms are supposed to be so close together that the outer electronic orbits overlap.

Such electrons **are not uniquely bound to any one particular atom**. These electrons are said to exist in the material somewhat as a «fog» surrounding the atoms. Consequently, these electrons are quite free to move from atom to atom (*fig. 2*). At ordinary temperatures, these electrons are imparted **random motions** by the action of thermal energy. If we subject the free electrons to the pressure of an electric field by connecting a battery to the wire, **an orderly procession of electrons is superimposed upon** the thermally induced random motion. Electrons are then supplied by the negative pole of the battery and «collected» at the opposite pole. Within the wire, electrons are impelled to move from one atom to another.

Typical «Free» electrons available
for conduction

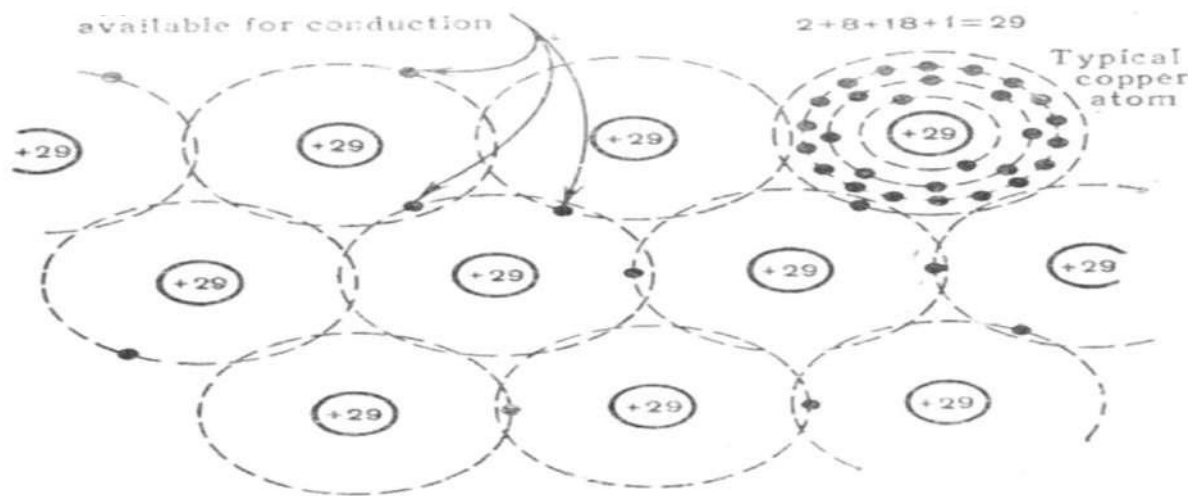


Fig. 2. Copper atoms are densely packed. The outer orbit electrons are free to move from atom because these orbits overlap one another.

VOCABULARY TO THE THEME

Gross substance – масса вещества

Are not uniquely bound to any one particular atom – не связаны с одним единственным атомом.

Random motions – беспорядочное движение.

An orderly procession of electrons is superimposed upon... – упорядоченное движение электронов накладывается на...

3. Answer the following questions.

1. What is copper composed of? 2. Why is copper classified as a conductor? 3. What occurs if we subject the free electrons to the pressure of an electric field?

4. Translate into Russian the following sentences paying attention to the Subjective Infinitive Construction.

1. Many elements and compounds are known to be semiconductors.
2. The atom is assumed to have a central nucleus, which carries most of the mass of the atom and has a positive charge.
3. The first transistor is known to be developed in 1948.
4. Some semiconductors are found to exhibit one conductivity type only.
5. The electron is supposed to move with great velocity.
6. Like charges are known to repel each other.

Практическая работа № 5.

Read and translate the text in written form

Steel



The most important metal in industry is iron and its **alloy** – steel. Steel is an alloy of iron and carbon. It is strong and **stiff**, but **corrodes** easily through **rusting**, although **stainless** and other special steels **resist** corrosion. The amount of carbon in steel influences its properties **considerably**. Steels of low carbon **content** (mild steels) are quite ductile and are used in the manufacture of sheet iron, wire, and pipes. Medium-carbon steels containing from 0,2 to 0,4 per cent carbon are **tougher** and stronger and are used as structural steels. Both mild and medium-carbon steels are suitable for forging and **welding**. High-carbon steels contain from 0,4 to 1,5 per cent carbon, are hard and **brittle** and are used in **cutting tools**, **surgical instruments**, razor **blades** and **springs**. Tool steel, also called silver steel, contains about 1 per cent carbon and is strengthened and toughened by quenching and tempering.

The **inclusion** of other elements **affects** the properties of the steel. **Manganese** gives extra strength and toughness. Steel containing 4 per cent **silicon** is used for transformer **cores** or electromagnets because it has large grains acting

like small magnets. The addition of chromium gives extra strength and corrosion resistance, so we can get **rust-proof** steels. Heating in the presence of carbon or **nitrogen-rich** materials is used to form a hard surface on steel (case-hardening). High-speed steels, which are extremely important in machine-tools, contain chromium and **tungsten** plus smaller amounts of vanadium, molybdenum and other metals.

VOCABULARY TO THE THEME

Alloy ['æləɪ] – сплав

Carbon ['kɑ:b(ə)n] – углерод

Stiff [stɪf] – жесткий

To corrode [kə'reʊd] – разъедать, ржаветь

Rusty ['rʌsti] – ржавый

Stainless ['steɪnləs] – нержавеющей

To resist [rɪ'zɪst] – сопротивляться

Considerably [kən'sɪd(ə)rəbli] – значительно, гораздо **Tough**

[tʌf] – крепкий, жесткий, прочный, выносливый **Forging**

['fɔ:dʒɪŋ] –ковка

Welding ['weldɪŋ] – сварка

Brittle ['brɪt(ə)l] – хрупкий, ломкий

Cutting tools ['kʌtɪŋ tu:lz] – режущие инструменты

Surgical instruments ['sə:dʒɪk(ə)l 'ɪnstɹəmənts] – хирургические инструменты

Blade [bleɪd] – лезвие

Spring [sprɪŋ] – пружина

Inclusion [ɪn'klju:ʒ(ə)n] – включение **To**

affect [ə'fekt] – влиять **Manganese**

['mæŋɡəni:z] – марганец **Silicon** ['sɪlɪk(ə)n]

– кремний

Rust-proof [rʌst pru:f] – нержавеющей

Nitrogen ['nɪtrədʒ(ə)n] – азот **Tungsten**

['tʌŋst(ə)n] – вольфрам

TASKS TO THE TEXT

A. General understanding /answer the questions in written form.

1. What is steel? 2. What are the main properties of steel? 3. What are the drawbacks of steel? 4. What kinds of steel do you know? Where are they used? 5. What gives the addition

of manganese, silicon and chromium to steel?

5. What can be made of mild steels (medium-carbon steels, high-carbon steels)?

6. What kind of steels can be forged and welded? 8. How can we get rust-proof (stainless) steel? 9. What is used to form a hard surface on steel? 10. What are high-speed steels alloyed with?

B. Find the following words and word combinations in the text:

1) сплав железа и углерода; 2) прочный и жесткий; 3) легко корродирует; 4) нержавеющая сталь; 5) низкое содержание углерода; 6) ковкость;

7) листовое железо, проволока, трубы; 8) конструкционные стали; 9) пригодны дляковки и сварки; 10) твердый и хрупкий; 11) режущие инструменты; 12) хирургические инструменты; 13) инструментальная сталь;

14) упрочнять; 15) добавление марганца (кремния, хрома, вольфрама, молибдена, ванадия).

6. Read the text in Russian. Translate it into English in written form.

Холодная формовка металлов



Объемная формовка

Объемная формовка – формообразование изделий путем заполнения металлом полости штампа.

Холодная штамповка. Она производится в открытых штампах, где излишки металла вытекают в специальную полость для образования облой (облой – излишки материала, остающиеся на детали после обработки), и в закрытых штампах, где облой не образуется. Формовку в закрытых штампах применяют реже из-за больших сложности и стоимости получения заготовок точного объема, необходимости использования более мощного оборудования и меньшей стойкости штампов. В закрытых штампах получают в основном детали из цветных металлов.

Объемной формовкой изготавливают пространственные детали сложных форм, сплошные и с отверстиями. Холодная объемная формовка требует значительных удельных усилий вследствие высокого сопротивления металла деформированию в условиях холодной деформации и упрочнения металла в процессе деформации. Упрочнение сопровождается снижением пластичности металла. Для облегчения процесса деформирования оформление детали расчленяется на переходы, между которыми заготовку подвергают *рекристаллизационному отжигу*. Каждый переход осуществляют в специальном штампе (рис. 1), а между переходами обрезают облой для уменьшения усилия деформирования и повышения точности размеров деталей.

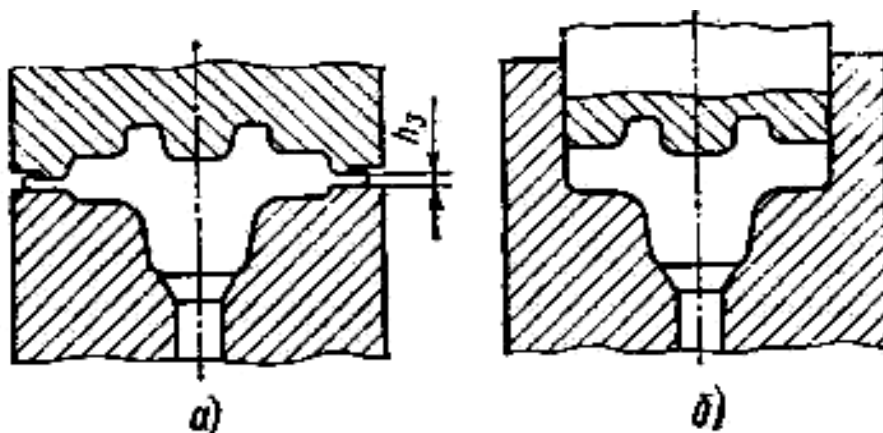


Рис. 1. Схемы объемной формовки:

а – открытый штамп; б – закрытый штамп

Заготовкой служит полоса или пруток, причем процесс штамповки может осуществляться непосредственно в полосе или прутке или из штучных заготовок.

Кузнечно-прессовое оборудование

В качестве оборудования используют *прессы*, однопозиционные и многопозиционные автоматы.

TASK TO THE TEXT

A. Make the dictionary of the words and word-combinations up using the text «Metal cold molding».

VOCABULARY TO THE THEME

Metal cold molding – холодная формовка металлов

Modern molding equipment – современные формовочные машины

Green sand (damp [dæmp] sand) – сырой песок

Sand of somewhat coarse [kɔ:s] grain [greɪn] – крупнозернистый песок **And then baking the mixture dry** – а затем высушиванием смеси **Are usually made up one day** – обычно заготавливаются днем

Baked overnight – высушиваются за ночь

Assembled and cast the next day – сборка и литье происходит на следующий день

Skin-dried mold – форма, высушенная с поверхности

Dry-sand bond [bɒnd] – сухой песок в качестве связывающего вещества

Partial ['pɑ:ʃ(ə)l] mold [məʊld] – мастичная форма (неполная форма)

The remaining [rɪ'meɪnɪŋ] portion ['pɔ:ʃ(ə)n] of the mold is completed with green-sand – оставшая часть формы заполняется сырым песком

Are kept in stock – имеется в качестве сырья

Should be very fine to bring out this detail – должен быть очень мелким, чтобы воспроизвести деталь

Come off through [θru:] – выходить (удаляться) через песок

Bench work – верстачная работа

Light [laɪt] floor work – негромоздкая работа

Less fine – более крупный

Is high in silica – содержащий много кварца

For a long time after – долгое время после

Which makes a strong bond – который действует как сильное связывающее вещество

Facing materials – припылы

Comes in contact – соприкасается

The object is to give a smooth [smu:ð] surface ['sə:fɪs] to – этот элемент должен придавать поверхности гладкость

Практическая работа № 7.

Read and translate the text in written form.

Sand molding equipment and materials

There are three principal methods of making sand molds. Green-sand or damp-sand molds are formed by mixing silica, 8 per cent or 15 per cent clay, and a small amount of water. Green-sand molds are recommended for cast iron.

Dry-sand molds are formed by mixing sand of somewhat coarse grain with a clay-bonding material and water, and then baking the mixture dry. These molds are used where heavy work is to be cast. Dry-sand molds are usually made up one day, baked overnight, and assembled and cast the next day. Dry-sand molds are recommended for steel castings.

A *modified sand mold* (also called a *skin-dried mold*) has been found suitable for certain types of sand castings. Silica sand (silicon dioxide) is mixed with a dry-sand bond. The mixture is packed around the pattern to a thickness of ½ inch thus forming a partial mold, which is permitted to dry out. When the partial mold is dry the remaining portion of the mold is completed with green sand.

There are three classes of materials for molding that are kept in stock in the foundry. Molding sands (light, medium and heavy), facings (graphite for blacking or finely ground soft coal) and miscellaneous (fire clay, core binders and parting compounds).

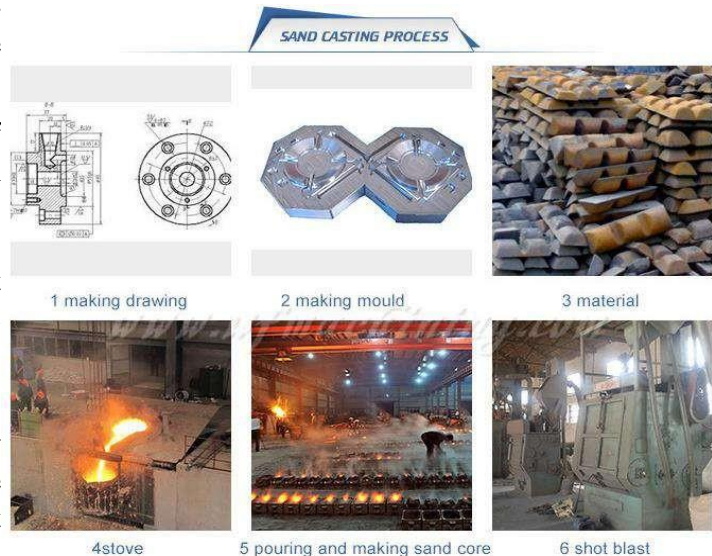
Light sand is used for the castings such as stove plate. The sand should be very fine to bring out this detail; it must be strong; i. e., high in clay content, so that the mold will retain every detail as the metal rushes in. Fine sand can be used for such casting because the work will cool so quickly that after the initial escape of the air and steam there will be very little gas to come off through the sand.

Medium sand is used in bench work and light floor work such as making machinery castings having from 1 to 2 sections. These castings are less fine than those molded in light sand. Therefore, the molding sand for this type of casting is coarser than in the case previously described.

Heavy sand is used for very large iron and steel castings. This sand is high in silica, low in lime, and its grain is coarse in order to resist the heat of the molten metal and enable the formed gases to pass through the molding sand for a long time after the molten metal is poured. This type of molding sand must be held firmly together by a large proportion of clay, which makes a strong bond.

Foundry Facing Materials are either applied or mixed with the molding sand that comes in contact with the melted metal. The object is to give a smooth surface to the casting.

Different forms of carbon are used for facing purposes because carbon will glow and give off gases, but it will not melt. The principal carbon facing is graphite.



Read and translate the text in written form.

Milling machines



Milling is the process of removing metal with rotating cutters.

The essential features of most milling machines are a power-driven table on which the work is done, and a spindle carrying one or more multiple-toothed cutters, slots or grooves.

The horizontal milling machine consists of a main casting in which is mounted the spindle and its gear drive, and the feed gearbox. On the front of this casting is a vertical V-guide on which is mounted the knee. The knee is raised or lowered by a telescopic jackscrew. A saddle slides from front to back on V-guides on the top of the knee. The worktable is mounted in V-guides on the saddle. The table is provided with movement in two directions at right angles to each other in the horizontal plane, and with vertical movement relative to the cutter, whose height is permanently fixed.

The cutter is mounted on an arbor, and held in the desired position by spacing washers and a locking nut.

The type of a cutter mainly used on the horizontal miller is what is known as a side and face cutter, that is, a cutter provided with cutting edges on both sides and on periphery. For large flat surfaces, roller-milling cutters are used, having cutting edges in the form of helix about the axis of rotation.

VOCABULARY TO THE THEME

Milling machines [ˈmɪlɪŋ məˈʃiːnz] – фрезерные станки

Rotating cutters [rəʊˈteɪtɪŋ ˈkʌtəz] – вращающиеся фрезы

Power-driven table [ˈpaʊə-ˈdrɪvŋ ˈteɪb(ə)l] – столик с механическим приводом

Multiple-toothed cutters [ˈmʌltɪp(ə)l-tuːθt ˈkʌtəz] – многозубчатые фрезы

Gear drive [ɡiə drɑɪv] – шестеренчатый привод

Feed gear-box [fiːd ˈɡiəbɒks] – зубчатая коробка передач

V-guide [viː ˈɡaɪd] – V-образная направляющая

Jack screw [dʒæk skruː] – домкратный винт

On the top of the knee [niː] – на верху кронштейна

At right angles [æt raɪt ˈæŋɡəlz] – под прямыми углами

Relative to [ˈrelətɪv tuː] – относительно

Is permanently fixed [ɪz ˈpɜːm(ə)nəntli fɪkst] – постоянно закреплен

Is mounted on an arbor [ˈmaʊntɪd ɒn ən ˈɑːbɔː] – смонтированный на шпинделе

Spacing washers and a locking nut [ˈspeɪsɪŋ ˈwɒʃəz ænd ə ˈlɒkɪŋ nʌt] – распорные шайбы и зажимные гайки

Side and face cutter – боковая и лобовая фреза

Cutting edges on both sides and on periphery [ˈedʒɪz ɒn bəʊθ saɪdɪz ænd ɒn pɪrɪfəri] – режущие кромки по бокам и на периферии

In the form of helix about the axis of rotation [ɪn(ə) ˈteɪʃ(ə)n] – в форме спирали

Практическая работа № 8.

Read and translate the text in written form.

What is the Modern Tools difference?

High-quality products. Superior service and support. The experience your business needs.

When buying machine tools, you need a supplier you can count on to deliver the right equipment at the right price, with peace of mind that your investment won't let you down. At

Modern Tools, our experienced team delivers and maintains quality products from global brands and gives you the right advice when you need it. Don't risk your business on inferior products and inexperience! Our priority is making sure you have the right product for your needs, as well as the support and warranty to make sure it continues to run long into the future.

Relax, you're covered 12, 24 and 36 month warranties keep you protected. Modern Tools provides industry-leading warranties up to 36 months – to ensure that your business is protected even when problems occur. Our service team can also provide onsite support in all Australian states and territories. The wrong advice can hurt your business.

Talk warranties to an experienced and knowledgeable team.

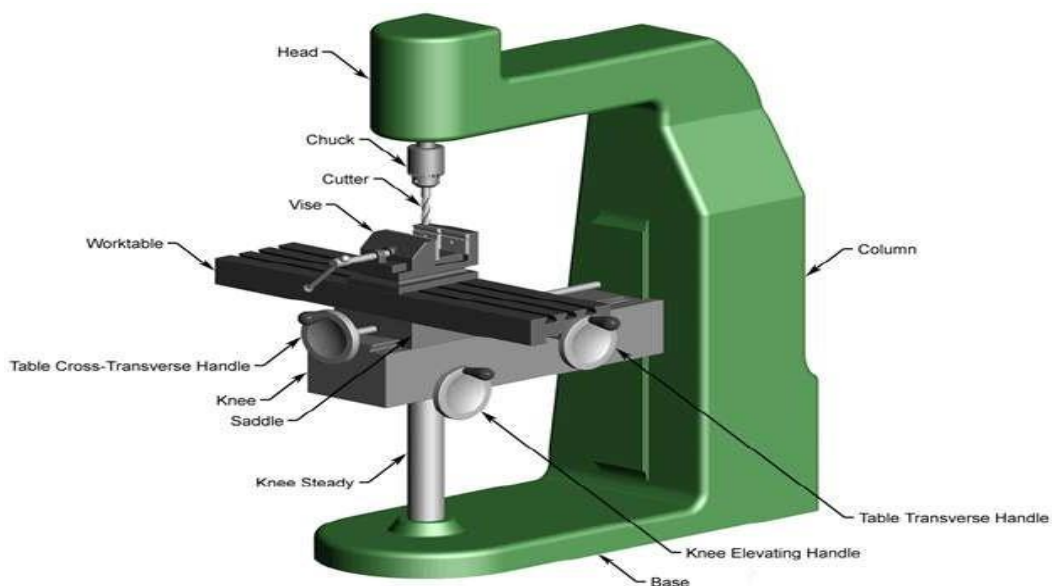
Choosing the wrong product can be a costly mistake. Our experienced team works with you every step of the way to ensure your machine suits your needs well into the future.

Avoid breakdowns and costly downtime.

Choose quality products from trusted brands. Superior products deliver superior reliability. When your business relies on machinery that won't break down – you need tough-built products from trusted global brands.

Read and translate the text in written form.

Drilling Machine



A drilling machine is one of the important machine tools in the workshop. In today's article, I will discuss the definition, parts, types, and operations of the drilling machine you should know about. We also perform drilling operation in lathe machine too, but drill machine is made for this specific drilling operations, so where we need bulk of drilling operation we go for drilling machine.

A drilling machine is used to form a hole of different sizes on a job, drilling is a metal removing process, by a drilling machine you can do drilling operation, reaming operation and boring operation.


Drilling Machine definition: Drilling is a material-removing or cutting process in which the tool uses a drill bit to cut a hole of circular cross-section in solid materials. This is the most

common machining process, one estimate is that 75 % of all metal cutting material removed comes from the drilling operation.

Drilling Machine main parts:

A drilling machine consists of the following parts: base, column or pillar, arm, worktable, drill head, feed mechanism, spindle, drill jigs, chuck, electric motor, pulley or gears.

Take a closer look at the modern tools

 A black metal toolpost with a circular base and a long handle with a black knob, used for quick tool changes in a lathe.	<p><i>Economy Quick Change Toolpost</i></p> <p>Экономичный инструмент для быстрой смены инструментов</p>
 A black metal lathe tool holder with a central threaded hole and several smaller holes on the top surface, designed for holding various tool bits.	<p><i>Lathe Tool Holder Multifix</i></p> <p>Держатель токарного инструмента Multifix</p>



*Sky Hook Industrial
Lifting Devices*

Промышленное
подъемное устройство



*5C Manual Collet
Fixture*

5C Ручное зажимное
устройство
конусных деталей



*Vertex Job
Manual Equipment*

Vertex Job ручное
зажимное устройство



Drill

Сверлильный станок



Grinder

Шлифовальный станок



Lathe

Токарный станок



Milling Machine

Фрезерный станок



Radial drill

Радиально-
сверлильный
станок



*Lathe: Hercus 9"
Model AU
«Craftsman»*

Токарный станок
Hercus 9 модель AU
«Craftsman»



Welding

Сварочный аппарат



Bandsaws

Ленточно-пильный
станок

Практическая работа № 9.

Transport / Транспорт

Means of transport – Виды транспорта

	автобус - bus [bʌs]		лодка - boat [bəʊt]		сани - sledge [sleɪʃ]
	автомобиль - car [kɑ:]		локомотив - locomotive [ˈləʊkəˈməʊtɪv]		сергей - segway [ˈsegweɪ]
	велосипед - bicycle [ˈbaɪsɪkl]		метро - subway [ˈsʌbweɪ]		скутер - scooter [ˈsku:tə]
	вертолет - helicopter [ˈhelɪkɒptə]		мотоцикл - motorcycle [ˈməʊtə,sɑɪkl]		снегоход - snowmobile [ˈsnəʊ,məʊbaɪl]
	воздушный шар - balloon [bəˈlu:n]		паровоз - steam locomotive [sti:m ˈləʊkəˈməʊtɪv]		судно - vessel [ˈves(ə)l]
	грузовик - lorry [ˈlɒri]		паром - ferry [ˈferi]		такси - cab, taxi [kæb], [ˈtæksi]
	дельтаплан - hang-glider [ˈhæŋ,ɡlaɪdə]		пароход - steamer [ˈsti:mə]		теплоход - motor ship [ˈməʊtə,ʃɪp]
	дирижабль - airship [ˈeəˌʃɪp]		подводная лодка - submarine [ˌsʌbm(ə)ˈri:n]		трактор - tractor [ˈtræktə]
	каное - canoe [kəˈnu:]		поезд - train [treɪn]		трамвай - tram [træm]
	карега - carriage [ˈkærɪɪʃ]		ракета - rocket [ˈrɒkɪt]		троллейбус - trolleybus [ˈtrɒləbʌs]
	катер - cutter [ˈkʌtə]		самокат - scooter [ˈsku:tə]		фургон - van [væn]
	корабль - ship [ʃɪp]		самолет - airplane [ˈeəpleɪn]		яхта - yacht [jɒt]

1. Read and translate the text in written form.

Transport

Transport has always played an important role in people's life. It's a way of travelling from one place to another. Modern transportation system is rather well developed thanks to rapid scientific and technological progress. There are lots of busses, mini-vans, taxis, personal cars, bicycles, trains, airplanes, even ships and ferries in every developed country. However, a couple of centuries ago, there were only carts carried by horses and old-fashioned boats. Perhaps, the oldest type of transport is the water one. People constructed primitive boats for river navigation since the stone ages. The first land transport was presented by the carriages, which were later carried by domestic animals. The first animal-drawn vehicles were traced in Europe in the 4th millennium BC. Rail transport appeared much later, to be precise nearly 500 years ago. Modern railroad was introduced in the 19th century England. Aviation had several forms throughout the history. If we speak about the kites, they appeared in ancient China around before 200 BC. Then, there were the hot air balloons invented in the 18th century. The first aircraft flight was made by the Wright brothers at the very beginning of the 20th century. Perhaps, the discoveries made in the field of transportation in the 20th century were the most important. Thus, in 1961 the first humanspaceflight was launched. In 1969, the first astronaut stepped on the Moon. Nobody knows exactly where else is scientific progress taking us, but it's most likely that soon we will travel by spaceships more often.

TASKS TO THE TEXT

A. Find in the text Transport the translation of the following sentences.

1. В каждой развитой стране множество автобусов, маршруток, такси, личных автомобилей, велосипедов, поездов, самолетов, даже кораблей и паромов.
2. Первый наземный транспорт был представлен повозками, которые позже перевозились домашними животными.
3. Никто точно не знает, куда еще нас выведет научно-технический прогресс, но есть вероятность, что вскоре мы будем чаще путешествовать на космических кораблях.
4. Современная железная дорога была введена в Англии в 19-м веке.
5. Первый гужевой транспорт появился в Европе в 4-м тысячелетии до нашей эры.
6. Первый полет самолета был сделан братьями Райт в самом начале 20-го века.
7. Еще в каменный век люди строили примитивные лодки для речного судоходства.
8. Это способ путешествия из одного места в другое.
9. Затем, появились воздушные шары, изобретенные в 18-м веке.
10. Железнодорожный транспорт появился гораздо позже, если быть точным почти 500 лет назад.
11. Современная транспортная система достаточно хорошо развита благодаря быстрому научно-техническому прогрессу.

12. Однако всего лишь пару веков тому назад были только тележки, перевозимые лошадьми, и старомодные лодки. 13. На протяжении всей истории у авиации было множество форм. Транспорт всегда играл важную роль в жизни людей. 14. Например, в 1961 году произошел первый полет человека в космос. 15. В 1969 году первый космонавт ступил на Луну.

16. Возможно, самый старый вид транспорта – это водный. 17. Возможно, открытия, сделанные в области транспорта в 20-м веке, были самыми важными. 18. Если говорить о воздушных змеях, то они появились в древнем Китае около 200 года до нашей эры.

B. Find the translation of the sentences.

1. There are different means of transport. 2. I know people who hate using public transport. 3. What's the reason for such kind of behavior? 4. It's often overcrowded. 5. That's the first problem. 6. If you go by underground in a rush hour, you'll understand it at once. 7. Secondly, it isn't comfortable to use public transport because you have too little personal space. 8. You are surrounded by strangers. 9. You can't concentrate. 10. It's almost impossible to make phone calls. 11. Going by bus can be very slow. 12. I can't say that I'm totally against public transport. 13. I just want to say it isn't acceptable for all people. 14. I'm a student and I don't have a car. 15. My dream is to have my own car.

1. Во-вторых, не комфортно использовать общественный транспорт, потому что у тебя слишком мало личного пространства. 2. Моя мечта иметь свою собственную машину. 3. Какая причина такого рода поведения? 4. Ты окружен незнакомцами. 5. Ты не можешь сконцентрироваться.

6. Он часто переполнен народом. 7. Есть различные транспортные средства. 8. Практически невозможно делать телефонные звонки. 9. Я знаю людей, которые ненавидят пользоваться общественным транспортом.

10. Это первая проблема. 11. Езда на автобусе может быть очень медленной. 12. Я студент и у меня нет машины. 13. Я не могу сказать, что я полностью против общественного транспорта. 14. Я просто хочу сказать, что он не приемлем для всех людей. 15. Если вы поедете в метро в час пик, вы это сразу же поймете.

Практическая работа № 10.

Read and translate in written form.

The history of land transport

1. The word transport means to carry people or goods from place to place. It is also used for the vehicles that carry people or goods – for example, motor transport includes buses, lorries, motor coaches and motor cars. The American word for the same thing is transportation, and the remark «transportation is civilization» was made by an American, the motor-car manufacturer Henry Ford. The history of transport is divided into two stages. The first stage is that

in which all forms of transport depended directly on the power of men or animals or natural forces such as winds and current. The second stage began with the development of the steam engine, which was followed by the electric motor and the internal combustion engine as the main sources of power for transport.

2. The most ancient people were probably wanderers. They did not live in settled homes because they did not know how to till the soil. As they moved from place to place they had to carry their goods themselves. The porters were usually the women, probably because the men had to be ready to beat off attacks by wild beasts or enemies. Even now, to carry the household goods is the job of women in backward wandering tribes. The next step was the use of pack animals for carrying goods. The kind of animal used varied in different places, but the general idea was the same – the bundles or baskets were carried by the animals on their backs. The dogs, although too small to carry much, was probably one of the first transport animals used because it is so easily trained. Dogs are still to be trained for dragging sledges in the Arctic because of their light weight.

3. The next advance in land transport came with the invention of the wheel. The wheel at once led to the development of two-wheeled carts and four-wheeled wagons and carriages, but before these could be used for carrying goods over long distances, a system of roads was necessary. These roads had to be wide enough to take a cart and paved, for unless their surface was paved the wheels sank in and the cart stuck. In Britain, and also over much Europe, the first long-distance paved roads were made by the Romans, chiefly so that troops could be marched without delay from place to place. The roads made it possible to use wheeled traffic. However, when the Roman Empire collapsed, the roads gradually got into a very bad state.

4. There were two problems to be solved – first, how to make good roads, and, second, to decide who was to pay for them. In Great Britain these problems were solved in the 18th century. Stretches of roads were handed over to groups called trusts. The trusts borrowed money for repairing and improving the roads, paying it back from the sums they collected from road users. This method of paying for new roads and bridges is still used, especially in the United States. Then it became possible to travel rather comfortably by coaches. In cities like London, rich people had their own carriages, while poor people went on horse-back or walked. Then appeared carriages that could be hired for short distances. They correspond to the modern taxis. The word is short for taxi cab which in turn comes from the words taximeter and cabriolet. A cabriolet is a light two-wheeled carriage introduced from France in the 19th century. The taximeter is a mechanical device connected with the wheels which, by measuring the distance travelled, shows the fare due at any moment. It is also controlled by a clock so that waiting time too is charged for.

Практическая работа № 11.

Read and translate the text in written form.

The wheel, steam carriages and railways



One of mankind's earliest and greatest inventions was the wheel. Without it there could be no industry, little transportation or communication, only crude farming, no electric power. Nobody knows when the wheel was invented. There is trace of the wheel during the Stone Age, and it was not known to the American Indians until the White Man came. In the Old World it came into use during the Bronze Age, when horses and oxen were used as work animals. At first all wheels were solid discs. The problem to be solved was to make the wheels lighter and at the same time keep them strong. At first holes were made in the wheels, and they became somewhat lighter. Then wheels with spokes were made. Finally, the wheel was covered with iron and with rubber. Light two-wheeled carriages were used widely in the ancient world. As time passed they were made lighter, stronger, and better. Later people joined together a pair of two-wheeled vehicle. At first only kings and queens had the privilege of driving in them. In the West the first steam carriage was invented in France. The three-wheeled machine had the front wheel driven by a two-cylinder steam engine, and carried two people along the road at a walking pace. It was not a great success, as the boiler did not produce enough steam for keeping the carriage going for more than about 15 minutes. The steam engine appeared in 1763. It was followed by several improved steam road carriages. Their further development was prevented by railway companies. The rapid spread of railways in the United Kingdom was due largely to George Stephenson, who was an enthusiast as well as a brilliant engineer. He demonstrated a locomotive that could run eighteen kilometers an hour and carry passengers cheaper than horses carried them. Eleven years later Stephenson was operating a railway between Stockton and Darlington. The steam locomotive was a success. In Russia the tsar's government

showed little interest in railway transportation. After long debates the government, which did not believe in its own engineers, finally decided to invite foreign engineers to submit (представить) projects for building railways in Russia. Yet at the very time when foreign engineers were submitting their plans, in the Urals a steam locomotive was actually in use. It had been invented and built by the Cherepanovs, father and son, both skilful mechanics and serfs (крепостные). The first Russian locomotive was, of course, a «baby» compared with the locomotives of today. Under the boiler (котел) there were two cylinders which turned the locomotive's two driving wheels (there were four wheels in all). At the front there was a smoke stack (труба), while at the back there was a platform for the driver.

3. Read and translate the text in written form.

Different kinds of land transport



1. What was the reaction of the people after the invention of the steam engine? In Washington the story is told of a director of the Patent Office who in the early thirties of the last century suggested that the Office be closed because «everything that could possibly be invented had been invented». People experienced a similar feeling after the invention of the steam engine. But there was a great need for a more efficient engine than the steam engine, for one without a huge boiler, an engine that could quickly be started and stopped. This problem was solved by the invention of the internal combustion engine.

2. Who introduced the first cheap motor car? The first practical internal combustion engine was introduced in the form of a gas engine by the German engineer N. Otto in 1876. Since then motor transport began to spread in Europe very rapidly. But the person who was the first to make it really popular was Henry Ford, an American manufacturer who introduced the first cheap motorcar, the famous Ford Model «T».

3. When did diesel-engined lorries become general?

The rapid development of the internal combustion engine led to its use in the farm tractors, thereby creating a revolution in agriculture. The use of motor vehicles for carrying heavy loads developed more slowly until the 1930s when diesel-engined lorries became general. The motor cycle steadily increased in popularity as engines and tyres became more reliable and roads improved. Motor cycles were found well suited for competition races and sporting events and also recognized as the cheapest form of fast transport.

4. When were the trams introduced first? Buses were started in Paris in 1820. In 1828 they were introduced in London by George Shillibeer, a coach builder who used the French name Omnibus which was obtained from the Latin word meaning «for all». His omnibuses were driven by three horses and had seats for 22 passengers. Then in the 20th century reliable petrol engines became available, and by 1912 the new motor buses were fast replacing horse-driven buses. Trams were introduced in the middle of the 19th century. The idea was that, as the rails were smoother than the roads, less effort was needed to pull a tram than a bus. The first trams were horse-drawn but the later trams were almost all driven by electricity. The electric, motor driving the tram was usually with electric current from overhead wires. Such wires are also used by trolley-buses, which run on rubber tyres and do not need rails. Another form of transport used in London, Paris, Berlin, Moscow, St. Petersburg, Kiev and some other crowded cities is the underground railway. London's first underground railway of the «tube» type was opened in 1863, the Moscow underground in 1935.

5. What do the longest oil pipe-lines connect? The pipe-lines, which were in use by the ancient Romans for carrying water supplies to their houses, are now mainly used to transport petroleum. The first pipe-line of this kind was laid in Pennsylvania, the United States, in 1865. Some of the longest oil pipe-lines connect oil-fields in Iraq and near the Persian Gulf with ports on the Mediterranean coast. A famous Pipe-Line Under the Ocean (PLUTO) was laid across the English Channel in 1944.

6. What are the cableways used for? A form of transport which is quite common in some mountainous parts of the world, especially in Switzerland, is the aerial cableway. Cableways are used at nearly all winter sport centers to pull or carry skiers to the top of the slopes. Cableways are used by many Alpine villages which lie high up the mountain-sides for bringing up their supplies from the valley below.

Практическая работа № 12.

Read and translate the text in written form.

Transport system of the USA



The development of transport facilities was very important in the growth of the United States. The first travel routes were natural waterways. No surfaced roads existed until the 1790s, when the first turnpikes were built. Besides the overland roads, many canals were constructed between the late 18th century and 1850 to link navigable rivers and lakes in the eastern United States and in the Great Lakes region. Steam railways began to appear in the East in the 1820s. The first transcontinental railway was constructed between 1862 and 1869 by the Union Pacific and Central Pacific companies, both of which received large subsidies from the federal government. Transcontinental railways were the chief means of transport used by European settlers who populated the West in the latter part of the 19th century. The railways continued to expand until 1917, when their length reached a peak of about 407,000 km. Since then motor transport became a serious competitor to the railway both for passengers and freight. Air transport began to compete with other modes of transport after World War I. Passenger service began to gain importance in the 1920s, but not until the beginning of commercial jet craft after World War II did air transport become a leading mode of travel. During the early 1990s railways annually handled about 37.5 per cent of the total freight traffic; trucks carried 26 per cent of the freight, and oil pipelines conveyed 20 per cent. Approximately 16 per cent was shipped on inland waterways. Although the freight handled by airlines amounted to only 0.4 per cent of the total, much of the cargo consisted of high-priority or high-value items. Private cars carry about 81 per cent of passengers. Airlines are the second leading mover of people, carrying more than 17 per cent of passengers. Buses are responsible for 1.1 per cent, and railways carry 0.6 per cent of passengers.

Read and translate the text in written form.

Roads and Railways



The transport network spreads into all sections of the country, but the web of railways and highways is much more dense in the eastern half of the United States. In the early 1990s the United States had about 6.24 million km of streets, roads, and highways. The National Interstate Highway System, 68,449 km in length in the early 1990s, connected the nation's principal cities and carried about one-fifth of all the road and street traffic. More than 188 million motor vehicles were registered in the early 1990s. More than three-quarters were cars – one for every two persons in the country. About one-fifth of the vehicles were lorries. Amtrak (the National Railroad Passenger Corporation), a federally subsidized concern, operates almost all the inter-city passenger trains in the United States; it carried more than 22 million passengers annually in the early 1990s.

General understanding: 1. What were the first routes in the US? 2. When was the first transcontinental railway constructed? 3. What was the length of railroads in 1917? 4. When did air transport start to gain importance? 5. How many motor vehicles were registered in US in early 90s? 6. What is Amtrak? How many passengers did it carry annually in the early 90s?

Практическая работа № 13.

Read and translate the text in written form.

Construction of an automobile



The primary components of a **car** are the power plant, the power transmission, the running gear, and the control system. These constitute the chassis, on which the body is mounted. The power plant includes the engine and its fuel, the carburettor, ignition, lubrication, and cooling systems, and the starter motor.



The Engine. The greatest number of cars uses piston engines. The four-cycle piston engine requires four strokes of the piston per cycle. The first downstroke draws in the petrol mixture. The first upstroke compresses it. The second downstroke – the power stroke – following the combustion of the fuel, supplies the power, and the second upstroke evacuates the burned gases. Intake and ex-

hau trol the intake of fuel and the release of burned gases. At the end of the power stroke the pressure of the burned gases in the cylinder is 2.8 to 3.5 kg/sq cm. These gases escape with the sudden opening of the exhaust valve. They rush to a silencer (muffler), an enlarged section of piping containing expanding ducts and perforated plates through which the gases expand and are released into the atmosphere.

Greater smoothness of operation of the four-cycle engine were provided by the development of the four-cylinder engine, which supplies power from one or another of the cylinders on each stroke of the cycle. A further increase in power and smoothness is obtained in engines of 6, 8, 12 and 16 cylinders, which are arranged in either a straight line or two banks assembled in the form of a V.



Carburation. Air is mixed with the vapour of the petrol in the carburettor. To prevent the air and the carburettor from becoming too cold for successful evaporation of the fuel, the air for the carburettor is usually taken from a point close to a heated part of the engine. Modern carburettors are fitted with a so-called float-feed chamber and a mixing or spraying chamber. The first is a small chamber in which a small

float is kept at a constant level. The petrol is pumped from the main tank to the float chamber as the petrol flows in until the desired level is reached, when the inlet closes. The carburettor is equipped with such devices as accelerating pumps and economizer valves, which automatically control the mixture ratio for efficient operation under varying conditions. Level-road driving at constant speed requires a lower ratio of petrol to air than that needed for climbing hills, for acceleration, or for starting the engine in cold weather. When a mixture extremely rich in petrol is necessary, a valve known as the choke cuts down the air intake, permitting large quantities of unvaporized fuel to enter the cylinder.



Ignition. The mixture of air and petrol vapour delivered to the cylinder from the carburettor is compressed by the first upstroke of the piston. This heats the gas and the higher temperature and pressure facilitate ignition and quick combustion. The next operation is that of igniting the charge by a spark plug. One electrode is insulated by porcelain or mica; the other is grounded through

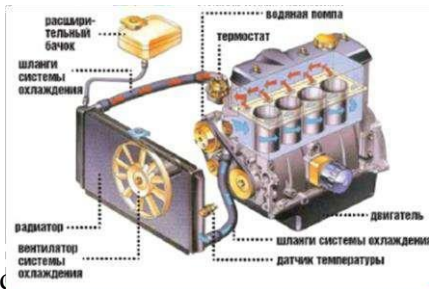
both form part of the secondary circuit of an induction system.

The principal type of ignition now commonly used is the battery-and-coil system. The current from the battery flows through the coil and magnetizes the iron core. When this circuit is interrupted at the distributor points by the interrupter cam, a current is produced in the primary coil with the assistance of the condenser. This induces a high-voltage current in the secondary winding. This secondary high voltage is needed to cause the spark to jump the gap in the spark plug. The spark is directed to the proper cylinder by the distributor, which connects the secondary coil to the spark plugs in the several cylinders in their proper firing sequence. The interrupter cam and distributor are driven from the same shaft, the number of breaking points on the interrupter cam being the same as the number of cylinders.

The electrical equipment controls the starting of the engine, its ignition system, and the lighting of the car. It consists of the battery, a generator for charging it when the engine is running, a starter and the necessary wiring. Electricity also operates various automatic devices and accessories, including windscreen wipers, directional signals, heating and air conditioning, cigarette lighters, powered windows and audio equipment.



Lubrication. In the force-feed system, a pump forces the oil to the main crankshaft bearings and then through drilled holes in the crankpins. In the full-force system, oil is also forced to the connecting rod and then out to the walls of the cylinder at the piston pin.



Cooling. At the moment of explosion, the temperature within the cylinder is much higher than the melting point of cast iron. Since the explosions take place as often as 2,000 times per minute in each cylinder, the cylinder would soon become so hot that the piston, through expansion, would «freeze» in the cylinder. The cyl-

inders are surrounded by cooling jackets, through which water is rapidly circulated by a small pump driven by a gear on the crankshaft or camshaft. During cold weather, the water is generally mixed with a suitable antifreeze, such as alcohol, wood alcohol, or ethylene glycol.

To keep the water from boiling away, a radiator forms part of the engine-cooling system. Radiators vary in shape and style. They all have the same function, however, of allowing the water to pass through tubing with a large area, the outer surface of which can be cooled by the atmosphere. In air cooling of engine cylinders, various means are used to give the heat an outlet and carry it off by a forced draught of air.



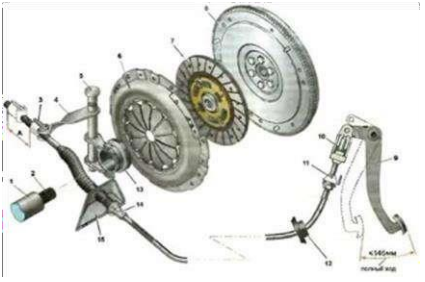
The Starter. The petrol engine must usually be set in motion before an explosion can take place and power can be developed; moreover, it cannot develop much power at low speeds. These difficulties have been overcome by the use of gears and clutches, which permit the engine to work at a speed higher than that of the wheels,

and to work when the vehicle is at rest. An electric starter receiving its current from the storage battery, turns the crankshaft, thus starting the petrol engine. The starter motor is of a special type that operates under a heavy overload, producing high power for very short periods. In modern cars, the starter motor is automatically actuated when the ignition switch is turned on.



drive shafts. The differential delivers the power to each of the rear wheels through the rear-axle drive shafts.

The Power Transmission. The engine power is delivered first to the flywheel and then to the clutch. From the clutch, which is the means of coupling the engine with the power-transmission units, the power flows through the transmission and is delivered into the rear-axle drive gears, or differential, by means of the drive shaft and universal



The Clutch. Some type of clutch is found in every car. The clutch may be operated by means of a foot pedal, or it may be automatic or semi-automatic. The friction clutch and the fluid coupling are the two basic varieties. The friction clutch, which depends on solid contact between engine and transmission, consists of: the rear face of the fly-

wheel; the driving plate, mounted to rotate with the flywheel; and the driven plate, between the other two. When the clutch is engaged, the driving plate presses the driven plate against the rear face of the flywheel. Engine power is then delivered through the contacting surfaces to the transmission.

Fluid coupling may be used either with or without the friction clutch. When it is the sole means of engaging the engine to the transmission, power is delivered exclusively through an oil medium without any contact of solid parts. In this type, known as a fluid drive, an engine-driven, fan-bladed disc, known as the fluid flywheel, agitates the oil with sufficient force to rotate a second disc that is connected to the transmission. As the rotation of the second disc directly depends on the amount of engine power delivered, the prime result of fluid coupling is an automatic clutch action, which greatly simplifies the requirements for gear shifting.



Manual and Automatic Transmissions. The transmission is a mechanism that changes speed and power ratios between the engine and the driving wheels. Three general types of transmission are in current use: conventional or sliding-gear, Hydra-Matic, and torque-converter systems.

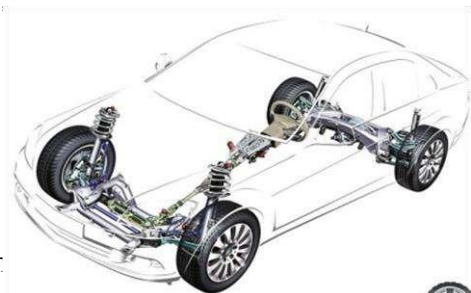
The conventional transmission provides for three or four forward speeds and one reverse speed. It consists of two shafts, each with gears of varying diameters. One shaft drives the other at a preselected speed by meshing the appropriate set of gears. For reverse speed/an extra gear, known as the idler gear, is required to turn the driven shaft in the opposite direction from normal rotation. In high gear, the two shafts usually turn at the same

speed. In low, second, and reverse gears, the driven shaft turns more slowly than the driving shaft. When a pair of gears permits the driven shaft to turn more rapidly than the driving shaft, the transmission is said to have overdrive. Over-drive is designed to increase the speed of a car.

The Hydra-Matic type of transmission combines the automatic clutch provided by fluid coupling with a semiautomatic transmission. A mechanical governor, controlled by the pressure exerted on the accelerator pedal, regulates gear selection through a system of hydraulically controlled shift valves. Hydra-Matic transmission provides for several forward gears.

The torque-converter type of transmission provides an unlimited number of gear ratios with no shifting of gears. The torque converter is a hydraulic mechanism using engine power to drive a pump, which impels streams of oil against the blades of a turbine. The turbine is connected to the drive shaft and causes it to rotate.

Both Hydra-Matic and torque-converter systems are controlled by a selector lever on the steering column, which provides also for reverse and sometimes for emergency-low gears.



The Running Gear. The running gear of the car includes the wheel-suspension system, the stabilizers, and the wheels and tyres. The frame of the car may be considered the integrating member of the running gear. It is attached to the rear axle and to the front wheels by springs. These springs, along with the axles,

shock absorbers, constitute the wheel-suspension system. In modern cars the front wheels are independently suspended from the frame in a manner that permits either wheel to change its plane without appreciably affecting the other. This type of front-wheel suspension is known popularly as independent suspension. The stabilizers consist of spring-steel bars, connected between the shock-absorber arms by levers, to decrease body roll and improve steerability.



The Control System. Steering is controlled by a hand wheel, mounted on an inclined column and attached to a steering tube inside the column. The other end of the tube is connected to the steering gear, which is designed

to provide maximum ease of operation. Power steering, adapted for passenger cars in the early 1950s, is generally a hydraulic mechanism used as a booster to reduce the effort of steering.

A car has two sets of brakes: the hand or emergency brake and the foot brake. The emergency brake generally operates on the rear wheels only. The foot brake in modern cars is always of the four-wheel type, operating on all wheels. Hydraulic brakes on cars and hydraulic vacuum, air, or power brakes on lorries apply the braking force to the wheels with much less force on the brake pedal than is required with ordinary mechanical brakes. The wheel brakes are generally of the internally expanding type, in which a convex strip of material is forced against a concave steel brake drum.

Практическая работа № 14.

Read and translate the text in written form.

Anti-blocking system of brakes of ABS – T for the car – the tractor

(Description Original language)



Fig. 1. The anti-blocking system

The anti-blocking system (*fig. 1*) is intended for prevention of blocking and maintenance of a wheel slip at the level providing optimum coupling with a paving in any road conditions. At the movement of vehicles (automatic telephone exchange) the electronic control unit (ECU) constantly measures speeds of all wheels connected to it, and also their acceleration, and at excess of some threshold sizes puts algorithms of anti-blocking regulation in action. During regulation by purposeful change of pressure of air in brake chambers the block tries to prevent blocking of wheels and to support a wheel slip at the level providing optimum coupling with a paving in these road conditions.

Regulation is made up to speed less than 10 km/h, or till the moment when the driver stops braking.

Besides, the ABS-T system allows to make restriction of the maximum speed of the movement of the vehicle with V_{max} accuracy + 1.5 km/h.

For storage of information on the last 40 seconds of emergency brake application the non-volatile RAM is used.

Anti-block braking system



Fig. 2. Anti-block braking system

In 2004 we developed and put on market the serial electronic anti-block braking system for rail transport (engineering documentation was assigned the O1 code) (*fig. 2*).

It was one of the first anti-block systems of new generation in Russia. The system is based on the method that prevents wheel sliding. The method was patented (invention patent No 2237587).

Today, the modified versions of the system are on serial production and are customized for various rail transport. The system is used on rolling stock of the Moscow light-rail metro (car 81-740), passenger electric trains (ED-6 and EM2I models). One of the modifications was tailored for freight cars.

Read and translate the text in written form.

Anti-blocking system of brakes (ABS)

Braking is most effective when coupling of the tire with the surface of the road maximum. In the course of braking the tire slides on a surface, and the district speed of a wheel becomes less than the speed of the car.

The anti-blocking system limits pressure created in the hydraulic drive of brakes so that the size of sliding was optimum. Action of this system has to be separate for each wheel. The system has to answer immediately each change of a surface (coupling coefficient) and load of the car.

The anti-blocking system interferes with blocking of wheels at sharp braking thanks to what the brake way decreases. Force of adhesion between wheels and the road in this case is more if when braking wheels continue to rotate. Even at full braking the car remains operated. Rotation frequency sensors, one on each wheel, measure the frequency of rotation of a wheel. On signals of sensors the electronic control unit calculates the average speed which is approximately corresponding to the speed of the movement of the car. Comparing the speed of rotation of each separate wheel to the average calculated speed, the electronic block defines a condition of slipping of a separate wheel and by that, establishes what wheel is in a preblocking state.

When one of four sensors of speed of wheels transmits a signal of blocking of the corresponding wheel, the electronic actuation device immediately gives a closing signal to the corresponding inlet electromagnetic valve which blocks supply of brake fluid via the pipeline to a wheel brake. At the same time force of braking remains to a constant. If sliding continues, then the final valve and pressure in hydraulic system of this brake opens decreases. The wheel does not brake, surplus of brake fluid comes back to a tank. As soon as the wheel starts over again rotating, the inlet valve opens, and final – is closed. Pressure increases in a contour, and the wheel brakes again.

Change of cycles of braking and free rotation of a wheel happens very quickly (several times in a second) and continues to a stop of the car or to a brake pedalotpuskaniye.

Process repeats at sharp braking separately for each wheel until the brake pedal is released.

The emergency system provides shutdown of ABS at any malfunction or low voltage in onboard network of the car (lower than 10 V). Malfunction of ABS does not influence work of brakes.

The hydraulic drive consists of the hydraulic block, supports of brakes and brake tubes. Enter the hydraulic block the electric pump creating pressure, and electromagnetic valves.

Практическая работа № 15.

Read and translate the text in written form.

A BACK-SEAT driver



A BACK-SEAT driver that can stop motorists making fatal mistakes is being developed by Nissan.

The new technology can predict when a driver is about to make a dangerous manoeuvre and in extreme cases the on-board computer takes control of the car to prevent a smash.

The driver is given a warning and if they fail to respond quickly enough, the computer overrides the driver's actions by taking control of the steering, brakes and accelerator.

The «predictive system» is in a unit under the back seat and linked by sensors to the steering wheel, accelerator and brakes.

The sensors monitor the driver's every move and a computer processes information from the sensors on the controls.

Driving-simulation tests showed the Nissan system to be nearly 100 per cent accurate in predicting drivers' moves for 12 seconds ahead.

Nissan may use the system in prototypes to produce the «intelligent car» but it is likely to be four years before it goes into production.

According to the Department of Transport, driver-error caused 236,923 road accidents in the UK last year which resulted in 3,421 deaths.

VOCABULARY TO THE THEME

A BACK-SEAT driver – механическое устройство, берущее на себя управление автомобилем

Fatal ['feɪt(ə)l] **mistakes** – ошибки, которые могут привести к аварии

Is being developed Nissan ['ni:sɒn] – разрабатывается (японской фирмой) Ниссан

Dangerous maneuver ['deɪn(d)ʒ(ə)rəs mə'nu:vər] – опасный маневр

On-board computer – встроенный в автомобиль компьютер

To prevent [prɪ'vent] **a smash** – чтобы предотвратить столкновение

Warning ['wɔ:nɪŋ] – предупреждение

Overrides [ˌəʊvə'raɪdz] – отменять

Steering ['stiəriŋ], **brakes and accelerator** [æk'seləreɪtə] – управление, тормоза и акселератор

Predictive system [prɪ'dɪktɪv 'sɪstəm] – система предупреждения

Unit ['ju:nɪt] – блок, узел

Sensors – датчики, чувствительные элементы

Driving-simulation [ˌsɪmjʊ'leɪʃən] **tests** – проверка методом моделирования движения

Intelligent car [ɪn'telɪdʒ(ə)nt kɑ:] – «думающий» автомобиль

Driver-error ['draɪvə 'erə] – ошибки водителей

Road accidents [rəʊd 'æksɪdənts] – дорожные аварии

Resulted in [rɪ'zʌltɪd ɪn] – приводить (к)

Практическая работа № 16.

Дифференцированный зачет (см. КОС).