

Министерство образования и науки Российской Федерации
Федеральное государственное бюджетное образовательное учреждение
высшего профессионального образования
«Амурский государственный университет»

Кафедра Иностранных языков

УЧЕБНО-МЕТОДИЧЕСКИЙ КОМПЛЕКС ДИСЦИПЛИНЫ
ПРОФЕССИОНАЛЬНЫЙ ИНОСТРАННЫЙ ЯЗЫК

Основной образовательной программы по направлениям подготовки

220700.62 «Автоматизация технологических процессов и производств»

профили: «Автоматизация технологических процессов и производств в энергетике »

«Автоматизация технико-экономических процессов »

Благовещенск 2012

УМКД разработан ст. преподавателем Смирновой Ольгой Геннадьевной

Рассмотрен и рекомендован на заседании кафедры

Протокол заседания кафедры от « 09 » 10 2012 г. № 2

Зав. кафедрой


(подпись)

/О.Н.Морозова/
(И. О. Фамилия)

УТВЕРЖДЕН

Протокол заседания УМСС совета направления 220700.62 Автоматизация технологических процессов и производств (по отраслям)

от « 18 » сентября 2012 г. № 1

Председатель УМСС


(подпись)

/А.К.Прибанов/
(И. О. Фамилия)

СОДЕРЖАНИЕ

I. Рабочая программа учебной дисциплины «Профессиональный иностранный язык» по направлению подготовки 220700.62 «Автоматизация технологических процессов и производств».....	4
II. Изложение программного материала.....	17
III. Методические указания (рекомендации)	57
IV. Контроль знаний.....	58
V. Интерактивные технологии и инновационные методы, используемые в образовательном процессе.....	62

I. РАБОЧАЯ ПРОГРАММА УЧЕБНОЙ ДИСЦИПЛИНЫ «ПРОФЕССИОНАЛЬНЫЙ ИНОСТРАННЫЙ ЯЗЫК» по направлению подготовки 220700.62 «Автоматизация технологических процессов и производств»

1. ЦЕЛИ И ЗАДАЧИ ОСВОЕНИЯ ДИСЦИПЛИНЫ

Целью изучения дисциплины (модуля) является повышение исходного уровня владения иностранным языком, достигнутого на предыдущей ступени образования, и овладение студентами необходимым и достаточным уровнем коммуникативной компетенции для решения социально-коммуникативных задач в различных областях бытовой, культурной, профессиональной и научной деятельности при общении с зарубежными партнерами, а также для дальнейшего самообразования.

Задачами дисциплины являются: повышение уровня учебной автономии, способности к самообразованию; развитие когнитивных и исследовательских умений; развитие информационной культуры; расширение кругозора и повышение общей культуры студентов; воспитание толерантности и уважения к духовным ценностям разных стран и народов.

2. МЕСТО ДИСЦИПЛИНЫ В СТРУКТУРЕ ООП ВПО

Дисциплина «Профессиональный иностранный язык» относится к блоку обязательных дисциплин Б.1.В.ОД.2 (Вариативная часть ФГОС ВПО).

Общая трудоемкость изучения данной дисциплины составляет 72 час. (36 час. аудиторных занятий, 36 час. самостоятельной работы, 2 з.е).

Дисциплина «Профессиональный иностранный язык» является завершающим этапом в освоении иностранного языка.

3. КОМПЕТЕНЦИИ ОБУЧАЮЩЕГОСЯ, ФОРМИРУЕМЫЕ В РЕЗУЛЬТАТЕ ОСВОЕНИЯ ДИСЦИПЛИНЫ (МОДУЛЯ)

В процессе изучения дисциплины обучающийся должен овладеть следующими компетенциями:

- способностью к обобщению, анализу, восприятию информации, постановке цели и выбору путей ее достижения, владением культурой мышления (ОК-1);
- способностью логически верно, аргументировано и ясно строить устную и письменную речь (ОК-2);
- способностью к саморазвитию, повышению своей квалификации и мастерства (ОК-6);
- способностью критически оценивать свои достоинства и недостатки, наметить пути и выбрать средства развития достоинств и устранения недостатков (ОК-7).

В результате освоения дисциплины обучающийся должен:

- 1) Знать: лексико-грамматический минимум в объеме, необходимом для работы с иноязычными текстами в процессе профессиональной деятельности.
- 2) Уметь: использовать иностранный язык в межличностном общении и профессиональной деятельности.
- 3) Владеть: иностранным языком в объеме, необходимом для возможности получения информации профессионального содержания из зарубежных источников.

4. СТРУКТУРА И СОДЕРЖАНИЕ ДИСЦИПЛИНЫ

Общая трудоемкость дисциплины составляет 2 зачетных единицы, 72 часа.

Аудиторные занятия составляют 36 часов.

Самостоятельная работа составляет 36 часов.

Таблица 1 – Структура дисциплины

Раздел дисциплины	Семестр	Неделя семестра	Виды учебной работы, включая самостоятельную работу студентов и трудоемкость (в часах)	Формы текущего контроля успеваемости (по неделям семестра) Форма промежуточной аттестации (по семестрам)
-------------------	---------	-----------------	----------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------

Electrical and Mechanical Engineering. Electric Circuit. Types of Current. Meters. Resistors. Capacitors. Transformers. Components of Electric Circuit. Electric Lines and Their Efficiency. Transmission Lines. Safety Earthing System. Electric Shock.	3	1-9	ПЗ 18	СРС 18		Монолог Составление глоссария/ кросс-ворда Тест/словарный диктант Лексико-грамматические упражнения Подготовка аннотаций /тезисов по обозначенной тематике Прием внеаудиторного чтения Письмо- запрос, письмо- предложение, письмо- реклама, письмо - уведомление Контрольное аудирование Лексико-грамматический тест
Electric Motors. Faults of Motors and Ways of Their Repair. Electric Power Consumers and Power Systems. Substations. Hydroelectric Power Plants. Atomic Power Plant. Protection against Environmental Pollution.	3	10-18	ПЗ 18	СРС 18	КР	Диалог Монолог Резюме, письмо-заявление, контракт, служебная записка Подготовка аннотаций /тезисов по обозначенной тематике Прием внеаудиторного чтения Подготовка к тесту Контрольное аудирование Контрольная работа Презентация
	3	18	36	36		Зачет 2 з.е.

5. СОДЕРЖАНИЕ ДИСЦИПЛИНЫ И ОБРАЗОВАТЕЛЬНЫЕ ТЕХНОЛОГИИ

Таблица 2 – Содержание дисциплины

№	Семестр	Тема модуля	Содержание модуля	Часы Пр.з.
1	3	Electrical and Mechanical Engineering. Electric Circuit. Types of Current. Meters. Resistors. Capacitors. Transformers. Electric Lines and Their Efficiency. Transmission Lines. Safety Earthing System. Electric Shock.	Грамматика: Причастие I и II. Независимый причастный оборот. Конверсия. Устные темы: Engineering. Electric Circuits. Meters. Types of Current (a.c./d.c.). Components of Electric Circuit. Electric Lines and Their Efficiency. Transmission Lines. Safety Earthing System. Текстовый материал: Engineering – what’s it all about? Series Circuit and Parallel Circuit. Types of Current. Lines. Safety Earthing System. The Risk of Electric Shock. Аудирование: по теме модуля. Письмо: Упражнения в написании писем по тематике модуля. Монолог – сообщение о различных устройствах, используемых в цепи; системы защиты в электроэнергетике	18

2	3	Electric Motors. Faults of Motors and Ways of Their Repair. Generators. Electric Power Consumers and Power Systems. Substations. Hydroelectric Power Plants. Atomic Power Plant. Protection against Environmental Pollution.	Грамматика: Герундий. Инфинитив. Инфинитивные обороты. Устные темы: Types of Generators. Electric Motors. Power Plants. Substations. Renewables. Текстовый материал: Alternating Current Generators. Induction Motors. Direct-Current Motors. Hydroelectric Power Plants. Atomic Power Plant. Renewables. Аудирование: по теме модуля. Письмо: Упражнения в написании писем по тематике модуля. Диалог- расспрос/обмен мнениями. Монолог – сообщение о различных видах двигателей. Презентация на темы: The Role of Electricity and its Future Applications in our Society. Hydroelectric Power Plants. Atomic Power Plant. Renewables.	18
Всего часов по 3 семестру				36

6. САМОСТОЯТЕЛЬНАЯ РАБОТА

Обязательные самостоятельные занятия студентов по заданию преподавателя (выполнение студентами текущих учебных заданий во внеурочное время – дома, в библиотеке, в компьютерном классе, в читальном зале иностранной литературы).

Виды заданий для самостоятельной работы определяются главной целью (миссией) рабочей программы и особенностью контингента обучающихся и, в связи с этим, могут изменяться и дополняться по усмотрению преподавателя.

Общая организация самостоятельной работы студентов

В ходе самостоятельной работы в рамках дисциплины студент должен:

- освоить теоретический материал (отдельные темы, отдельные вопросы тем, отдельные положения и т.д.);
- закрепить знания теоретического материала, используя необходимый инструментальный практическим путем, (решение задач, выполнение контрольных работ, тестов, ответов на вопросы самопроверки);
- применить полученные знания и практические навыки для анализа ситуации и выработки правильного решения, (подготовка к групповой дискуссии, письменный анализ конкретной ситуации и т.д.);
- применение полученных знаний и умений для формирования собственной позиции (написание реферата или другой научно-исследовательской работы студента).

Перечисленные виды самостоятельной работы соответствуют имеющимся четырем образам обучения:

- обучение как получение знаний (студент «знает о»);
- формирование в процессе обучения понимания студентом предмета изучения (студент «знает как»);
- умение применить изученные идеи, умение при необходимости их моделировать в соответствии с собственным контекстом и находить наиболее уместные решения (студент «умеет применить свое знание как»);
- обучение как развитие личности.

Виды СРС представлены в таблице 3.

Таблица 3

№ п/п	Темы модуля	Форма (вид) самостоятельной работы	Трудоемкость в часах
-------	-------------	------------------------------------	----------------------

1	Electrical and Mechanical Engineering. Electric Circuit. Types of Current. Meters. Resistors. Capacitors. Transformers. Components of Electric Circuit. Electric Lines and Their Efficiency. Transmission Lines. Safety Earthing System. Electric Shock.	Чтение общественно - политических, публицистических (медийных) / нелинейных (карты, схемы, диаграммы и т.п.) текстов по обозначенной проблематике. Монолог – сообщение об устройствах, использующихся в цепи. Презентация по теме модуля. Лексико-грамматические упражнения. Подготовка к тесту/словарному диктанту. Лексико-грамматический тест. Подготовка внеаудиторного чтения. Составление делового письма.	18
2	Electric Motors. Faults of Motors and Ways of Their Repair. Electric Power Consumers and Power Systems. Substations. Hydroelectric Power Plants. Atomic Power Plant. Protection against Environmental Pollution.	Монолог-сообщение о различных видах двигателей. Лексико-грамматические упражнения. Составление делового письма. Подготовка аннотаций /тезисов по обозначенной тематике. Подготовка внеаудиторного чтения. Подготовка презентаций по темам: «Electric Power Consumers and Power Systems». «Substations». «Hydroelectric Power Plants». «Atomic Power Plant». Контрольная работа.	18
	ИТОГО		36

1. МАТРИЦА КОМПЕТЕНЦИЙ УЧЕБНОЙ ДИСЦИПЛИНЫ

Таблица 4 – Матрица компетенций

Компетенции	модуль 1	модуль 2
ОК-1	+	+
ОК-2	+	+
ОК-6	+	+
ОК-7		+
Итого	3	4

8. ОБРАЗОВАТЕЛЬНЫЕ ТЕХНОЛОГИИ

На занятиях используются следующие образовательные технологии:

- технология стимуляции реального общения на иностранном языке;
- групповой и индивидуальный методы работы со студентами;
- технология проблемного обучения и воспитания;
- информационно-компьютерные технологии;
- технологии сотрудничества;
- тестовые технологии;
- диалоговые;
- дискуссия;
- технология аудиторной дискуссии (круглого стола, конференции, собрания);
- игровые технологии;
- интеллектуальная игра;
- ролевая игра;
- контролируемые игры.

Выписка из стандарта: «удельный вес занятий, проводимых в интерактивной форме, должен составлять не менее 20% аудиторных занятий».

Таблица 5 – Образовательные технологии

№	Темы модуля	Образовательные технологии	Часы
1	Electrical and Mechanical Engineering. Electric Circuit. Types of Current. Meters. Resistors. Capacitors. Transformers. Components of Electric Circuit. Electric Lines and Their Efficiency. Transmission Lines. Safety Earthing System. Electric Shock.	Диалог: «Different branches of engineering». Дискуссия: «Are there women's and men's professions?» Контролируемая игра: «Making a circuit and using components of a circuit». Ролевая игра: «Advantages and disadvantages of transmission lines». Круглый стол: «Potential dangers in your lab, workshop or place of work». Дискуссия- диспут: «Safety at work».	3,5
2	Electric Motors. Faults of Motors and Ways of Their Repair. Generators. Electric Power Consumers and Power Systems. Substations. Hydroelectric Power Plants. Atomic Power Plant. Protection against Environmental Pollution.	Диалог: «Electric motors used in everyday life». Ролевая игра: «Functions and components motors /generators». Брейн-ринг: «D.c. motors vs a.c. motors». Круглый стол: «Smart home technologies». Дискуссия: «Renewables». Конференция: «Power engineering: problems and prospects».	3,5
Итого			7

Диалоговые технологии - форма организации и метод обучения, основанный на диалогическом мышлении во взаимодействующих дидактических системах

Дискуссия – один из эффективных интерактивных методов познания и нахождения истины (дискуссия диспут, прогрессивная дискуссия, дискуссия – соревнование)

Технология аудиторной дискуссии (круглого стола, конференции, собрания) – коллективное обсуждение какого-либо вопроса, проблемы или сопоставления информации, идей, мнений предложений. Цели дискуссий – обучение, тренинг, диагностика, изменение установок, стимулирование творчества. Темы дискуссий – проблемы морали, семейных отношений, политики, науки техники и др.

Игровые технологии – дидактические системы применения различных игр, формирующих умения решать задачи выбора на основе альтернативных вариантов.

Интеллектуальная игра - средство, формирующее не только интеллектуальное развитие, но и коммуникативные умения, и навыки, личностные и профессиональные качества человека. Она разрешает трудности межличностного и межгруппового общения; создает благоприятный психологический, в ней разрешаются какие-либо жизненные проблемы, закрепляются свойства, качества, состояния, умения, навыки, способности, необходимые личности для выполнения социальных, творческих и профессиональных функций.

Ролевая игра - это речевая, игровая и учебная деятельности одновременно; самая точная модель общения, так как она подражает действительности в самых существенных чертах и в ней переплетается речевое и неречевое поведение партнеров. Ролевая игра способствует расширению сферы общения, предполагает предварительное усвоение языкового материала в тренировочных упражнениях и развитие навыков, которые позволят учащимся сосредоточиться на содержательной стороне высказывания.

Контролируемые игры на основе диалога или текста. В первом случае обучаемые знакомятся с базовым диалогом и отрабатывают его: обсуждают содержание диалога, прорабатывают нормы речевого этикета и необходимую лексику; составляют свой вариант диалога. Вторым видом контролируемой ролевой игры является игра на основе текста.

9.ОЦЕНОЧНЫЕ СРЕДСТВА ДЛЯ ТЕКУЩЕГО КОНТРОЛЯ УСПЕВАЕМОСТИ, ПРОМЕЖУТОЧНОЙ АТТЕСТАЦИИ ПО ИТОГАМ ОСВОЕНИЯ ДИСЦИПЛИНЫ И УЧЕБНО-МЕТОДИЧЕСКОЕ ОБЕСПЕЧЕНИЕ

В рамках данной Программы используется традиционная система контроля, которая включает в себя:

текущий контроль осуществляется в течение семестра в устной и письменной форме в виде контрольных и устных опросов;

промежуточный контроль проводится в виде зачета по семестрам. Объектом контроля являются коммуникативные умения во всех видах речевой деятельности (аудирование, говорение, чтение, письмо), ограниченные тематикой и проблематикой изучаемых разделов курса;

итоговый контроль проводится в виде зачета или экзамена за весь курс обучения иностранному языку. Объектом контроля является достижение заданного Программой уровня владения иноязычной коммуникативной компетенцией.

Виды контроля (по способу выявления формируемых компетенций)

Устный опрос

Достоинства: позволяет оценить знания и кругозор студента, умение логически построить ответ, владение монологической речью и иные коммуникативные навыки, обладает большими возможностями воспитательного воздействия преподавателя.

Письменные работы

Достоинства: экономия времени преподавателя; возможность поставить всех студентов в одинаковые условия, объективно оценить ответы при отсутствии помощи преподавателя, проверить обоснованность оценки; субъективности при оценке подготовки студента.

Контроль с помощью технических средств и информационных систем

Достоинства: оперативное получение объективной информации об усвоении студентами контролируемого материала, возможность детально и персонализировано представить эту информацию преподавателю, формирования и накопления интегральных (рейтинговых) оценок достижений студентов по всем дисциплинам и модулям образовательной программы, привитие практических умений и навыков работы с информационными ресурсами и средствами, возможность самоконтроля и мотивации студентов в процессе самостоятельной работы.

Формы контроля

Собеседование - специальная беседа преподавателя со студентом на темы, связанные с изучаемой дисциплиной, рассчитанная на выяснение объема знаний студента по разделу, теме модуля, проблеме и т.п.;

контрольная работа состоит из небольшого количества средних по трудности вопросов, задач или заданий, требующих поиска обоснованного ответа. Может занимать часть или полное учебное занятие с разбором правильных решений на следующем занятии. Рекомендуемая частота проведения – не менее одной перед каждой промежуточной аттестацией;

реферат - краткое изложение содержания научных трудов, литературы по определенной научной теме. Объем реферата может достигать 10-15 стр.; время, отводимое на его подготовку – от 2 недель до месяца. Подготовка реферата подразумевает самостоятельное изучение студентом нескольких литературных источников (монографий, научных статей и т.д.) по определённой теме, не рассматриваемой подробно на лекции, систематизацию материала и краткое его изложение. Цель написания реферата – привитие студенту навыков краткого и лаконичного представления собранных материалов и фактов в соответствии с требованиями, предъявляемыми к научным отчетам, обзорам и статьям;

тест - процедура, ориентирующая испытуемого на выполнение какого-нибудь практического действия (практические испытания);

зачет представляет собой форму промежуточной аттестации студента, определяемую учебным планом подготовки по направлению ВПО.

ПРИМЕРНЫЕ ЗАДАНИЯ ДЛЯ САМОКОНТРОЛЯ (3 СЕМЕСТР)

Контрольный перевод

Terminal Translation Variant 1

Electricity generation

Nikola Tesla's generation system using AC circuits to transport energy across great distances. The importance of dependable electricity generation, transmission and distribution] was revealed when it became apparent that electricity was useful for providing heat, light and power for human

activities. Decentralized power generation became possible when it was recognized that alternating current electric power lines can transport electricity at low cost across great distances by taking advantage of the ability to transform the voltage using power transformers.

Electricity has been generated for the purpose of powering human technologies for at least 120 years from various sources of potential energy. The first power plants were run on wood, while today we rely mainly on petroleum, natural gas, coal, hydroelectric and nuclear power and a small amount from hydrogen, solar energy, tidal harnesses, and wind generators.

The demand for electricity can be met in two different ways. The primary method thus far has been for public or private utilities to construct large scale centralized projects to generate and transmit the electricity required to fuel growing economies. Many of these projects have unpleasant environmental effects such as air or radiation pollution and the flooding of large areas of land.

Increasingly, distributed generation is seen as an alternate way to supply the electrical demand close to the users. Smaller, distributed projects can:

- Protect from blackouts caused by the closure of de-centralized power plants or transmission lines for maintenance, market manipulation or emergency shut downs
- Reduce pollution
- Allow smaller players to enter the energy markets.

Контрольная работа

Terminal Test (The Verbals)

Task 1 Underline the infinitives in the sentences. Translate into Russian.

1. To magnetize a body requires some energy.
2. In order to build the power plant near Northfield (USA), three miles of tunnels were drilled.
3. The distance to be covered was equal to ten miles.
4. To reduce the power losses, thick wires should be used.
5. No additional components were used since they were not needed to actuate the relay.
6. Various installations were used in order to transform electric power into mechanical, heat, and chemical power.
7. At least 90 per cent of electric energy to be generated at present is a.c.
8. A.c. can be increased, or decreased to meet industrial requirements.

Task 2 Underline the participles. Translate into Russian.

1. The energy lost in the capacitor appears in the form of heat being generated in the dielectric.
2. The problem being discussed is of no great importance for practice.
3. The generators constructed at the plant have no commutators.
4. The code widely used is called Morse code.
5. While passing through the conductor, resistance results in the production of heat.
6. Having been insulated with polythene, the line was tested under unfavorable conditions.
7. Having made a number of tests, the researcher got some useful results.
8. Having been tested under different conditions, the motors were put to use.

Task 3 What are the forms of the gerund in the examples given below? Translate into Russian.

1. Programming is the process of preparing, testing and correcting instructions for a computer
2. Is any metal capable of being drawn out into a wire?
3. After having been subjected to severe testing the material was recommended for use.
4. A motor-starter is a device for starting motors from rest by the simple act of closing the switch.
5. A constant speed of the device is maintained by supplying it with energy.
6. Steam is an important factor in producing usable energy because of the power being created by its expansion.
7. One of the problems modern research laboratories are working at is the problem of finding materials that can serve as electrical conductors in fusion reactors.

Примерные темы рефератов, сообщений, презентаций и дебатов

1. Power Engineering.
2. Electric Power Consumers and Power Systems.
3. Motors and Generators.
4. All Types of Power Plants.
5. Renewables.
6. Green Power Engineering.

Примерное содержание карточки

КАРТОЧКА НА ЗАЧЕТ № _____

1. Переведите на русский язык со словарем текст по специальности (объем 1200 печ. зн.) и подготовьте фонетическое чтение указанного отрывка (время работы 45 мин.).
2. Ознакомьтесь с содержанием текста по специальности (объем 3000 печ.зн.) и подготовьте реферированный пересказ (время работы 30 мин.).
3. Переведите 5 предложений с английского языка на русский и 5 предложений с русского языка на английский, обращая внимание на изученные грамматические явления и вокабуляр.
4. Изложите одну из пройденных тем (без подготовки).

Task 1 Wind - Driven Power Plant.

The engineers calculated that the annual energy available in the winds over the earth's surface exceed millions OF KILOWATT hours. Nevertheless, only a comparatively negligible part of that value finds an efficient application under our present conditions.

It is very difficult to say when men first utilized wind-mills as a source of mechanical energy. The Dutch used them for centuries in order to perform certain kinds of mechanical work. Old Egyptian writings tell us that Egyptian used wind power thousands and more years before our times. However, wind power is able to meet but small local needs for mechanical power.

Today scientists, designers and inventors pay attention to electricity generation. Electric windmills are in production or operation in a-number of countries; the Russia, the USA? England, France. We should like to point out that in 2004 a large turbine powered by the wind was built for electricity generation in Jalta; the Crimea. The electric generator was housed in an installation raised on a high tower.

A wind power plant must consist of the following main parts:

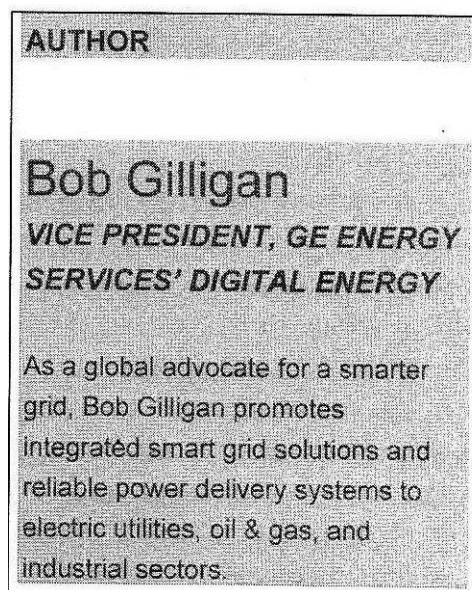
1. A rotor which is turned round by the wind. A wind-driven rotor must be designed in such a manner that the wind blowing on it causes it to rotate.
2. A tower to raise the rotor well above the earth's surface so that it can circulate freely without any danger or damage to people. The tower should be as high as possible because then the rotor intercepts wind moving at a greater and steadier rate than that over the earth's surface.
3. The rotor drive в the electric generator and produces power. The three parts mentioned above form the wind-driven power plant.

**Task 2 ELECTRIC CARS NEED A SMARTER GRID
MAY 14, 2012 / INDUSTRY INSIGHT**

Electric cars are hitting a responsive chord with consumers. But the environmental and economic benefits of these cars will be stunted if their cords don't plug into a smarter electrical grid.

Auto manufacturers are currently producing plug-in electric vehicles that are safe, affordable and fun to drive. State and federal governments are encouraging consumer adoption of EVs through generous tax rebates. Additionally, the Obama administration has earmarked \$400 million in grants to electrify the transportation sector One goal is to get 20,000 charging stations up and running by the end of 2013.

However, the development and consumer adoption of a smarter electrical grid remains a significant roadblock. Without the addition of advanced communication, automation and information technologies, our current electrical infrastructure can't optimally support the burden that EVs will bring from a power demand, billing or even cost perspective. Charging infrastructure is in early development. The novelty of a few electric cars can be absorbed by the current power system. But as more EVs appear, they could overburden the current power grid if they don't charge at off-peak times. During peak periods - the time when most people are either getting ready for work or coming home and turning on their biggest appliances - utilities are forced to



activate additional, more expensive "peaker plants" to meet demand spikes and deliver the power levels we've come to expect. Add in EV charging to peak periods, and it's possible the existing grid won't be able to handle the overwhelming demand.

With a smart grid and "time of use" pricing in place, plug-in owners will have incentive to charge car batteries during off-peak hours, when there is more power available and when power is cheaper. It's more economical for EV drivers to recharge when the power is "on sale" during off-peak periods - as defined by "time-of-use" pricing models, which are enabled by regulation and powered by smart meters.

If 10,000 gas-powered passenger vehicles were switched to electric vehicles, more than 33,000 metric tons of CO₂ emissions could be avoided annually, according to GE research.

Electric cars can provide a jolt as America explores a new energy strategy - but infrastructure investment is critical. Americans need to support the development of a smarter grid and understand its environmental and economic benefits. Only then will we get the most out of an electrified transportation network.

Task 3 Card

1. All the equipment removed, the explorers stopped working.
2. We know the scientist to study this proposal thoroughly.
3. High temperatures allowed the reaction with Kelly's explanations of the discrepancies to be carried out in 2 hours.
4. His having made this experiment is a known fact.
5. We disliked the problem being treated in this way.
6. Чтобы усилить металл, инженеры используют искусственные волокна.
7. Применение этого прибора, несомненно, даст лучшие результаты.
8. Отремонтировав двигатель, механик показал его инженеру.
9. Мы все знаем, что они проектируют новый тип устройства на полупроводниках.
10. Идея использования энергии океанов и морей для нужд человека не нова.

Task 4 Список тем:

1. Electric Circuit.
2. Meters.
3. Transmission Lines.
4. Electric Motors.
5. Power Plants.

10. УЧЕБНО-МЕТОДИЧЕСКОЕ И ИНФОРМАЦИОННОЕ ОБЕСПЕЧЕНИЕ ДИСЦИПЛИНЫ

А) Основная литература:

1. Трухан, Е.В. Английский язык для энергетиков: учеб. пособие / Е.В. Трухан, О.Н. Кобяк. – Минск: Высшая школа, 2011. (ЭБС Ун. б-ка online).
2. Кушникова, Г.К. Electricity. Обучение профессионально-ориентированному чтению [электронный ресурс]: учеб. пособие/ Г.К. Кушникова. - 2-е изд., стер. - М.: Флинта, 2011. (ЭБС Ун. б-ка online).
3. Федорищева, Е. А. Энергетика : проблемы и перспективы [Текст] : учеб. пособие по английскому языку для технических вузов / Е. А. Федорищева. – М.: Высш. шк., 2008.

Б) Дополнительная литература:

1. Полякова, Т.Ю. Английский язык для инженеров: учебник: рек. Мин. обр. РФ / Т. Ю. Полякова [и др.]. – 7-е изд. – М.: Высш. шк., 2009.
2. Полякова, О.В. Грамматический справочник по английскому языку с упражнениями: учеб. пособие / О.В. Полякова. – М.: Флинта: Наука, 2011. (ЭБС Ун. б-ка online).
3. Кузнецова, А. Ю. Грамматика английского языка. От теории к практике: учеб. пособие / А. Ю. Кузнецова. – 2-е изд. стер. – М.: изд-во Флинта, 2012. (ЭБС Ун. б-ка online).
4. Grammar in Use = Практическая грамматика [Текст]: учеб. пособие / АмГУ, ФФ; сост. Е. А. Процукович, М. С. Бузина. – Благовещенск: Изд-во Амур. гос. ун-та, 2008.
5. Кушникова Г. К. Electrical Power. Обучение профессионально – ориентированному чтению [Текст] : учеб. пособие / Г. К. Кушникова. – М : Флинта: Наука, 2007.

6. Glendinning E.H. Oxford English for Electrical and Mechanical Engineering [Текст]: Student's Book / E. H. Glendinning, N. Glendinning. – Oxford: Oxford University Press, 2002.
7. Изучаем английские спонтанные тексты [Текст] : учеб. пособие / С.В.Андросова [и др.] ; АмГУ , ФФ. Ч. 1. - 2004.
8. Изучаем английские спонтанные тексты [Текст] : учеб. пособие / С.В.Андросова [и др.] ; АмГУ , ФФ. Ч. 2. - 2004.

В) Программное обеспечение и Интернет-ресурсы

Широкое использование студентами и преподавателями поисковых систем RAMBLER, GOOGLE, YANDEX.

Библиотечно-информационные ресурсы

Таблица 6

№	Наименование ресурса	Краткая характеристика
1	Energy Policy http://www.elsevier.com	журнал, который студенты используют для внеаудиторного чтения, составления аннотаций и при подготовке к студенческой научной конференции
2	Scientific American SciAm.com .	журнал, который студенты используют для внеаудиторного чтения, составления аннотаций и при подготовке к студенческой научной конференции
3	International Journal of Electrical Power & Energy Systems www.sciencedirect.com	журнал для внеаудиторного чтения
4	Ieee Transactions on Power Systems http://www.ieee.org/pes	журнал для внеаудиторного чтения
5	Электронная библиотечная система «Университетская библиотека- online» www.biblioclub.ru	ЭБС по тематике охватывает всю область гуманитарных знаний и предназначена для использования в процессе обучения в высшей школе, как студентами и преподавателями, так и специалистами-гуманитариями

11. МАТЕРИАЛЬНО-ТЕХНИЧЕСКОЕ ОБЕСПЕЧЕНИЕ ДИСЦИПЛИНЫ

Оргтехника, мультимедийные средства, имеющиеся в наличии на кафедре, используются на практических занятиях по английскому языку со студентами неязыковых специальностей и для проведения студенческой научной конференции.

12. БАЛЛЬНО-РЕЙТИНГОВАЯ СИСТЕМЫ КОНТРОЛЯ

Логическим завершением идеи постоянной комплексной оценки учебной деятельности студента является *модульно-рейтинговая система обучения*.

Такая система контроля возможна только при модульном построении курса, что соответствует структуре данной Программы, где каждый раздел/тему можно рассматривать как учебный модуль.

Данная система контроля способствует решению следующих задач:

- повышению уровня учебной автономии студентов;
- достижению максимальной прозрачности содержания курса, системы контроля и оценивания результатов его освоения;
- усилению ответственности студентов и преподавателей за результаты учебного труда на протяжении всего курса обучения;
- повышению объективности и эффективности промежуточного и итогового контроля по курсу.

При балльно-рейтинговом контроле итоговая оценка выставляется не на основании оценки за ответ на зачете или экзамене, а складывается из полученных баллов за выполнение контрольных заданий по каждому учебному модулю курса. Рейтинговая составляющая такой системы контроля предполагает введение системы штрафов и бонусов, что позволяет осуществлять мониторинг учебной деятельности более эффективно. Штрафы могут назначаться за нарушение сроков сдачи и требований к оформлению работ, бонусные баллы – за выполнение дополнительных заданий или заданий повышенного уровня сложности. Сумма набранных баллов позволяет не только определить оценку студента по учебной дисциплине, но и его рейтинг в группе/ среди других студентов курса.

Данная система предполагает:

- систематичность контрольных срезов на протяжении всего курса в течение семестра или семестров, выделенных на изучение данной дисциплины по учебному плану;
- обязательную отчетность каждого студента за освоение каждого учебного модуля/темы в срок, предусмотренный учебным планом и графиком освоения учебной дисциплины по семестрам и месяцам;
- регулярность работы каждого студента, формирование должного уровня учебной дисциплины, ответственности и системности в работе;
- обеспечение быстрой обратной связи между студентами и преподавателем, учебной частью, что позволяет корректировать успешность учебно-познавательной деятельности каждого студента и способствовать повышению качества обучения;
- ответственность преподавателя за мониторинг учебной деятельности каждого студента на протяжении курса.

Семестровый курс предлагается оценивать по шкале в 100 +5(бонусы) баллов. Для получения зачета достаточно набрать 51 балл.

ТЕХНОЛОГИЧЕСКАЯ КАРТА ДИСЦИПЛИНЫ

Таблица 7

Наименование дисциплины	Уровень/ ступень Образования (бакалавриат, магистратура)	Статус дисциплины в рабочем учебном плане (А,В,С)	Количество зачетных единиц /кредитов
Профессиональный иностранный язык	бакалавриат 3семестр	А	2

Смежные дисциплины по учебному плану

ВВОДНЫЙ МОДУЛЬ
(проверка «остаточных знаний» по смежным дисциплинам)

Тема или задание текущей аттестационной работы	Виды текущей атте-	Аудиторная или внеауди- торная	Мини- мальное количе- ство	Макси- мальное количе- ство

	станции		баллов	баллов
Тестирование на проверку остаточных знаний предшествующего уровня	тест	Аудиторная		

Итого:

БАЗОВЫЙ МОДУЛЬ
(проверка знаний и умений)

Тема или задание текущей аттестационной работы	Виды текущей аттестации	Аудиторная или внеаудиторная	Минимальное количество баллов	Максимальное количество баллов
Electrical and Mechanical Engineering. Electric Circuit. Types of Current. Meters. Resistors. Capacitors. Transformers. Components of Electric Circuit. Electric Lines and Their Efficiency. Transmission Lines. Safety Earthing System. Electric Shock.	Ролевой пересказ Монолог Диалог Тест	Аудиторная	2,5	7
Electric Motors. Faults of Motors and Ways of Their Repair. Generators. Electric Power Consumers and Power Systems. Substations. Hydroelectric Power Plants. Atomic Power Plant. Protection against Environmental Pollution.	Монолог Диалог Лексико-грамматический тест Презентация Контрольное аудирование	Аудиторная	2,5	7
ИТОГО минимум:			25	70

ДОПОЛНИТЕЛЬНЫЙ МОДУЛЬ

Тема или задание текущей аттестационной работы	Виды текущей аттестации	Аудиторная или внеаудиторная	Минимальное количество баллов	Максимальное количество баллов
Подготовка презентации	презентация	Внеаудиторная	2,5	4
Разработка вик-	собеседование	Внеаудиторная	2	4

торин, кросс-вордов и других креативных заданий				
Создание видеороликов, видеофильмов на английском языке	презентация	Внеаудиторная	2	5
Составление конспектов практических занятий	собеседование	Внеаудиторная	1	2
ИТОГО	максимум			23

Необходимый минимум для допуска к промежуточной аттестации **51** балл.

Для студентов, пропустивших более 1/2 практических занятий по дисциплине, собеседование по всему курсу считается обязательным. Для студентов, пропустивших более 30 % практических занятий по болезни (подтверждается медицинской справкой), и для студентов, пропустивших занятия без уважительной причины, либо получивших на занятии неудовлетворительную оценку (не подготовившихся к занятию), отработка пропущенного (неудовлетворительно оцененного) занятия является обязательной. При этом полученная оценка (кроме отработки за пропуск по болезни) в текущий рейтинг не включается.

Дополнительные требования для студентов, отсутствующих на занятиях по уважительной причине:

- наличие конспектов пропущенных занятий;
- выполнение дополнительных лексико-грамматических упражнений; чтение и перевод текстов по пропущенной теме;
- выполнение заданий по усмотрению преподавателя.

II. ИЗЛОЖЕНИЕ ПРОГРАММНОГО МАТЕРИАЛА

МОДУЛЬ 1

ТЕМА: «Engineering – what’s it all about? »

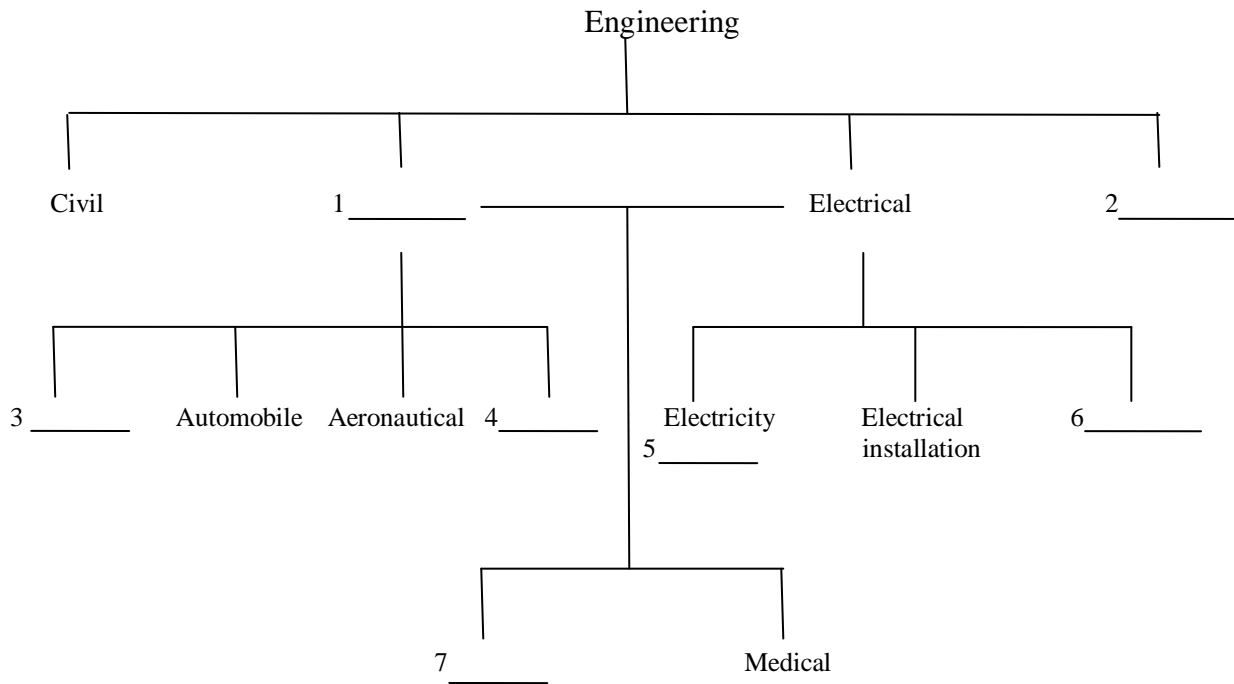
Task 1 List the main branches of engineering. Combine your list with others in your group.

Then read this text to find out how many of the branches listed are mentioned.

Engineering is largely a practical activity. It is about putting ideas into action. Civil engineering is concerned with making bridges, roads, airports, etc. Mechanical engineering deals with the design and manufacture of tools and machines. Electrical engineering is about the generation and distribution of electricity and its many applications. Electronic engineering is communications, computing, and so on.

Mechanical engineering includes marine, automobile, aeronautical, 10 heating and ventilating, and others. Electrical engineering includes electricity generating, electrical installation, lighting, etc. Mining and medical engineering belong partly to mechanical and partly to electrical.

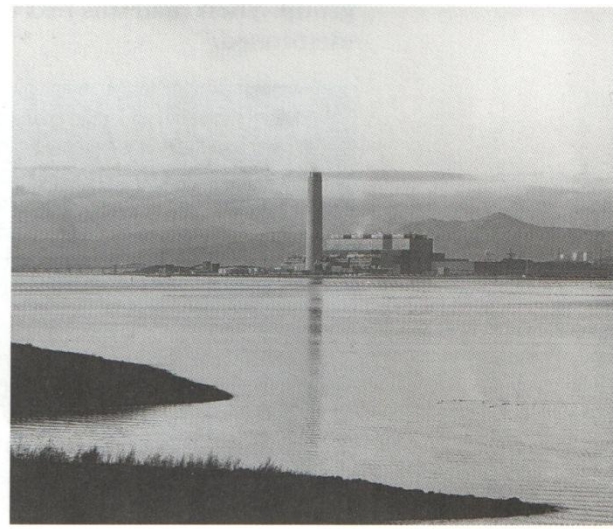
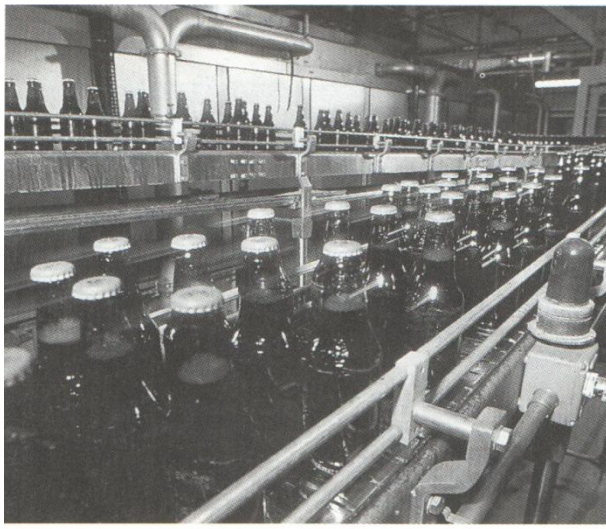
Task 2 Complete the blanks in this diagram using information from the text.



Reading Introduction

In your study and work, it is important to think about what you are doing to read before you read. This helps you to link old and new knowledge and to make guesses about the meaning of the text. It is also important to have a clear purpose when you read.

Task 3 Study these illustrations. They show some of the areas in which engineers work. Can you identify them? What kinds of engineers are concerned with these areas – electrical, mechanical, or both?



Task 4 Now read the following texts to check your answers to Task 3. Match each text to one of the illustrations above.

Transport: Cars, trains, ships, and planes are all products of mechanical engineering. Mechanical engineering are also involved in support services such as roads, rail track harbours, and bridges.

Food processing: Mechanical engineers design, develop, and make the machines and the processing equipment for harvesting, preparing and preserving the foods and drinks that fill the supermarkets.

Medical engineering: Body scanners, X-ray machines, life-support systems, and other high-tech equipment result from mechanical and electrical engineers combining with medical experts to convert ideas into life-saving and preserving products.

Building services: Electrical engineers provide all the services we need in our homes and places of work, including lighting, heating, ventilation, air-conditioning, refrigeration, and lifts.

Energy and power: Electrical engineers are concerned with the production and distribution of electricity to homes, offices, industry, hospitals, colleges and schools, and the installation and maintenance of the equipment involved in these processes.

Source: Adapted from Turning ideas into action, Institution of Mechanical Engineers, and Engineering a Career, Institution of Electronics and Electrical Incorporated Engineers.

Language study deals with/is concerned with

What is the link between column A and column B?

A
mechanical
electrical

B
machines
electricity

concerned with. We can show the link between them in a number of ways

Mechanical engineering **deals with** machines.

Mechanical engineers **deal with** machines.

Mechanical engineering **is concerned with** machines.

Mechanical engineers **are concerned with** machines.

Machines **are the concern of** mechanical engineers.

Task 5. Match each item in column A with an appropriate item from column B and link the two in a sentence.

A
1 marine
2 aeronautical
3 heating and ventilating
4 electricity generating
5 automobile
6 civil
7 electronic
8 electrical installation
9 medical

B
a air-conditioning
b roads and bridges
c body scanners
d cables and switchgear
e communications and equipment
f ships
g planes
h cars and trucks
i power stations

Word study Word stress

Words are divided into syllable. For example:

engine

en.ging

engineer

en.gin.eer

engineering

en.gin.eer.ing

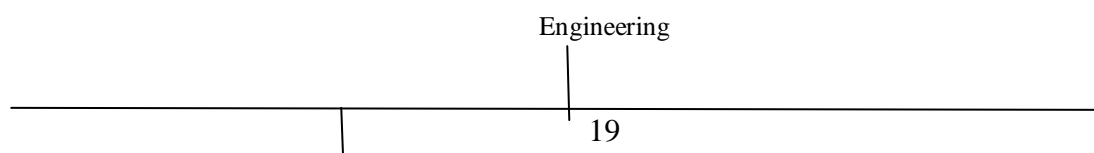
Each syllable is pronounced separately, but normally only one syllable is stressed. That means it is said more slowly and clearly than the other syllables. We say 'engine but engin'eer. A good dictionary will show the stressed syllable.

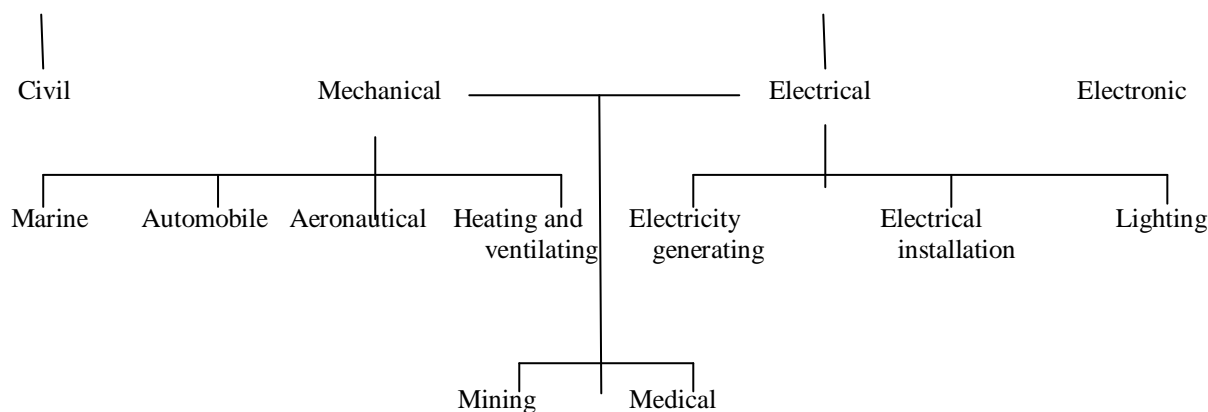
Task 6. Listen to these words. Try to mark the stressed syllables.

machinery
mechanical
machine
install
installation
electricity
electrical
electronics
aeronautical
ventilation

Writing

Task 7. Fill in the gaps in the following description of the different branches of engineering using information from this diagram and language you have studied in this unit.





The main branches of engineering are civil, _____, _____, and electronic. Mechanical engineering is _____ machinery of all kinds. This branch of engineering includes _____, automobile, _____, and heating and ventilating. The first three are concerned with transport: _____, cars and planes. The last _____ with air-conditioning, refrigeration, etc.

Electrical engineering deals with _____ from generation to use. Electricity generating is concerned with _____ cables, switchgear, and connecting up electrical equipment.

Two branches of engineering include both _____ and _____ engineers. There are mining and _____ engineering. The former deals with mines and mining equipment, the latter with hospital _____ of all kinds.

Listening

Task 8. Listen to these short extracts. To which branch of engineering do these engineers?

Task 9. Listen again. This time note the words which helped you decide on your answers

TEMA: «Choosing a course»

Task 1. Study this list of points to consider when deciding whether to study engineering. Tick the statements which refer to you. Then ask your partner which statements refer to him or her.

You enjoy practical projects – creating and investigating things.

You like finding out how things work.

You are interested in improving the environment.

You like helping people.

You enjoy solving problems.

You enjoy organizing activities.

You enjoy science programs on TV or on the radio.

You sometimes read articles on scientific or engineering topics.

You have a lot of determination and stamina.

If you have ticked most of these statements, engineering is the right course of study for you.

Task 2. Fill in the gaps in this text. Each gap represents one word. Compare your answers with your partner. More than one answer is possible for many of the gaps.

In the United Kingdom you can _____ engineering at a college of further education or a university. Most college courses _____ from one to two years. University undergraduate courses _____ engineering last from three to four years.

A college will take _____ after four years of secondary school education. Most students study full-time, _____ day-release courses are available for people who _____ in local engineering companies. Students will be given a certificate _____ a diploma at the _____ of their course.

Most university students will have completed six _____ of secondary school. Others will have taken a diploma course at college. _____ give degrees. A Bachelor's degree _____ three to four years. Master's _____ requires a further year.

Task 3. Listen to the text and note the words used on the tape for each gap.

Reading Having a purpose

As a student of engineering or as a professional engineer, you have to read a great deal. Make a list of some of the kinds of texts you may read. It is important that you develop the most effective skills for getting the information you want quickly and accurately when you read.

Task 6. Choosing a course requires careful reading of college and university brochures. Your purpose here is to find the most appropriate course for each of the following prospective students. Use the Course Guide which follows and answer the course code.

A student who has just left school and wants to become a technician.

A student who wants to design ships.

A student who wants to get an engineering degree and also improve his knowledge of languages.

A student who wants a degree eventually but whose qualifications at present are enough to start an HND course.

A student who wants to work as an engineer with the air force.

A technician employed by a company which installs electrical wiring in factories.

A student with a National Certificate in Electrical Engineering who is prepared to spend another two years studying to improve her qualifications.

A student interested in how micro-organisms can be used in industry.

Course Guide

Engineering

- EE22 Higher National Diploma in Electronic and Electrical Engineering. Two years, full-time. For potential electronic and electrical engineers. The first year is common and the second year allows students to specialize in either electronic or electrical engineering subjects. Successful students may continue to a degree course.
- EE17 National Certificate in Electrical Engineering. One year, full-time. For potential technicians or for those who wish to gain entry to an HND course.
- EE3 Higher National Certificate Course in Electrical Engineering. Two years, day-release. This course provides the technical education required for senior technicians employed in the electrical installation.
- H300 Bachelor of Engineering (B Eng) – Mechanical Engineering for Europe. Four years, full-time, including one year study and work attachment in France or Germany.
- H400 Bachelor of Engineering (B Eng) – Aeronautical Engineering. Three years, full-time, or four years including one year of professional training in the aircraft industry.
- HJ36 Bachelor of Engineering (B Eng) – Naval Architecture and Ocean Engineering. Three years, full-time.
- H340 Bachelor of Science (Engineering) – Mechanical
- H250 Bachelor of Engineering (B Eng) – Manufacturing Management. A two-year HND course in engineering followed by two years of technology and management designed to produce managers qualified in high technology.

Further information may be obtained by contacting one of these information centers and requesting the appropriate course leaflet by code number.

All E courses

Information Centre
Fraser Street
Parlett Street
Glasgow GL2 2KL

All H courses

Information Centre
Maxwell University
Hunter Square
Glasgow GL1 5PN

Writing Letter writing: requesting information

Write a letter to either the college or the university mentioned in Task 6 asking for information on a course which interests you. Set out your letter like this:

21 Route de St Fargeau
18900 Russe
France

30 August 2012

Information Centre
Fraser College
Parlett Street
GLASGOW
GL2 2KL
UK

Dear Sir/Madam

Please send me further information one course EE17 - National Certificate in Electrical Engineering.

Yours faithfully (sincerely, truly)
Daniel Romero

TEMA: «Electric Circuit »

1. a) Cover the right column and read the English words. Translate them into Russian.

b) Cover the left column and translate the Russian words back into English.

circuit	цепь, контур
conductor	проводник
function	назначение
difference	разница
open	обрыв
short	короткое замыкание
trouble	повреждение
no	никакой, нисколько
to reduce	сокращать
to supply	снабжать
to connect	связывать
to compare (with)	сравнивать (с)
to pass through	проходить через
to result in	приводить к, иметь результатом
to result from	следовать, проистекать из

2. Translate into Russian:

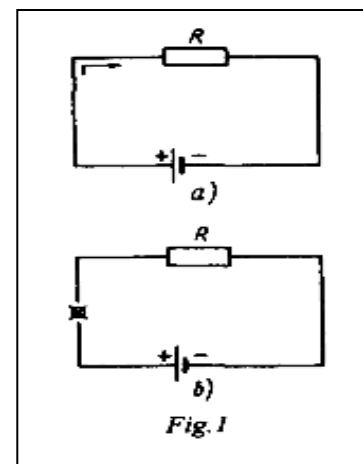
1. An open and a short are troubles in a circuit.
2. A trouble in a circuit results in no current in it.
3. What does an open in a circuit result in?
4. What does a short in a circuit result in?
5. What does a trouble in a circuit result from?

Electric Circuit

This is a circuit. Its elements are a voltage source, a resistor and a conductor. The circuit consists of a voltage source, a resistor and a conductor. A voltage source supplies current. A resistor reduces current. A conductor connects the elements of the circuit.

Compare circuit a with circuit b. What is the difference between them? Current passes through circuit a while no current passes through circuit b. Circuit b has an open. No current through circuit b results from an open. An open and a short are troubles in a circuit. A trouble in a circuit may result in no current in it.

3. Complete these sentences, using the correct variant:



1. Circuit a consists of
 - a) resistors and conductors.
 - b) a voltage source and resistors. .
 - c) a voltage source, a resistor and a conductor.
2. A voltage source
 - a) conducts current.
 - b) reduces current.
 - c) supplies current.
3. A conductor
 - a) connects the elements.
 - b) supplies voltage.
 - c) conducts current.
4. A resistor
 - a) connects the elements.
 - b) supplies current.
 - c) reduces current.
5. No current results from
 - a) an open.
 - b) a short.

4. Answer the following questions:

1. What elements does a circuit consist of?
2. What is the function of a voltage source?
3. What is the function of a conductor?
4. What is the function of a resistor?
5. When is there no current in a circuit?
6. What does an open or a short result in?
7. What does no current in a circuit result from?

5. Solve these problems:

1. How much is the current in the circuit if a 60volt source is connected to a resistance of 1,600 ohms?
2. How much is the voltage in a circuit having a current equal to 25 amp, if a 25-ohm resistance is connected to it?
3. A 70.35-ohm resistance is connected to the circuit. How much is the voltage if the current equals 4.5 amp?

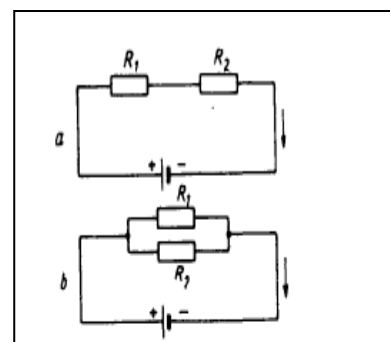
6. Pair work. Ask your groummate to compare circuits a and b (see Fig. 1).

1. What do they have in common?
2. Which of the circuits has a trouble?
3. What does the trouble result from?
4. What does it result in?

ТЕМА: «Series Circuit and Parallel Circuit»

1. a) Cover the right column and read the English words. Translate them into Russian and check your translation.
- b) Cover the left column and translate the Russian words back into English.

branch	отвод
line	линия
value	величина
voltage drop	падение напряжения
series	последовательное
parallel	параллельное
main	главный, основной
to use	использовать
in order (to)	для того чтобы



Series Circuit and Parallel Circuit

Compare circuits a and b. Circuit a consists of a voltage source and two resistors. The resistors are connected in series.

Circuit a is a series circuit. Circuit b consists of a voltage source and two resistors.

The resistors are connected in parallel. Circuit b is a parallel circuit. A parallel circuit has the main line and parallel branches.

In circuit b the value of voltage in R1 equals the value of voltage in R2 . The value of voltage is the same in all the elements of a parallel circuit while the value of current is different. A parallel circuit is used in order to have the same value of voltage. In

circuit a the value of current in R1 equals the value of current in R2 . The value of current is the same in all the elements of a series circuit while the value of voltage is different. A series circuit is used in order to have the same value of current. In R1,

$V_1 = IR_1$ is the voltage drop in R1. In R 2 the voltage equals

$I \times R_2$; IR_2 is the voltage drop in R2 . In circuit d a trouble in one element results in no current in the whole circuit. In circuit d a trouble in one branch results in no current in that branch only, a trouble in the main line results in no current in the whole circuit.

2. Complete these sentences using the correct variant:

1. A parallel circuit has
 - a) parallel branches only.
 - b) the main line and parallel branches.
2. A parallel circuit is used in order
 - a) to have the same value of current in all the elements.
 - b) to have the same value of voltage in all the elements.
3. In a parallel circuit a trouble in one branch
 - a) results in no current in that branch only.
 - b) results in no trouble in the whole circuit.
4. No current in a parallel circuit
 - a) results from a trouble in one branch.
 - b) results from a trouble in the main line.
5. The sum of IR voltage drops
 - a) equals the value of voltage in the circuit.
 - b) is less than the smallest voltage drop.
 - c) is more than the value of voltage in the circuit.

3. Complete the sentences using while. Follow the model:

Model: Resistors connected in series have the same value of current...

Resistors connected 'n series have the same value of current while resistors connected in parallel have the same value of voltage.

1. Resistors connected in series have different values of voltage while....
2. A trouble in one element of a series circuit results in no current in the whole circuit while...
3. In order to have the same value of current in all the elements, a series circuit is used while...
4. No current in a parallel circuit results from a trouble in the main line while...

4. Answer the following questions:

1. What type of circuit has the main line and parallel branches?
2. What type of circuit is used in order to have the same value of current in all the elements?
3. What type of circuit is used in order to have the same value of voltage in all the elements?
4. What does a trouble in the main line result in?
5. What does a trouble in a branch result in?
6. What does no current in a series circuit result from?
7. How much does the sum of IR voltage drops equal?
8. What is the difference between series and parallel circuits?

TEMA: «Meters»

1. a) Cover the right column and read the English words. Translate them into Russian and check your translation.

b) Cover the left column and translate the Russian words back into English.

meter	измерительный прибор
battery	батарея
scale	шкала
readings	показания на шкале (прибора)
terminal	клемма
positive	положительный
negative	отрицательный
to measure	измерять
to take into consideration	принимать во внимание
in this way	таким путем, таким образом

2. Translate into Russian:

1. One should take into consideration the difference between these circuits.
2. One should take into consideration that the ammeter is connected to the circuit in series.
3. What should one take into consideration using the ohmmeter?

Meters

Among the most common meters used there are the ohmmeter, the ammeter and the voltmeter. The ohmmeter is used to measure the value of resistance. It consists of a milliammeter calibrated to read in ohms, a battery and resistors. The meter is connected in parallel and the circuit is not opened when its resistance is measured. The readings on the scale show the measured value.

The ammeter is used to measure the value of current. When the ammeter is used the circuit should be opened at one point and the terminals of the meter should be connected to it. One should take into consideration that the positive terminal of the meter is connected to the positive terminal of the source; the negative terminal to the negative terminal of the source. The ammeter should be connected in series. The readings on the scale show the measured value.

3. Complete the sentences using the correct variant:

1. The ammeter is
 - a) a common meter.
 - b) an uncommon meter.
2. In order to measure the value of current
 - a) the ohmmeter is used.
 - b) the voltmeter is used.
 - c) the ammeter is used.
3. A meter has
 - a) positive terminals only.
 - b) negative terminals only.
 - c) positive and negative terminals.
4. When the ammeter is used
 - a) the circuit should be opened.
 - b) the circuit should not be opened.
5. The ammeter should be connected
 - a) in series.
 - b) in parallel.
6. One should take into consideration that
 - a) the positive terminal should be connected to the negative terminal.
 - b) the positive terminal should be connected to the positive terminal of the source.

4. Complete these sentences using while. Follow the model.

Model: The ammeter is used to measure the value of current ...

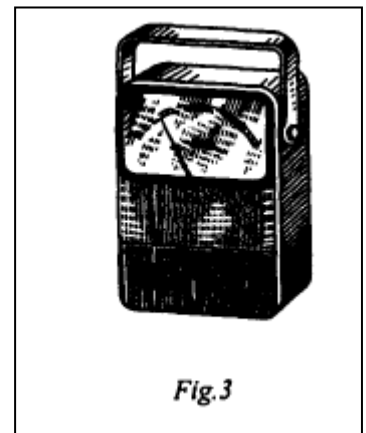


Fig.3

The ammeter is used to measure the value of current while the ohmmeter is used to measure the value of resistance.

1. The ohmmeter is used to measure the value of resistance ...
2. The ammeter is connected in series ...
3. When the ammeter is used to measure the value of current the circuit should be opened ...

5. Pair work. Put these questions to your groupmate. Let him/her answer them.

1. What is the ammeter used for?
2. What is the voltmeter used for?
3. What is the ohmmeter used for?
4. What terminals does a meter have?
5. Should the measured circuit be opened when the voltmeter is used?
6. Should the measured circuit be opened when the ammeter is used?
7. In what way should the voltmeter be connected to the circuit?
8. In what way should the ammeter be connected to the circuit?
9. What is the difference between a voltmeter and an ammeter?
10. What common meters are used to measure the values in a circuit?

6. Solve the following problems:

1. Suppose the ammeter scale reads 1.9 amp, the voltmeter scale reads 2.4 V; how much is the value of resistance in the measured circuit?
2. Suppose the ohmmeter scale reads 75 ohms, the voltmeter scale reads 220 V; how much is the value of current in the measured circuit?
3. Suppose that you have a series circuit consisting of three resistors and a voltage source. $R_1=0.18$ ohm, $R_2=1.15$ ohms, $R_3=2$ ohms, $I=10$ amp. Find the voltage drop across each resistor; find the value of voltage in the circuit. Suppose R_1 gets open. What does it result in?
4. Two resistors are connected in series. $R_1=7,000$, $R_2=2,200$, $I=110$ amp. Find the voltage drop across each resistor. Suppose no current passes through the circuit, what does it result from?

TEMA: « Resistors»

1. a) Cover the right column and read the English words. Translate them into Russian and check your translation.

b) Cover the left column and translate the Russian words back into English.

capacity	ёмкость
power	мощность
heat	теплота, нагрев
rate	скорость, степень
to produce	производить
to change	меняться
to vary	варьировать
low	низкий
high	высокий
fixed	постоянный
any	(зд.) любой
variable	переменный
the (more) ... the (more)	чем... тем

2. Read the words and put down their Russian equivalents:

temperature _____
energy _____
watt _____
constant _____
potential _____

3. Translate into Russian using *чем ... тем*:

1. The more one studies nature, the better one knows its laws.
2. The longer one learns, the more one knows.
3. The higher the atmosphere, the less is its pressure.
4. The heavier the object, the more work one has to do in order to lift it.
5. The greater the number of free electrons in any metal, the higher is its conductivity.

4. Translate into Russian. Mind no.

1. There is no energy in this machine.
2. No charges move through an open circuit.
3. No material is a perfect conductor of electricity.
4. No electric machinery is used without protection.
5. No special material is needed in this case.

Resistors

A resistor is one of the most common elements of any circuit. Resistors are used:

1. to reduce the value of current in the circuit;
2. to produce IR voltage drop and in this way to change the value of the voltage.

When current is passing through a resistor its temperature rises high. The higher the value of current the higher is the temperature of a resistor. Each resistor has a maximum temperature to which it may be heated without a trouble. If the temperature rises higher the resistor gets open and opens the circuit.

Resistors are rated in watts. The watt is the rate at which electric energy is supplied when a current of one ampere is passing at a potential difference of one volt. A resistor is rated as a 1 W resistor if its resistance equals 1,000,000 ohms and its current-carrying capacity equals 1/1,000,000 amp, since $P = E \times I = IR \times I = I^2 R$ where P power is given in watts, R resistance is given in ohms and I- current is given in amperes.

If a resistor has a resistance of only 2 ohms but its current carrying capacity equals 2,000 amp, it is rated as a 8,000,000W resistor. Some resistors have a constant value these are fixed resistors; the value of other resistors may be varied these are variable resistors.

5. Complete the sentences using the correct variant:

1. A resistor is used
 - a) to measure the resistance.
 - b) to reduce the current.
 - c) to change the resistance.
 - d) to produce IR voltage drop.
2. When current passes through a resistor
 - a) its temperature drops.
 - b) its temperature rises.
3. Resistors are rated
 - a) in ohms.
 - b) in volts.
 - c) in watts.
4. Power is given
 - a) in amperes.
 - b) in watts.
5. Fixed resistors have
 - a) a constant value.
 - b) a variable value.
6. The value of a variable resistor
 - a) is fixed.
 - b) is varied.
7. A two-ohm resistor rated as a 8,000,000- W resistor
 - a) has a current-carrying capacity equal to 2,000 amp.
 - b) has a current-carrying capacity equal to 200 amp.
8. The higher the value of current,
 - a) the lower is the temperature of a resistor.
 - b) the higher is the temperature of a resistor.

6. Complete the sentences using while.

1. The value of a fixed resistor is constant...
2. Current-carrying capacity is given in amperes...
3. The lower the value of current, the lower is the temperature of a resistor...
4. An electric source produces energy...

7. Pair work. Put these questions to your groupmate and let him/her answer them.

1. What is a resistor used for?
2. When does the temperature of a resistor rise?
3. What element is used to change the value of voltage?
4. How are resistors rated?
5. What types of resistors do you know?
6. When does a resistor get open?
7. What does an open resistor result in?
8. What is the difference between a fixed resistor and a variable resistor?
9. How much is the current-carrying capacity of a two-ohm resistor?
10. What resistors have a variable value?

8. Solve the problem:

What is the maximum current for a resistor having a 5-W capacity and a resistance of 20,000 ohms?

9. Pair work. Think of three similar problems of your own. Ask your groupmate to solve them.

ТЕМА: «Electric Cells»

1. a) Cover the right column and read the English words. Translate them into Russian.

b) Cover the left column and translate the Russian words back into English.

cell	элемент
output	ёмкость, мощность
bulb	электрическая лампа
to light	зажигать, освещать
to increase	увеличивать, возрастать
to substitute	заменять
... and so on	и так далее

2. Read the words and put down their Russian equivalents:

electrode _____

electrolyte _____

to start _____

to operate _____

to isolate _____

3. Translate into Russian and put down the Russian equivalents.

a. current capacity _____

resistor temperature _____

voltage output _____

current value _____

b. to start supplying energy _____

to stop operating _____

to start lightening _____

to stop lightening the bulbs _____

c. to operate well _____

to operate badly _____

to increase the voltage output _____

to substitute the resistor _____

4. Read and translate into Russian. Mind one:

1. The element has a trouble. It operates badly. It should be substituted by a new one.

2. The element with a trouble was substituted with a new one and the cell started operating.

Electric Cells

An electric cell is used to produce and supply electric energy. It consists of an electrolyte and two electrodes. Electrodes are used as terminals; they connect the cell to the circuit- current passes through the terminals and the bulb lights. Cells can be connected in series, in parallel and in series-parallel. In order to increase the current capacity cells should be connected in parallel. In order to increase the voltage output cells should be connected in series. In case a battery has a large current capacity and a large voltage output, its cells are connected in series-parallel. When cells are connected in series the positive terminal of one cell is connected to the negative terminal of the second cell, the positive terminal of the second cell to the negative terminal of the third ... and so on. When cells are

connected in parallel their negative terminals are connected together and their positive terminals are also connected.

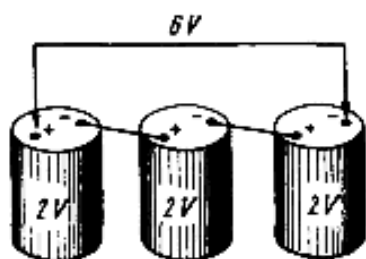


Fig.6

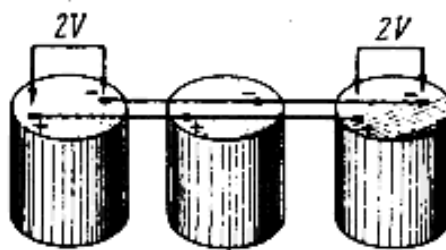


Fig.7

In case a cell has a trouble it stops operating or operates badly. This cell should be substituted by another one.

5. Complete the sentences using the correct variant:

1. A cell is used
 - a) to increase the voltage output.
 - b) to reduce the current capacity.
 - c) to supply electric energy.
2. The terminals of a cell are used
 - a) to conduct current.
 - b) to increase voltage.
 - c) to connect the battery to a circuit.
3. When cells are connected in series
 - a) all the positive terminals are connected together.
 - b) all the negative terminals are connected together.
 - c) the positive terminal of one cell is connected to the negative terminal of the second.
4. Cells are connected in series in order
 - a) to increase the current capacity.
 - b) to increase the voltage output.
5. In order to increase the current capacity
 - a) cells are connected in series.
 - b) cells are connected in parallel.

6. Answer the following questions:

1. What is a cell used for?
2. What does a cell consist of?
3. What is the function of the terminals?
4. In what way are cells connected in order to increase the voltage output?
5. In what way are cells connected in order to increase the current capacity?
6. In what way are the terminals of series cells connected?
7. In what case does a cell stop operating?
8. What should be done in case it stops operating?

7. Solve these problems:

1. Suppose that you have four electric cells. The current capacity of each cell equals 1.5 amp, the voltage output equals 2V.
 - a) Connect the cells in series. In what way should it be done?
 - b) Connect the battery to a circuit whose resistance value equals 15 ohms. What is the value of current in the circuit?
2. Suppose that you have three cells of the same value.
 - a) Connect them in parallel. In what way should it be done?
 - b) Connect the second battery to the same circuit: what will it result in?
 Suppose that one of the cells stops operating. What should be done in this case?

TEMA: «Capacitors»

1. a) Cover the right column and read the English words. Translate them into Russian and check your translation.

b) Cover the left column and translate the Russian words back into English.

capacitor	конденсатор
insulator	изолятор
frequency	частота
distance	расстояние
advantage	преимущество
disadvantage	недостаток
plate	анод (лампы)
part	часть
to apply	прилагать, применять
to move	двигать(ся)
to prevent	предотвращать
reason	причина
for this reason	по этой причине
besides	кроме того
provided that	при условии что

2. Translate into Russian and write down the Russian equivalents. Then translate the Russian variants back into English (orally).

- a. paper insulators _____
 air insulators _____
 electrolyte capacitors _____
 advantages of electrolyte capacitors _____
 disadvantages of air insulators _____
- b. cells under test _____
 capacitors in common use nowadays _____
 radio sets under test _____
 PC in common use nowadays _____
- c. a radioman _____
 radio work _____
 radio parts _____
 telephone and radio work _____

3. Translate into Russian. Mind *provided that*.

1. A circuit operates well provided that it does not have any trouble.
2. The bulb lights provided that the circuit is connected to the cell.
3. A cell supplies energy provided that its electrodes are of different materials.

Capacitors

A capacitor is one of the main elements of a circuit. It is used to store electric energy. A capacitor stores electric energy provided that a voltage source is applied to it.

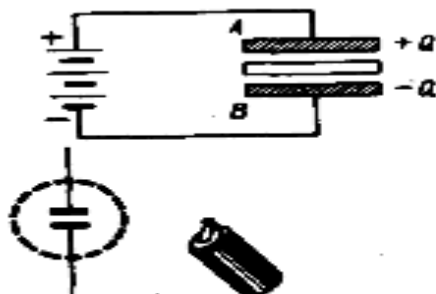


Fig.8



Fig.9

The main parts of a capacitor are metal plates and insulators. The function of insulators is to isolate the metal plates and in this way to prevent a short. In the diagram one can see two common types of capacitors in use nowadays: a fixed capacitor and a variable one. The plates of a fixed capacitor cannot be moved; for this reason its capacity does not change. The plates of a variable capacitor move; its capacity changes. The greater the distance between the plates, the less is the capacity of a capacitor. Variable capacitors are commonly used by radiomen; their function is to vary the frequency in the circuit. Fixed capacitors are used in telephone and radio work. Fixed capacitors have insulators

produced of paper, ceramics and other materials; variable capacitors have air insulators. Paper capacitors are commonly used in radio and electronics; their advantage is their high capacity: it may be higher than 1,000 picofarad. Besides, electrolyte capacitors are highly in use. They also have a very high capacity: it varies from 0.5 to 2,000 microfarad. Their disadvantage is that they change their capacity when the temperature changes. They can operate without a change only at temperatures not lower than -40 C. Common troubles in capacitors are an open and a short. A capacitor stops operating and does not store energy in case it has a trouble. A capacitor with a trouble should be substituted by a new one.

4. Complete these sentences using the correct variant:

1. A capacitor is used
 - a) to supply voltage.
 - b) to increase the voltage output.
 - c) to store energy.
2. The main parts of a capacitor are
 - a) insulators only.
 - b) metal plates only.
 - c) metal plates and insulators between them.
3. The function of insulators is
 - a) to store energy.
 - b) to isolate the metal plates.
 - c) to prevent a short between the metal plates.
4. The capacity of a capacitor depends on
 - a) the size of the plates.
 - b) the distance between the plates.
 - c) the material of the insulators.
5. The capacity of a fixed capacitor
 - a) is constant.
 - b) is varied.
6. The plates of a variable capacitor
 - a) can be moved.
 - b) cannot be moved.
7. In order to charge a capacitor a voltage source is applied
 - a) to the metal plates.
 - b) to the insulators.
8. The greater the distance between the plates,
 - a) the greater is the capacity of a capacitor.
 - b) the less is the capacity.
9. Variable capacitors have
 - a) air insulators.
 - b) paper insulators.
 - c) ceramic insulators.
10. Electrolyte capacitors have
 - a) a very low capacity.
 - b) a very high capacity.
11. In case a capacitor has a trouble
 - a) it operates.
 - b) it stops operating.

5. Complete these sentences using while.

1. The plates of a fixed capacitor cannot be moved to vary the capacity ...
2. The capacity of a variable capacitor is varied ...
3. Electrolyte capacitors change their capacity when the temperature changes ...
4. The less the distance between the plates, the greater is the capacity ...
5. When a capacitor has no trouble it stores energy ...

6. Pair work. Put these questions to your groupmate and ask him/her to answer them.

1. What is a capacitor used for?
2. What are the main parts of a capacitor?

3. What is the function of insulators?
4. What does the capacity of a capacitor depend on?
5. What is the difference between a fixed capacitor and a variable one?
6. What should be done in order to change a capacitor?
7. What is the relation between the value of capacity and the distance of plates?
8. What type of insulators have variable capacitors?
9. What should be done in case a capacitor has a trouble?

7. Solve these problems:

Draw a diagram of a circuit consisting of two resistors and two capacitors connected in parallel. A battery of four cells is applied to the circuit. Two ammeters are used: one is connected to the main line, the other to a parallel branch. What is the function of each element? In what way can one increase the value of resistance in the circuit? Suppose one of the branches stops operating. What does it result from?

ТЕМА: «Transformers»

1. a) Cover the right column and read the English words. Translate them into Russian.

b) Cover the left column and translate the Russian words back into English.

core	сердечник
winding	обмотка
turn	ВИТОК
to step up	ПОВЫШАТЬ
to step down	ПОНИЖАТЬ
frequency	ЧАСТОТА
due to	благодаря, из-за

2. Put down the Russian for:

- iron core _____
- closed core _____
- input voltage _____
- output voltage _____
- primary winding _____
- secondary winding _____
- step-up transformer _____
- step-down transformer _____

Transformers

A transformer is used to transfer energy. Due to the transformer electric power may be transferred at a high voltage and reduced at the point where it must be used to any value. Besides, a transformer is used to change the voltage and current value in a circuit.

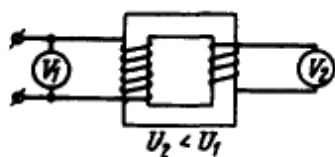


Fig.10

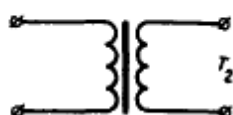


Fig.11

A two-winding transformer consists of a closed core and two coils (windings). The primary winding is connected to the voltage source. It receives energy. The secondary winding is connected to the load resistance and supplies energy to the load. The value of voltage across the secondary terminal depends on the number of turns in it. In case it is equal to the number of turns in the primary winding the voltage in the secondary winding is the same as in the primary. In case the secondary has more turns than the primary the output voltage is greater than the input voltage. The voltage in the secondary is greater than the voltage in the primary by as many times as the number of turns in the secondary is greater than the number of turns in the primary. A transformer of this type increases or steps up

the voltage and is called a step-up transformer. In case the secondary has fewer turns than the primary the output voltage is lower than the input. Such a transformer decreases or steps down the voltage, it is called a step-down transformer. Compare T1 and T2 in the diagram. T2 has an iron core. For this reason it is used for low frequency currents. T1 has an air core and is used for high frequencies. Common troubles in transformers are an open in the winding, a short between the primary and the secondary, and a short between turns. In case a transformer has a trouble it stops operating or operates badly. A transformer with a trouble should be substituted.

3. Complete the sentences using the correct variant:

1. A transformer is used
 - a) to store charge.
 - b) to prevent the change of energy.
 - c) to transfer energy.
 - d) to change the voltage and current value in a circuit.
2. Electric power is transferred at a high voltage and reduced to any value
 - a) due to resistors.
 - b) due to capacitors.
 - c) due to transformers.
3. A transformer consists of
 - a) cores only.
 - b) the primary and the secondary windings.
 - c) a core and the primary and the secondary windings.
4. The function of the primary is
 - a) to prevent the change of voltage.
 - b) to supply energy.
 - c) to receive energy.
5. The function of the secondary is
 - a) to receive energy.
 - b) to supply energy.
 - c) to transfer energy.
 - d) to decrease the value of charge.
6. A step-up transformer is used
 - a) to step down or decrease the secondary voltage.
 - b) to step up or increase the primary voltage.
7. A step-down transformer is used
 - a) to step down the secondary voltage.
 - b) to step down the primary voltage.
8. A transformer with an iron core
 - a) is used for high-frequency currents.
 - b) is used for low-frequency currents.
9. A transformer with an air core is used
 - a) for high-frequency currents and for low- frequency currents.
 - b) for high-frequency currents only.
10. In a step-up transformer
 - a) the number of turns of the secondary winding is greater than the number of turns of the primary.
 - b) the number of turns of the primary winding is greater than the number of turns of the secondary.
11. A transformer should be substituted
 - a) in case it has an open in the winding.
 - b) in case it has a short between the primary and the secondary.
 - c) in case it has a short between turns.

4. Complete these sentences using while.

1. The secondary winding of a transformer is connected to the load resistance ...
2. The primary winding receives energy...
3. A step-down transformer decreases the primary voltage ...
4. An air core transformer is used for high-frequency currents ...
5. In a step-up transformer the number of turns of the secondary winding is greater than the number of turns of the primary winding ...

5. Pair work. Put these questions to your groupmate and ask him/her to answer them.

1. What is a transformer used for?
2. What does a transformer consist of?
3. What is the function of the primary winding?
4. What is the function of the secondary winding?
5. What type of transformer is called a step-up transformer?
6. What type of transformer is used for high-frequency currents?
7. What type of transformer is called a step-down transformer?
8. What type of transformer is used for 10w-frequency currents?
9. What is the relation between the number of turns in the windings and the value of current?
10. What are common troubles in a transformer?
11. What should be done in case a transformer has a trouble?

6. Read about current transformer. Answer the questions that follow.

Current Transformers

Current transformers are used for operating ammeters, wattmeters, and other measuring devices. They produce in the meters a current lower than the measured current but proportional to it. Current transformers also insulate the instrument from the circuit which is being measured. This is necessary for high voltage circuits.

1. What is a current transformer used for?
2. What type of current does it produce?

ТЕМА: «Electric Lines and Their Efficiency»

1. a) Cover the right column and read the English words. Translate them into Russian.

b) Cover the left column and translate the Russian words back into English.

efficiency	отдача, эффективность
ignorance	незнание, неведение
dependence	зависимость
cost	стоимость
loss	потеря
length	длина
to ignore	не принимать во внимание
to depend (on)	зависеть от
to exceed	превышать
long	длинный
exceedingly	чрезвычайно, очень
per cent	процент

2. Read the words and put down their Russian equivalents:

line _____
station _____
engineer _____
engineering _____

3. Put down the nouns corresponding to these verbs. Follow the model.

Model: to act- action

to produce _____
to use _____
to lose _____
to ignore _____
to depend _____
to cost _____

4. Translate into Russian:

a. line efficiency _____
voltage loss _____
power station _____
b. interdependent values _____
interconnected sources _____
changing power efficiency _____

- c. exceedingly high power losses _____
 exceedingly inefficient energy sources _____
 d. One can ignore these exceedingly low power losses.

One should take into consideration the interdependence of these values.
 One should not ignore the high cost of these installations.

Electric Lines and Their Efficiency

Wires are used to deliver electric power and to interconnect different components of electrical installations. Conductors used for electric wiring are commonly produced of copper and aluminium. Aluminium is widely used nowadays due to its low cost. Copper is also widely used in electrical engineering but its cost is much higher. Wires connecting the components of various installations may be insulated. They may also be used without insulation. Since in short lengths of wire power loss is exceedingly low one can ignore it. In long wires (longer than 10 m), power loss cannot be ignored since it is rather high. Power loss in a line should not exceed a definite value. If this value is exceeded the line becomes inefficient. One should know that the efficiency of a line is not constant it may change. The value of the line efficiency depends on the load: the greater the load the lower is the line efficiency. At voltage losses of 2 to 5 per cent the efficiency of a line is 98-95 per cent. Protecting devices fuses and relays are used to protect the circuit against overcurrents and short circuits.

5. Complete the sentences using the correct variant:

- Aluminium is used due to its
 - high cost.
 - low cost and high efficiency.
- Cross-section of different conductors
 - varies.
 - is the same.
- Power loss can be ignored
 - in short wires.
 - in long wires.
- A definite value of loss
 - can be exceeded.
 - should not be exceeded.
- Electric Lines nowadays are
 - efficient.
 - inefficient.
- Installations are protected
 - by switches.
 - by fuses.

6. Complete these sentences using *while*.

- The cost of aluminium is comparatively low while ...
- In a short length of wire power loss is extremely low while ...
- The greater the load the lower is the efficiency of the line...

7. Answer these questions:

- Why is aluminium widely used nowadays?
- Is its cost very low or comparatively low?
- What is the cross-section of copper conductors?
- May one ignore power loss in short wire? Why?
- What does the efficiency of a line depend on?
- What are fuses used for?
- When does a line become inefficient?

TEMA: «Transmission Lines»

1. a) Cover the right column and read the English words. Translate them into Russian.

b) Cover the left column and translate the Russian words back into English.

area	площадь, область
distance	расстояние
network	сеть электролиний
support	опора, мачта

cord	провод
bus	шина
enterprise	предприятие
to term	называть, именовать
to divide	делить, разделять
to support	поддерживать
to distribute	распределять
accordingly	соответственно
as to...	что касается; ... что до
long distance	большое расстояние
length of transmission lines	длина линий передачи
power consumption	потребление энергии
distribution centre	распределительный центр
city area	район городской застройки

2. Put down the Russian for:

interdependent city areas
interacting underground lines
interconnected overhead lines
transmitting power lines
transmission and distribution lines
overhead lines
step-down transformer
indoor lines
underground lines

Transmission Lines

A power system is an interconnection of electric power stations by high voltage power transmission lines. Nowadays the electricity is transmitted over long distances and the length of transmitting power lines varies from area to area. A wire system is termed a power line in case it has no parallel branches and a power network in case it has parallel branches. According to their functions, power lines and networks are subdivided into transmission and distribution lines. Transmission lines serve to deliver power from a station to distribution centers. Distribution lines deliver power from distribution centers to the loads. Lines are also classed into: 1) overhead; 2) indoor; 3) cable (underground).

Overhead lines include line conductors, insulators, and supports. The conductors are connected to the insulators, and these are connected to the supports. The greater the resistance, the higher are the heating losses in the conducting wires. In order to reduce the losses, a step-down transformer can be used. Indoor lines include conductors, cords, and buses. The conductor may include one wire or a combination of wires not insulated from one another. They deliver electric current to the consumers. As to underground lines, they are used in city areas. Accordingly, they are used in cities and towns, and in the areas of industrial enterprises.

3. Complete these sentences using the correct variant.

- Electric power is transmitted
 - by electric lines.
 - by power networks.
- Lines are divided into
 - overhead and underground.
 - overhead, indoor and underground.
- An overhead line includes
 - conductors and supports.
 - conductors, insulators and supports.
- The insulators are connected
 - to the buses.
 - to the supports.
- Conductors consist of
 - bare wire.
 - insulated wire.
- Underground lines are used

- a) in cities.
- b) in areas of enterprises.
- c) in agricultural areas.

4. Complete the sentences using while or as to.

1. The system is termed a power line in case it has no parallel branches
2. Transmission lines deliver power from a station to distribution centres...
3. Low current results in decreased heating losses...
4. Overhead lines are used in open areas...

5. Answer these questions:

1. By what means is electric power system transmitted?
2. Which system has no parallel branches?
3. Into what groups are all the transmitting lines classed?
4. What components does an overhead line have?
5. What elements do conductors consist of?
6. In what areas are overhead (underground) lines used?

ТЕМА: «Safety Earthing System. Electric Shock »

1. a) Cover the right column and read the English words. Translate them into Russian.

b) Cover the left column and translate the Russian words back into English.

safe	безопасный
safety	безопасность
danger	опасность
strength	сила
earth	земля
ground	земля
dead	выключенный
dangerous	опасный
strong	сильный
to save	безопасный
to disappear	исчезать
to appear	появляться
live	под напряжением
dry	сухой
wet	влажный

2. Read the words and put down their Russian equivalents. Then translate them back into English (orally).

atmosphere
 personnel
 contact
 regular
 control
 detect

3. Form nouns from these adjectives and translate them into Russian.

strong
 long
 wide
 broad
 high

4. Put down the Russian for:

under voltage
 under 20 V
 over 30 V
 the power is on
 the power is off
 great strength
 dry air

dead conductor
live conductor

5. Choose the suitable words and translate the sentences:

1. The danger of electric shock (appears, disappears) when the conductor becomes (live, dead).
2. Current passes through faulty (earthed, disappears) part of installations when the power is on.
3. Low accuracy of measurement is (an advantage, a disadvantage) of the measuring device.
4. The danger of electric shock (increases, decreases) in the wet and hot atmosphere.
5. No current flows through a (dead, live) conductor.

6. Fill in using the verbs to detect, to appear, to disappear and to decrease:

1. When resistance increases, the risk of electric shock
2. Faults in electric installations are ... by means of special devices.
3. Electric power... only on live conductors with power on.
4. When the device is switched off electric power

Safety Earthing System. Electric Shock

The strength of current depends on both the voltage and the resistance in a circuit. A current of 50 mA is dangerous for a man and a current of 100 mA and higher is lethal.

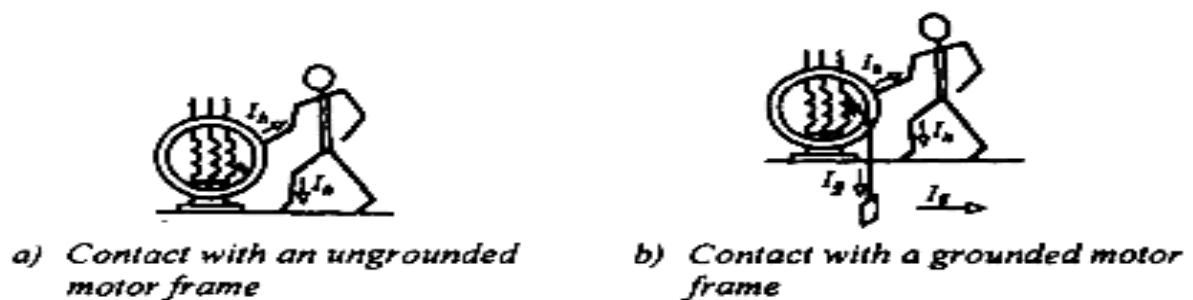


Fig. 19

Earthing system serves to protect attending personnel from electric shocks when voltage appears on parts that are normally dead. The risk of an electric shock decreases with decreasing voltage. In wet and hot atmosphere the risk of electric shock increases. Safe voltage for circuits used in dry atmosphere is under 36 V. When the power is on, contacts with live conductors are dangerous for life. Thus, measures are taken to protect attending personnel from contacts with live parts of installations under voltage. The danger of an electric shock disappears provided the metal parts of installations under voltage are connected with ground by means of safety earthing. Connecting to ground is made by means of earthing electrodes which are connected directly with ground. The insulation resistance of any installation should be regularly controlled by means of measuring devices. The faulty parts should be detected, eliminated, and replaced by new ones.

7. Complete the sentences using the correct variant:

1. Earthing system serves
 - a) as protection from an electric shock.
 - b) as connection with ground.
2. Voltage appears on
 - a) dead parts.
 - b) live parts.
3. Contact with live conductors is
 - a) dangerous.
 - b) safe.
4. Connection to ground is made
 - a) by means of wire conductors.
 - b) by means of earthing electrodes.
5. Danger of an electric shock disappears if the frame
 - a) is earthed.
 - b) is unearthed.

8. Complete the sentences using while.

1. The insulation resistance of a faulty unearthed frame is extremely low
2. Danger of an electric shock disappears when the faulty parts are earthed
3. One should work on the circuit when the power is on. One should not work on the circuit when the power is

4. Contact with dead conductors is safe
5. In dry air the risk of an electric shock decreases

9. Answer these questions:

1. What does an earthing system serve for?
2. What parts are termed dead (live)?
3. In what an does the risk of an electric shock decrease?
4. By what means is connection to ground made?
5. What does an electric shock result from?
6. Is a current of 50 mA dangerous for a man?
7. Is wet and hot atmosphere dangerous for the attending personnel?
8. Does the risk of an electric shock decrease with increasing current?

10. Read the text and write four questions .Ask your groupmates to answer them.

A man can get an electric shock when he comes into contact with the electric fish. One of this kind is found in the tropical waters of South America: it is the electric eel. Small electric eels, one inch long, give a small shock. When the fish is 6 inches long its internal battery gives as much as 200 volts. A very big fish can generate 600 volts! When it is short circuited, a current of one ampere can be obtained. A two-meter long eel can light a dozen 50 watt lamps. The eel's head is positively charged and the opposite end is negatively charged.

МОДУЛЬ 2

ТЕМА: «Electric Motors»

1. a) Cover the right column and read the English words. Translate them into Russian and check your translation.

b) Cover the left column and translate the Russian words back into Russian and check your translation.

condition	условие
plant	завод
pole	полюс
torque	вращение
poor	бедный, плохой
nameplate	заводская табличка

2. Read the words and put down their Russian equivalents. Then translate them back.

industry
service
transport
motor
practical
potential

3. Give the Russian for:

magnet pole
different conduit
machine ratings
rated torque
service life
poor operation

4. Form adjectives and adverbs. Translate them into Russian.

a. care - careful

use

power

b. care - careless

use

power

wire

c. normal - normally

practical

potential

abnormal

poor

5. Answer these questions:

1. What types of magnets are used in heavy industry?
2. How long is motors' service life under normal conditions?
3. Are motors used in every branch of industry?
4. What are the main types of motors in use nowadays?

Electric Motors

Motors are used for converting different forms of energy into mechanical energy. The main part of a motor is a coil or armature.

The armature is placed between the poles of a powerful magnet. When a motor is put into operation current starts flowing through the coil (armature) and the armature starts rotating.

Electric motors are used practically in every branch of industry, transport, and agriculture. Naturally, they are produced in many different designs. They are used in industrial plants, and operate under different conditions.

Each motor is supplied with a nameplate which bears machine ratings: output power, voltage, the rated current, the starting current, the power factor, the efficiency, and the rated torque.

These motor ratings should be taken into consideration since they are necessary for the users. On them depends the length of motors' service life, which is normally equal to about 10 years, provided that the operating conditions are normal. Naturally, under abnormal conditions the service life becomes much shorter: motors operate poorly and may have different faults.

6. Complete the sentences using the correct variant:

1. Motors are used
a) for transmitting energy.
b) for converting energy.
2. Motor's main part is
a) the frame.
b) the armature.
c) the stator.
3. The armature is placed
a) between the poles of the magnet.
b) about the poles of the magnet.
4. Motors service life becomes shorter
a) under normal conditions.
b) under abnormal conditions.
5. Faulty motors operate
a) normally.
b) poorly.

7. Answer these questions. Use them in a talk with your groupmate:

1. What are motors used for?
2. What is the motor's main part?
3. Where is the armature placed?
4. What ratings does the nameplate of a motor bear?
5. Under what conditions does a motor operate normally (poorly)?

8. Read about energy resources of today. Write three questions about the text and ask your groupmate to answer them.

Energy Resources of Today

People are energy-rich today. Solar energy is considered to be a potentially limitless source of clean energy. The waters of the world contain potential fuel in the form of a special isotope of hydrogen deuterium. It is sufficient to power fusion reactors for thousands of years.

TEMA: «Faults of Motors and Ways of Their Repair»

1. a) Cover the right column and read the English words. Translate them into Russian.

b) Cover the left column and translate the Russian words back into English.

to repair ремонтировать

brush

щетка

gap

зазор, люфт

spark

искра

speed

скорость

noise

шум

slow	медленный
excessive	избыточный
check	проверка
to adjust	регулировать, подгонять

2. Read the words and put down their Russian equivalents:

commutator
 stator
 rotor
 contact
 to contact
 process

3. Put down the verbs corresponding to the given nouns and translate them:

check
 spark
 brush
 repair
 slow

4. Put down the Russian equivalents of these word combinations. Translate them back into English (orally).

air gap
 brush sparks
 slow speed
 excessive speed
 safety devices

5. Answer these questions:

1. What do motors' faults result from?
2. Are there any faults that can be ignored?
3. What makes motors' service life shorter?
4. What does voltage supply stop result in?
5. What processes show the (dis)advantages of devices?

6. Are the words: spark, short, slow, brush, fault, load, test nouns? Are they verbs? Translate the sentences into Russian:

1. New motors are given a no-load and under a load tests.
2. When the motor is tested it should produce no abnormal noise.
3. In case this noise appears the motor must be disconnected.
4. This generator must be checked; one should give it a test.
5. The motor's brushes seem to be sparking. Can you see the sparks?
6. The windings of the coil are shorted. I have detected a short in the windings.
7. The armature rotates slowly; let's check it up!
8. The speed of rotation is too excessive; it must be slowed down.
9. In case the rotor brushes against the stator, the motor operates slowly. The faulty brushes should be replaced.

Faults of Motors and Ways of Their Repair

Motors may have different faults. A faulty motor does not start, or, when it is started, it operates at an excessive speed.

Its brushes may spark and its windings and the commutator may be overheated and burnt. Besides, a motor may produce an abnormal noise, etc. All these and other faults should be detected and repaired.

In case the motor does not start it may have different faults (see the table):

<i>Possible causes of faults</i>	<i>Ways of repair</i>
1. Fuses are faulty.	1. Replace the fuses.
2. Motor is overloaded.	2. Reduce motor load.
3. Circuit in armature winding has an open.	3. Repair the armature winding.
<i>In case the motor, when started, stops:</i>	
1. Rheostat is shorted.	1. Check the rheostat and repair it.
2. Rheostat switches from one position to another.	2. Slow down operation of rheostat handle.
<i>Brushes may spark in case:</i>	
1. Motor is overloaded.	1. Reduce the load and remove overload.
2. Brushes are in poor condition.	2. Replace the brushes.
3. Pressure is low.	3. Adjust the pressure.
4. Pressure is excessive.	4. Adjust the pressure.
<i>In case the armature winding is overheated:</i>	
1. Motor is overloaded.	1. Remove the overload.
2. Ventilation fails to operate properly.	2. Check for slowing down the speed of the motor.
<i>In case of abnormal motor speed:</i>	
1. Motor is overloaded.	1. Reduce the load.
2. Rotor circuit has poor contact.	2. Repair the shorting mechanism.
<i>In case rotor brushes against stator:</i>	
Rotor brushes against stator.	Adjust air gap.

7. Complete the sentences using the correct variant:

1. A motor with a fault
 - a) operates normally.
 - b) operates poorly.
2. Motor brushes spark in case
 - a) they are in poor conditions.
 - b) they are in poor conditions.
3. Burnt commutator should be
 - a) replaced.
 - b) repaired.
4. Brushes may spark in case
 - a) pressure is low.
 - b) pressure is excessive.
5. Air gap is adjusted in case
 - a) the rotor brushes against the stator.
 - b) the stator brushes against the rotor.

8. Answer these questions:

1. When does a motor operate poorly?
2. What should be done in case the motor is overloaded?
3. What should be done in case the fuses are faulty?
4. What should be done in case the rheostat is shorted?
5. What should be done in case the brushes spark?
6. What should be done in case the pressure is low?
7. What should be done in case the ventilation does not operate?
8. What should be done in case the rotor brushes against stator?

9. Say a few words about your electrical engineering laboratory. Are there any faulty devices in it? Have a talk with your groupmate about the faults and the ways to repair them.

10. You know that electrical devices and installations are constructed of a certain number of components. To these components belong electric power sources, wires, cables, buses, switches, fuses, resistors, rheostats, capacitors, transformers, motors and others.

Let us have a talk about these components. Speak with your group mates about their types, their use, operation, possible faults and ways of their repair. Use the table below:

<i>Circuit components</i>	<i>Symbols</i>
Electric energy source	
D.c. generator	
D.c. motor	
Chemical power source (primary or storage cell)	

<i>Circuit components</i>	<i>Symbols</i>
Electric lamp	
Electric connection, removable and permanent	
Switches, single- and double-pole switches	
Fuse	
Load, resistor	
Safety earthing system	
Rheostat, or variable resistor	
Transformer, air-core T,	
iron-core T	
Capacitor, fixed C, variable C	

11. Draw schemes of circuits and devices constructed from these components. Have a talk with your groupmates about them:

1. Connect four resistors, two voltage sources and a switch in series. Speak about the construction and the operation of the circuit.
2. Connect several resistors and cells in series-parallel. Suppose that one of the resistors gets open; what does it result in? Suppose that a whole set gets open. What does it result in?
3. Measure the value of current (voltage, power, resistance) in the circuit. Use proper meters. Speak about the way you connect the meters to the circuit.

4. Take the proper components and construct an earthing protection system. Draw its scheme. Speak about its operation.
5. Draw a scheme of a thermal relay. What components are necessary for it?
6. Draw a scheme of an overhead transmission line. Speak about its operation. What are its possible faults?
7. Draw a scheme of a substation. Speak about its operation and about its possible faults. What are the ways of their repair?

TEMA: « ALTERNATING CURRENT GENERATOR»

ALTERNATING CURRENT GENERATOR

Fundamentally, a generator is a device used to convert mechanical power into electrical power. In other words, the mechanical power put into turning the rotor of a generator is delivered at the output terminals of the generator in the form of electrical power (minus some mechanical and electrical losses).

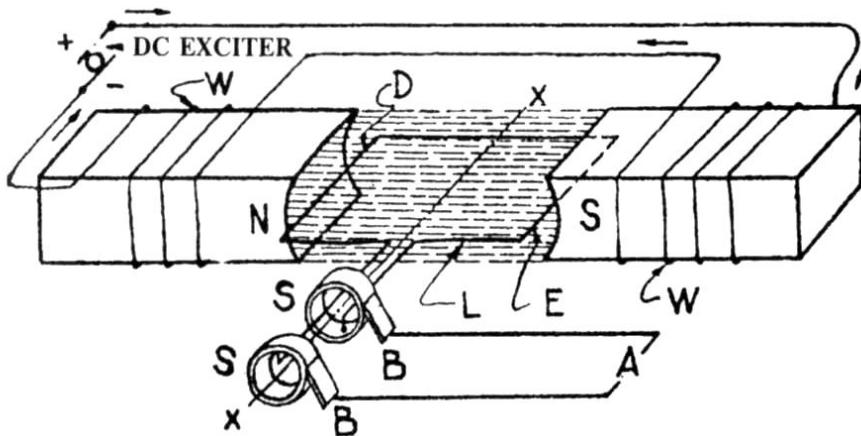
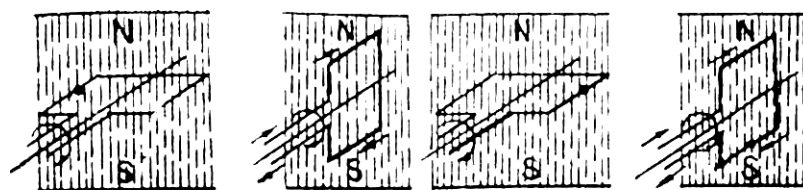


Fig.6 Single-phase two-pole revolving armature generator

Diagram 6 shows that the generator is a device made to take advantage of the principle of electromagnetic induction to generate an alternating current. A magnetic field (shown by dotted lines) is established between the N and S poles by means of the "exciting" current flowing through winding

W. A loop of wire L is suspended in this field so that it can be rotated on the axis x-x and its ends are brought out to the "slip rings" S-S on which the brushes B-B slide. The circuit of this loop is completed from B-B through A. When this loop is rotated so that its conductors D and E cut across the field a voltage is produced in it (principle of electromagnetic induction). Since a circuit is completed through A, current will flow.

Fig. 7 shows a series of simplified diagrams in which the magnetic field is merely indicated.



START 1/4 CYCLE 1/2 CYCLE 3/4 CYCLE

Fig. 7 Why the current generated is alternating

The loop of wire is assumed to be rotating as shown by curved arrows. Considering only the conductor marked with a spot, one may see that at "start" the voltage will be zero, since a conductor is moving parallel to the direction of the field. Gradually it begins to cut across the field and at "1/4 cycle", it is cutting across the field and the voltage in the conductor is at maximum. This voltage decreases again to zero as the loop reaches "1/2 cycle" and increases again to maximum in the opposite direction as the loop reaches "3/4 cycle". The voltage finally returns to zero when the loop again reaches the original or "start" position.

Thus, as the conductor passes across the faces of the N and S poles a cycle of voltages takes place, first in one direction and then in the other. The unmarked conductor forming the opposite side of the loop always has a voltage of opposite direction induced in it as it passes across the pole of opposite polarity.

The voltages of these two conductors, added together, produce the total voltage of the loop.

Figure 5 shows a graph of the changes in voltage through two cycles. The curved line represents the voltage at any instant in the cycle by its distance above or below the horizontal zero line. The generator diagrammed in Figure 6 is a two-pole single-phase revolving-armature alternating-current machine. The magnetic field, the coils of wire, and the iron core are called its "field".

EXERCISES

1. Read and translate the text.

2. Give Russian equivalents:

output terminals shown by dotted lines; exciting current winding; a loop of wire; armature; slip rings; brush; curve; alternating-current machine; single-phase two-pole revolving armature generator.

3. Retell the text using Figs. 6 and 7.

TEMA: « THREE-PHASE GENERATOR »

THREE-PHASE GENERATOR

In a three-phase generator, three single-phase windings are combined on a single rotor and rotated in the same magnetic field. The voltage in each winding alternates exactly one-third of a cycle after the one ahead of it, due to the arrangement of the windings. The diagram in Fig. 8 shows this.

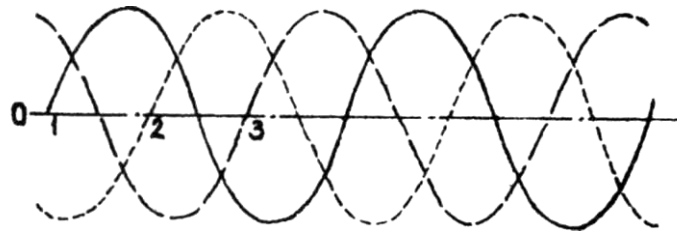


Fig. 8 Distribution of phases in a three-phase generator

Compare this diagram with the single-phase diagram. As a rule, the end of each phase winding is not brought out to a separate slip ring, but the windings are connected together inside of the machine and only three leads are brought out as shown in Fig. 9.

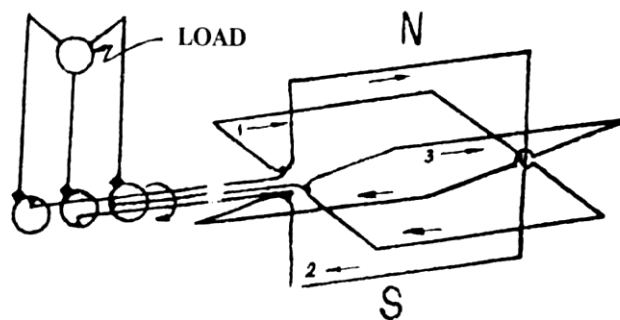


Fig. 9 Diagram of three-phase revolving armature generator

This makes only three wires necessary for transmitting three-phase current. Perhaps you have noticed some three-wire transmission lines.

In present-day commercial practice single-phase generators are very seldom used because three-phase generators are more economical. When single-phase current is wanted it may be had by just using any two wires of the three that are led out of a three-phase generator.

Modern alternating-current generators are built with revolving fields, that is, the magnetic field is produced in the rotating part or rotor, and the conductors in which the current is generated are located in the stationary outer part which is called the stator. This practice is followed because it means that only two slip rings may be used and they must carry only the low voltage "exciting" current.

Practically all present-day alternating current generating systems operate to supply three-phase, 60-cycle power, at voltages of 110, 120 and 440. The 110-volt power is usually taken off as single-phase.

EXERCISES

1. Read and translate the text.

2. Give Russian equivalents:

three-phase generator; single-phase windings; the arrangement of the windings; three-wire transmission line; alternating-current generator; low-voltage exciting current; present-day alternating-current generator; three-phase revolving armature generator.

3. Read the text again. Make up a plan for this text in the form of questions. Retell the text according to this plan.

4. Look at Fig. 9 and describe it.

TEMA: « TRANSMITTING ALTERNATING CURRENT »

TRANSMITTING ALTERNATING CURRENT

Alternating current is used more than direct current because it is best suited to long-distance transmission. Alternating current has the advantage over direct current in this because it may easily be generated at low voltages, raised to higher voltages suitable for transmission, and then reduced again by means of transformers to voltages suitable for general use. High voltage is best for transmission over long distances because with high voltage more power may be carried over small wires.

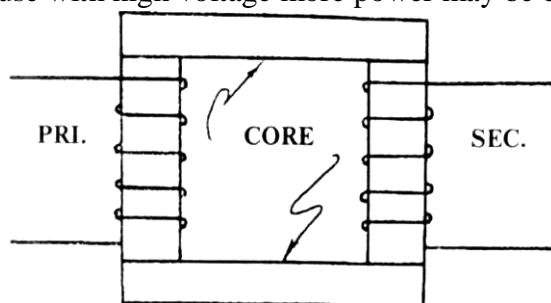


Fig. 10 Diagram of transformer (single-phase)

Transformers. — A transformer is a stationary device by which the voltage in an alternating-current system may be raised or lowered. It consists of an iron core surrounded by coils of insulated copper wire. There are two coils: the primary, to which current is supplied, and the secondary, from which current is led away. The voltage is "stepped up" or "stepped down" in exact proportion to the number of turns of wire in each coil. For instance, if the primary winding has 1,000 turns and is connected to a 2,200-volt supply, a secondary winding of 100 turns would give 220 volts (this would be called a "step down" transformer. See Fig. 10 for a simple diagram of a single-phase transformer).

Transformers are made single-phase and connected in groups of three for use with three-phase current, as shown in Fig. 11, or they are made as special three-phase transformers.

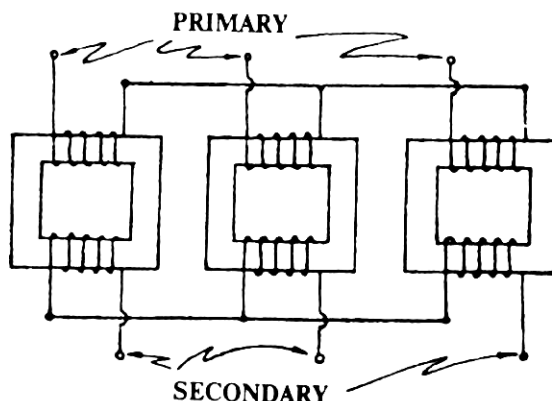


Fig. 11 Diagram of three single-phase transformers (connected three-phase)

Using alternating current for power. — As previously stated, the generator is really a machine for converting mechanical power into electrical power, as may be seen from the fact that some source of mechanical power is always needed to drive the generator. After the electrical power has been generated, transformed, transmitted, and transformed again, it must be changed again to mechanical power for use. This large change, from electrical power to rotary mechanical power, is brought about by means of the motor. Thus the motor is really a device for changing electrical power into mechanical power.

EXERCISES

1. Read the text using a dictionary if you can't understand any part of the text.

2. Give Russian equivalents:

step down transformer; step up transformer; as previously stated; three-phase transformer; primary coil; secondary coil.

3. Speak on:

- a. alternating current;
- b. transformers.

4. Look at Figs. 10 and 11 and describe them.

TEMA: «ALTERNATING-CURRENT MOTORS»

ALTERNATING-CURRENT MOTORS

The three-phase motors. — Nearly all three-phase, alternating-current motors depend for their operation upon the production of the revolving magnetic field which is developed by the rotating part or rotor of the motor. This revolving magnetic field is set up by rising and falling currents in the three evenly distributed windings of the three-phase motor. When the current is rising in the first phase the magnetic field is produced only by the first winding. As the current decreases in the first phase and increases in the second the field shifts along until it is all produced by the second winding. A similar shift of field is produced when current rises in the third phase. The windings are so distributed that the shifting is uniform and continuous, and thus the rotating field is produced.

Alternating current motors may be divided according to the principle of operation into two general classes: synchronous and induction motors. A synchronous motor is one which rotates at the same speed as the generator. In this type of motor, current from the generator is supplied to the windings of the stator or outer part and the windings of the rotor are "excited" by a source of direct current. Thus the magnetized rotor is pulled around by the revolving three-phase field. A three-phase generator will operate as a synchronous motor without any changes being made in its construction. Synchronous motors are usually made in very large sizes for service requiring constant speed. Very small synchronous motors such as those used in electric clocks and scientific instruments where constant speed is necessary are made similar to the large ones except that the rotor is made of a simple, toothed iron wheel and is not magnetized by an outside source of direct current. This arrangement is satisfactory where only very small amounts of power are needed.

EXERCISES

1. Read and translate the text.

2. Give English equivalents:

трёхфазный двигатель, двигатель переменного тока, вращающееся магнитное поле, синхронный двигатель, статор, ротор, постоянная скорость.

3. Retell the text touching the following points:

- a revolving magnetic field developed by the rotating part or rotor of the motor;
- shift of field;
- two general classes of alternating current motors;
- some details about synchronous motors;
- the use of synchronous motors.

TEMA: «INDUCTION MOTOR»

INDUCTION MOTOR

An induction motor is one in which the magnetic field in the rotor is induced by the field created by the current flowing in the stator windings. This motor is the more commonly used because it is of simple construction and has the widest application. The most commonly used induction motor is the squirrel-cage type, which takes its name from the fact that the rotor windings resemble the wheel often seen in squirrel cages. This winding is usually in the form of copper bars set in slots in the rotor and connected together at the ends by heavy copper rings.

In operation, the revolving field of the stator cuts the squirrel-cage conductors and induces a voltage in them and this in turn magnetizes or sets up poles in the rotor. These poles in the rotor are attracted by poles of the revolving field and are pulled by them, thus causing the rotor to revolve. Three-phase induction motors are commonly made to run at either 860, 1, 180, and 1, 725 rpm (revolutions per minute).

The wound-rotor or slip-ring induction motor has a regular three-phase winding on the rotor

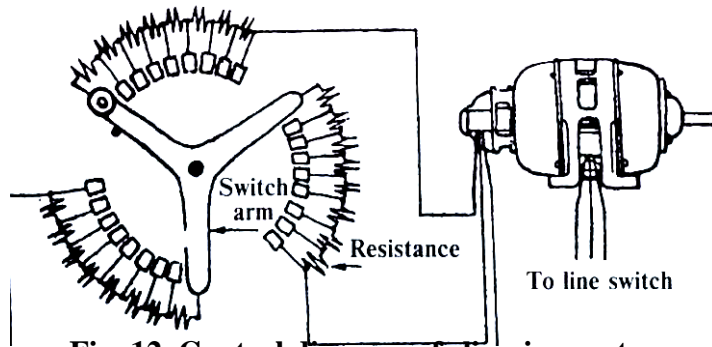


Fig. 12. Control diagram of slip-ring motor

instead of the squirrel cage. (The stator is the same as that on the squirrel-cage motor.) The ends of these rotor windings are brought out to three slip rings.

Brushes touching these slip rings conduct current out to the resistances which are used to vary the induced current flowing in the rotor windings. (See Fig. 12.) Varying the current in the rotor windings varies the speed of the motor. This type of the motor is the best of very few types of variable speed alternating current motors.

The slip-ring or wound-rotor induction motor is used where variable speeds are needed or where a motor must be started under a very heavy load.

Thus, this motor is suitable for operating printing presses, elevators, cranes, and conveyors.

EXERCISES

1. Read and translate the text.

2. Give Russian equivalents:

squirrel-cage induction motor; the view of rotor; wound-rotor induction motor; slip-ring induction motor; rotor winding; control box; variable speeds; heavy load.

3. Answer the following questions:

What is an induction motor?

What type of induction motor is the most commonly used?

How does a squirrel-cage induction motor operate?

What can you say about slip-ring induction motor?

Where are slip-ring induction motors used?

TEMA: «SINGLE-PHASE MOTORS»

SINGLE-PHASE MOTORS

Single-phase motors may be divided into two main classes according to their construction, namely, commutator motors and induction motors. The former may be subdivided into series and repulsion. Induction motors are made in several types, depending on the method used for starting them.

Commutator motors. — The single-phase series motor, in construction and operation, is similar to the direct-current series motor which will be described in detail later, under "Types of Direct-Current Motors". This type of alternating-current motor varies in speed, having a low speed with heavy loads and a high speed with light loads. Small sizes are used to drive electric fans and vacuum cleaners, and large sizes are used to some extent, for railways and in cranes and hoists.

EXERCISES

1. Read and translate the text.

2. Put 15 questions to the text. Make your neighbour answer them.

3. Read the text again and speak on its main parts.

TEMA: «INDUCTION MOTORS»

INDUCTION MOTORS

Ordinarily, single-phase induction motors are not self-starting, since the single-phase field does not revolve as does the three-phase, so some feature must be added to produce this effect.

The most common method of producing the self-starting characteristic in these motors is to create a revolving field similar to that found in three-phase motors by means of "splitting" the single-phase.

Motors constructed in this manner are called split-phase motors. Another common method of starting single-phase motors is called the repulsion-start method.

Split-phase motors for use with single-phase power supply are now commonly made in two types: the resistance and the capacitor types. These may be found in the small washing machine and in home workshop power motors. Both types have auxiliary starting windings on the stator in addition to the main stator winding. This auxiliary winding, due to its size, position, spacing, and other arrangements, produces a revolving field similar to that found in the three-phase motor.

Both types of split-phase induction motors are made with the squirrel-cage rotor similar to that described for the three-phase induction motor. In the resistance-start type the auxiliary winding either has a high resistance in itself or, as an additional device, there is a resistance connected in series with it. In all cases with this type the auxiliary winding is disconnected by means of a centrifugal switch as soon as the motor has reached normal running speed. These motors are not economical in current consumption and they do not start easily under load. In the case of the capacitor type, an additional device is a condenser. In this type the auxiliary winding and condenser may or may not be disconnected by a centrifugal switch when the motor has reached normal running speed. This type of motor is more difficult to construct than the resistance-type and consequently usually costs more. However, it requires less starting current. Consequently, it is more economical in operation.

The repulsion-start induction motor is the best all-around, single-phase motor for several reasons. It starts easily under load with very little current, is rugged in construction.

EXERCISES

1. Read and translate the text.

2. Give Russian equivalents:

split-phase motor; single-phase power supply; starting winding; stator winding; normal running speed.

3. Speak on induction motors.

4. Call the names of induction motors.

TEMA: « Electric Power Consumers and Power Systems»

1. a) Translate into Russian.

water head

large capacity power plant

magnitude of the water head

daily inflow of water

turbine runner

b) Cover the left column and translate the Russian words back into English.

to achieve

достигать

to belong (to)

принадлежать, относиться (к)

to feed

снабжать, питать

to determine

определять

to relate

относиться (к), быть связанным (с)

predominant

преобладающий

graph

кривая, график

national economy

народное хозяйство

1. Read the words and put down their Russian equivalents. Then translate them back into English (orally).

characteristic

municipal

to electrify

hydro

period

3. Distribute the words below into three columns:

action

utilizer, protect, distribution, utilize, protection, distributor, consumption,

consume, utilization, consumer

4. Put down the Russian equivalents of these word combinations. Translate them back into English (orally).

a. load graph

lighting load
power load
b. power utilizing devices
parallelly operating plants
enterprises utilizing power

5. Complete the sentences translating the words in brackets:

1. Water turbine (заводы) are called hydro turbines.
2. Load graph (определяет) the operating load (условия).
3. Economical (потребление) of electric power (достигается) by interconnected operation of power plants.

Electric Power Consumers and Power Systems

An electric power consumer is an enterprise utilizing electric power. Its operating characteristics vary during the hours of day, days and nights, days of week and seasons. All electric power consumers are divided into groups with common load characteristics.

To the first group belong municipal consumers with a predominant lighting load: dwelling houses, hospitals, theatres, street lighting systems, mines, etc.

To the second group belong industrial consumers with a predominant power load (electric motors): industrial plants, mines, etc.

To the third group belongs transport, for example, electrified railways. The fourth consists of agricultural consumers, for example, electrotractors.

The operating load conditions of each group are determined by the load graph. The load graph shows the consumption of power during different periods of day, month, and year. On the load graph the time of the maximum loads and minimum loads is given. Large industrial areas with cities are supplied from electric networks fed by electric power plants. These plants are interconnected for operation in parallel and located in different parts of the given area. They may include some large thermal and hydroelectric power plants. The sum total of the electric power plants, the networks that interconnect them and the power utilizing devices of the consumers, is called a power system. All the components of a power system are interrelated by the common processes of protection, distribution, and consumption of both electric and heat power. In a power system, all the parallelly operating plants carry the total load of all the consumers supplied by the given system. The building up of a power system is of great importance for the national economy. An economical utilization of the power plant installations and of the sources of power is achieved by interconnected operation of a series of power plants in a common power distribution system.

6. Answer these questions:

1. What enterprises are called electric power consumers?
2. When do their operating characteristics vary?
3. What consumers belong to the four different groups?
4. What conditions does the load graph determine?
5. What type of system is called a power system?
6. What processes interconnect the components of a power system?
7. In what way is an economical utilization of power installations achieved?

7. Describe a power system and its operation.

ТЕМА: « Substations»

1. a) Cover the right column and read the English words. Translate them into Russian and check your translation.

b) Cover the left column and translate the Russian words back into English.

auxiliary	вспомогательный, добавочный
breaker	выключатель, прерыватель
bus bar	собирательная шина
feeder	фидер
flexible	гибкий
to comprise	включать в себя
to distribute	распределять
as ... to	что касается
as well as	так же, как и

2. Put down the Russian equivalents of these word combinations. Translate them back into English (orally).

circuit breaker
auxiliary units
distribution centre
flexible construction
reliable operation
switch gear bus
hydraulic as well as solar sources of energy
as to phase-word motors

3. Fill in as well as and translate the sentences:

1. Excessive starting current may result in fluctuations in the voltage ... in other faults of the motor.
2. ... A.C. motors they are subdivided into single- and three-phase motors.

Substations

A substation is designed to receive energy from a power system, convert it and distribute it to the feeders. Thus a substation serves as a distribution centre. Substations feed (supply) various consumers provided that their basic load characteristics are similar. Therefore the energy is distributed without transformation of the voltage supplied. Common substations comprise isolators, switchgear buses, oil circuit breakers, fuses, power and instrument transformers and reactors.

Substations are classed into step up and step down ones. The step up substation includes transformers that increase the voltage. Connected to the bus bars of the substation are the power transmission lines of power plants of the system. As to step down substations, they reduce the voltage to 10 or 6 kV.

At this voltage the power is supplied to the distribution centers and to the transformer substations of power consumers. A transformer substation serves for transmitting and distributing electric power. It comprises a storage battery, control devices and auxiliary structures. Transformer substations are classed into indoor and outdoor; both types are used for feeding industrial enterprises. Compared to other types of substations, transformer substations have certain advantages. They have flexible construction and easy and reliable operation. In case of a fault in the left hand section, the main circuit breaker opens while the normally open section circuit breaker closes and puts the voltage of the section to normal. Power from a substation is delivered to distribution centres.

4. Complete the sentences using the correct variant:

1. A substation serves
 - a) to consume energy.
 - b) to distribute energy.
 - c) to convert energy.
2. A substation feeds consumers
 - a) with various load characteristics.
 - b) with similar load characteristics.
3. The lines of power plants are connected
 - a) to the busbars.
 - b) to the switchgear.
4. A substation comprises
 - a) the main elements.
 - b) the main and auxiliary elements.
5. Flexible construction is
 - a) an advantage.
 - b) a disadvantage.

5. Pair work. Put these questions to your groupmate, and ask him/her to answer them.

1. What does a substation serve for?
2. What type of consumers does a substation feed?
3. What parts are the power transmission lines connected to?
4. What components does a substation comprise?
5. What types are substations classed into?
6. What are advantages of a transformer substation?

ТЕМА: «Hydroelectric Power Plants»

1. a) Cover the right column and read the English words. Translate them into Russian and check your translation.

b) Cover the left column and translate the Russian words back into English.

blade	лопасть
level	уровень
magnitude	величина
head	(зд.) верх, верхушка
plant	станция, завод
runner	ротор
shaft	привод, вал
to rotate	вращать(ся)
to influence	влиять
to fluctuate	колебаться

2. Put down the Russian equivalents of these word combinations. Then translate them back into English (orally).

runner blade
turbine runner
turbine shaft
water level
shaft

Hydroelectric Power Plants

Hydroelectric power plants are built on rivers. Large-capacity hydroelectric power plants are commonly located at considerable distances from the consumers of electric power. The production process at these plants is rather simple: the water flows into the hydro turbine runner, acts upon the runner blades and rotates the runner and the turbine shaft. The generator shaft is connected to the turbine runner shaft. The difference in the water level influences the power capacity of a plant, i.e. the magnitude of the water head and the daily inflow of water fluctuates considerably according to the season. The production process is different at power plants of different constructions and of different kinds. In atomic power plants, for example, it is not so simple as in hydroelectric plants.

3. Complete the sentences using the correct variant:

- Hydroelectric power plants are built
 - on rivers.
 - on waterfalls.
- Large-capacity power plants are located
 - at a short distance from consumers of power.
 - at a considerable distance from consumers of power.
- The production process at the plants
 - is very complex.
 - is rather simple.
- The power capacity of a plant
 - remains constant.
 - changes considerably.
 - is influenced by the difference in the water level.
- The daily inflow of water
 - fluctuates according to the consumption.
 - fluctuates according to the season.
- The production process
 - depends upon the construction of the plant.
 - is the same at power plants of different constructions.

4. Pair work. Put these questions to your groupmate and ask him/her to answer them:

- on what sites are hydroelectric power plants built?
- Are large-capacity plants located far from consumers of power?
- Is the production process at the plants simple or is it complex?
- What influences the power capacity of a plant?
- According to what factors does the daily inflow of water fluctuate?

6. Does the production process at the plant depend on its construction?
7. Do you know that a thermal power plant seldom has efficiency more than 40%?

TEMA: «Atomic Power Plant»

1. a) Cover the right column and read the English words. Translate them into Russian and check your translation.

b) Cover the left column and translate the Russian words back into English.

exchanger	теплообменник
steam	пар
tube	труба, лампа
dust	пыль
attending personnel	обслуживающий персонал
to deliver	поставлять
to pollute	загрязнять
to shield	защищать

2. Put down the Russian equivalents of these word combinations. Then translate them back into English (orally).

- a. auxiliary units
 - steam generator
 - heat exchanger
 - fuel consumption
- b. water to be heated in the reactor
 - water to be converted into steam
 - steam to be fed into the turbo generator
- c. the polluted atmosphere
 - utilized nuclear fuel
 - shielded concrete walls

Atomic Power Plant

Atomic power plants are modern installations. They consist of several main units and a great number of auxiliary ones. In a nuclear reactor uranium is utilized as a fuel. During operation process powerful heat and radioactive radiation are produced. The nuclear reactor is cooled by water circulation. Cooling water circulates through a system of tubes, in which the water is heated to a temperature of 250-300 C. In order to prevent boiling of water, it passes into the reactor at a pressure up to 150 atmospheres. A steam generator includes a series of heat exchangers comprising tubes. The water heated in the reactor is delivered into the heat exchanger tubes. The water to be converted into steam flows outside these tubes. The steam produced is fed into the turbogenerator. Besides, an atomic power plant comprises a common turbogenerator, a steam condenser with circulating water and a switchboard. Atomic power plants have their advantages as well as disadvantages. The reactors and steam generators operate in them noiselessly; the atmosphere is not polluted by dust and smoke. As to the fuel consumption, it is of no special importance and there is no problem of fuel transportation. The disadvantage of power plants utilizing nuclear fuel is their radiation. Radioactive radiation produced in the reactors is dangerous for attending personnel. Therefore, the reactors and steam generators are installed underground. They are also shielded by thick (up to 1.5m) concrete walls. All their controls are operated by means of automatic devices. These measures serve to protect people from radioactive radiation.

3. Complete the sentences using the correct variant:

1. A nuclear reactor is used in
 - a) wind power plants.
 - b) atomic power plants.
2. A nuclear reactor is cooled by
 - a) water circulating in tubes.
 - b) oil circulating in tubes.
3. Water is passed into the reactor
 - a) at a low pressure.

- b) at a high pressure.
- 4. High pressurey
 - a) activates boiling of water.
 - b) prevents boiling of water.
- 5. Atomic power plants
 - a) pollute the air with dust and smoke.
 - b) do not pollute the air with dust and smoke.
- 6. Circulating water flows
 - a) inside the heat exchangers.
 - b) outside the heat exchangers.
- 7. Attending personnel is shielded by
 - a) thick concrete walls.
 - b) thick metal walls.

4. Pair work. Put these questions to your groupmate and ask him/her to answer them:

1. What are the main units of an atomic power plant?
2. By what means is the nuclear reactor cooled?
3. At what pressure does the water pass into the reactor?
4. What types of power plants pollute the air with dust and smoke?
5. Why is it necessary to protect attending personnel?
6. By what means is it done?

ТЕМА: «Protection Against Environmental Pollution»

1. a) Cover the right column and read the English words. Translate them into Russian and check your translation.

b) Cover the left column and translate the Russian words back into English.

concrete	бетон
environment	окружающая среда
fission	расщепление
(stainless) steel	(нержавеющая) сталь
vessel	сосуд
waste	отходы
to confine	заключать
to release	выпускать, освобождать
to withstand	противостоять
to dispose	устранять, убирать

2. Put down the Russian equivalents of these word combinations. Then translate them back into English (orally):

- nuclear fuel
- nuclear fission
- steel vessel
- reactor vessel
- fission release
- sealed tubes
- concrete housing
- waste products
- nuclear waste
- shielded cylinders

Protection Against Environmental Pollution

Any operating nuclear power plant releases fission products into the environment, which causes environmental pollution. To prevent the harmful effects of nuclear power release, the nuclear power plants are supplied with protective installations that serve as barriers to the pollution. First, the nuclear fuel and the fission products are confined within sealed tubes made of stainless steel or zirconium. Then the assembly of tubes is placed in a steel reactor vessel. And finally the steel

reactor vessel is placed in a large steel and concrete housing. As to the hot radioactive waste products they are disposed in heavily shielded cylinders. The cylinders are buried 305 to 610 metres under ground.

3. Complete the sentences using the correct variant:

1. A nuclear power plant releases
 - a) liquid products.
 - b) fission products.
2. Operating nuclear power plants
 - a) pollute the environment.
 - b) prevent the pollution.
3. The protective power plant installations
 - a) produce the release of fission products.
 - b) prevent the release of fission products.
4. The sealed tubes are made of
 - a) bronze.
 - b) stainless steel.
5. The fission products are confined
 - a) within sealed tubes.
 - b) within open tubes.
6. The steel reactor vessel is placed
 - a) in a concrete housing.
 - b) in a zirconium housing.
7. The waste products are disposed
 - a) in an open vessel.
 - b) in shielded cylinders.

4. Pair work. Put these questions to your groupmate and let him\her answer them:

1. What kind of products does the operating nuclear power plant release?
2. What installations are used to prevent the harmful effects of a nuclear power plant operation?
3. What material are the tubes made of?
4. Where are the fission products confined?
5. In what part of the installation is the reactor vessel placed?
6. In what way are the hot radioactive waste products disposed?

III. МЕТОДИЧЕСКИЕ УКАЗАНИЯ (РЕКОМЕНДАЦИИ)

Данное УМКД адресовано студентам 2 курса по направлениям подготовки 220700.62 «Автоматизация технологических процессов и производств (по отраслям)», овладевшим базовой грамматикой и лексикой английского языка.

Цель УМКД – сформировать у студентов навыки и умения различных видов чтения и говорения, развить способность извлекать и интерпретировать информацию, содержащуюся в оригинальных научных и других англоязычных текстах. В УМКД так же уделяется внимание и расширению словарного запаса по энергетическим специальностям.

УМКД ориентировано на 72 часа (3 семестр) аудиторных и самостоятельных занятий, т.е. из расчета одно аудиторное занятие в неделю.

Профориентированность УМКД позволяет студентам пополнить знания по основной специальности, создает дополнительные возможности для изучения терминологических особенностей современного английского языка. УМКД соответствует одному из главных программных требований, предъявляемых к курсу иностранного языка в неязыковых вузах, и не имеет аналога.

При выборе текстов для курса дисциплины был проведен анализ содержания как российских так, и зарубежных научно-популярных изданий. Были отобраны тексты, которые представляют интерес для студентов, наиболее полно отражают стиль научно-технической прозы и дают информативный материал по широкому профилю, расширяющий общетехническую эрудицию студентов.

Речевой материал организован на функционально-ситуативной основе и вводится в форме ситуативно обусловленных диалогов. Дополнительный речевой материал также вводится в виде связных микродиалогов, и его функция состоит в обеспечении языковой вариативности выражений той или иной коммуникативной интенции. Каждая интенция обеспечивается тремя-четырьмя речевыми вариантами, что позволяет применить адаптивный подход. Это означает, что объем усваиваемого языкового материала может сознательно варьироваться в зависимости от уровня владения обучаемыми английским языком. При отборе языкового материала и речевых моделей автор стремился следовать принципам высокой частотности отбираемых речевых клише и их функциональной значимости для реализации типовых коммуникативных интенций в сфере научного общения. Типология упражнений одинакова для всех разделов пособия.

В качестве одного из вариантов автор предлагает следующую методику работы над материалом раздела.

Следует начинать с ознакомления обучаемых со словарем раздела. Приемы первичного усвоения слов могут быть самыми разнообразными, но они должны преследовать две главные цели – узнавание слова и его правильное воспроизведение в устной речи.

Выполнение упражнений для ролевой игры основывается на использовании усвоенных речевых клише и их лексико-грамматических вариантов. Учащиеся группы работают попарно, параллельно либо последовательно. Можно ввести элементы соревновательности, а также любые другие приемы, делающие игру приятным развлечением. Проигрывать каждую ситуацию следует несколько раз, чтобы вовлечь всех учащихся группы, однако необходимо вводить элементы новизны, например, менять время, место и имена персонажей. Целью многократного проигрывания ситуации является автоматизация речевого материала, закрепление его за данным типом коммуникативной интенции и ситуацией общения.

МЕТОДИЧЕСКИЕ УКАЗАНИЯ ПО САМОСТОЯТЕЛЬНОЙ РАБОТЕ

Особенностью овладения иностранным языком на данном этапе обучения является то, что объем самостоятельной работы студента по выработке речевых навыков и умений равен объему практических и аудиторных занятий. Соотношение аудиторных и самостоятельных часов, отводимых на курс обучения равно 36 ч.: 36 ч. Таким образом, каждому аудиторному двухчасовому занятию должно предшествовать не менее двух часов самостоятельной работы студента.

Для того чтобы добиться успеха, необходимо приступить к работе над языком с первых дней обучения в вузе и заниматься систематически.

Самостоятельная работа студента по изучению иностранного языка охватывает: заучивание слов английского языка. Уяснение действия правил словообразования, грамматических правил, чтение текстов на английском языке вслух в соответствии с правилами чтения, понимание текстов, слушание текстов, записанных на магнитофонной ленте, с тем, чтобы научиться правильно произносить и понимать на слух содержание сообщения; построение вопросов и ответов к текстам; перевод на русский язык (устный и письменный).

Для того чтобы достигнуть указанного в целевой установке уровня владения языком, следует систематически тренировать память заучиванием иноязычных слов, текстов. Надо помнить, что способности развиваются в процессе работы, что осмысленный материал запоминается легче, чем неосмысленный, что навык вырабатывается путем многократно выполняемого действия.

IV. КОНТРОЛЬ ЗНАНИЙ ТЕКУЩИЙ КОНТРОЛЬ ЗНАНИЙ

В рамках данной Программы используется традиционная система контроля, которая включает в себя:

текущий контроль осуществляется в течение семестра в устной и письменной форме в виде контрольных и устных опросов;

промежуточный контроль проводится в виде реферата. Объектом контроля являются умения, ограниченные тематикой и проблематикой изучаемых разделов курса;

итоговый контроль проводится в виде зачета за весь курс обучения английскому профессиональному языку. Объектом контроля является достижение заданного Программой уровня владения иноязычной коммуникативной компетенцией.

Виды контроля (по способу выявления формируемых компетенций)

Устный опрос

Достоинства: позволяет оценить знания и кругозор студента, умение логически построить ответ, владение монологической речью и иные коммуникативные навыки, обладает большими возможностями воспитательного воздействия преподавателя.

Письменные работы

Достоинства: экономия времени преподавателя; возможность поставить всех студентов в одинаковые условия, объективно оценить ответы при отсутствии помощи преподавателя, проверить обоснованность оценки; субъективности при оценке подготовки студента.

Контроль с помощью технических средств и информационных систем

Достоинства: оперативное получение объективной информации об усвоении студентами контролируемого материала, возможность детально и персонализировано представить эту информацию преподавателю, формирования и накопления интегральных (рейтинговых) оценок достижений студентов по всем дисциплинам и модулям образовательной программы, привитие практических умений и навыков работы с информационными ресурсами и средствами, возможность самоконтроля и мотивации студентов в процессе самостоятельной работы.

Формы контроля

Собеседование - специальная беседа преподавателя со студентом на темы, связанные с изучаемой дисциплиной, рассчитанная на выяснение объема знаний студента по разделу, теме модуля, проблеме и т.п.;

контрольная работа состоит из небольшого количества средних по трудности вопросов, задач или заданий, требующих поиска обоснованного ответа. Может занимать часть или полное учебное занятие с разбором правильных решений на следующем занятии. Рекомендуемая частота проведения – не менее одной перед каждой промежуточной аттестацией;

эссе одна из форм письменных работ, наиболее эффективная при формировании универсальных компетенций выпускника. Небольшая по объему самостоятельная письменная работа на тему, предложенную преподавателем. Цель эссе состоит в развитии навыков самостоятельного творческого мышления и письменного изложения собственных умозаключений. Содержит изложение сути поставленной проблемы, самостоятельно проведенный анализ этой проблемы с использованием концепций и аналитического инструментария соответствующей дисциплины, выводы, обобщающие авторскую позицию по поставленной проблеме;

реферат - краткое изложение содержания научных трудов, литературы по определенной научной теме. Объем реферата может достигать 10-15 стр.; время, отводимое на его подготовку – от 2 недель до месяца. Подготовка реферата подразумевает самостоятельное изучение студентом нескольких литературных источников (монографий, научных статей и т.д.) по определённой теме, не рассматриваемой подробно на лекции, систематизацию материала и краткое его изложение. Цель написания реферата – привитие студенту навыков краткого и лаконичного представления собранных материалов и фактов в соответствии с требованиями, предъявляемыми к научным отчетам, обзорам и статьям;

тест - процедура, ориентирующая испытуемого на выполнение какого-нибудь практического действия (практические испытания);

зачет представляет собой форму итоговой аттестации студента, определяемую учебным планом подготовки по направлению ВПО.

Темы рефератов

1. Альтернативные источники энергии.
2. Автоматизация технологических процессов и производств.
3. Промышленная электроника.
4. Электронная и преобразовательная техника.
5. Энергетика: перспективы развития.
6. Устройства автоматической защиты.
7. Устройства автоматического управления.
8. Приборы и устройства промышленной электроники.

Примерные задания для самоконтроля

Примерное содержание теста

- 1 Pressing... allowing
Press the control lever.
This opens the control valve.
This allows compressed air to enter the drill.
- 2 ... forcing...
The air passes through the valve and down the return chamber to the underside of the piston.
The pressure forces the piston to rise up the cylinder.
- 3 As ... which
The piston rises.
The piston covers the exhaust.
This prevents the air from escaping.
- 4 At the same time ... which
The rising piston starts to compress the air.
The air is trapped above it.
- 5 ...admitting ... and closing ...
The increase in pressure forces the operating valve to open.
This admits air to the top of the chamber.
This closes off air in the return chamber.
- 6 As ...
The pressure in the chamber increases to 620 kPa.
The pressure forces the piston to strike the chisel.
- 7 When ... and ...
The piston passes the exhaust.
The air is released into the atmosphere.
The valve closes.
- 8 ... which ... and...
This opens the return chamber again.
This allows the air to pass to the underside of the piston.
This restarts the cycle.

Примерное содержание карточки

Vocabulary:

1. Процесс сгорания
2. Теплопроизводительность
3. Важная роль
4. Технические усовершенствования
5. Растущая важность
6. Поощрять
7. Добыча и переработка газа
8. Приведёт к
9. Стратегия исследования и разработки
10. Электростанция, работающая на традиционных источниках энергии
11. Практический коэффициент полезного действия

12. Важная роль
13. Более низкие цены на топливо
14. Связаны с
15. Природные ресурсы
16. Признание

Темы сообщений, презентаций и дебатов

1. Автоматический контроль.
2. Полупроводниковые приборы.
3. Эффективность автоматизации.
4. Автоматические системы (структура, свойства и т.д.).
5. Принципы автоматики.
6. Контрольные измерительные приборы и автоматы.

Примерные задания к зачету

CREDIT TEST

Task Make the rendering of the article.

WIND AND SOLAR ENERGY TO REPLACE OIL AND GAS?

Because Russia's oil and gas reserves will have been depleted in the not too distant future, we must begin to develop alternative sources of energy now

By Natalya Alyakrinskaya
THE MOSCOW NEWS

At the summit of G8 energy ministers held in mid-March in Moscow, Russia's majestic bearing was due to its status as a global supplier of hydrocarbons. It will not enjoy this status for long, though. According to estimates by analysts, Russia's explored oil reserves will last 30 to 40 years; its gas and coal reserves, 100 years. Meanwhile, countries less lucky with natural fuel resources have launched an all-out effort to develop alternative sources of energy. Russia has yet to hammer out development strategy regarding these sources. But it had better do so soon.

Excessive Oil Production

Drug addicts say that if you have an abstinence syndrome, you live for the moment. That's the way Russia is living, having been hooked up on the oil drug. Last year, it produced 470 million tons of oil, thereby exceeding the output ceiling set in its energy strategy for the period to 2010. According to estimates by scientists, given the amount of Russia's oil reserves, it could well do with 370 million tons.

Excessive oil production in Russia is a result of ruthless exploitation of its underground resources. Gennady Shmal, president of the Union of Russian Oil and Gas Producers, admitted in an interview with *MN* that the production of "black gold" in this country is practically uncontrolled. He said that each oil company must submit to the Natural Resources Ministry a draft project for the development of the deposit concerned, and the draft must specify the oil output planned by the company. Naming the output figures, however, is a pure formality. In reality, the majority of companies "lacerate the deposit," as oilmen put it. Shmal said: "Twenty years ago, if anyone violated the targets of the deposit development project, he would be fired or even put on trial. Today, oil production and output are not controlled."

Hence the entailing woes. The biggest of these is the so-called oil recovery factor, which is very low in Russia, constituting 0.3 at most. This means that extraction leaves 70% of the oil in the subsoil. According to Gennady Shmal, if Russia raised the factor to the American level of 0.4, this would be tantamount to opening several large deposits equal in size to the vast Samotlor field. This effort, however, would require new technologies, and most important, the vested interest of oil producers. Thus far, they don't seem to be interested at all. In the oil fields of many companies, a great many wells sit idle. In Sibneft's fields, for example, more than 50% of the wells are idle, Shmal says.

To be sure, East Siberia is still practically unexplored. Even West Siberia, currently Russia's chief supplier of oil, is no more than 40% tapped. Yet geological prospecting is deplorably inadequate. The state has slightly increased funding for it (having allocated nine billion rubles or so), but experts say 10 times as much is needed.

The Natural Resources Ministry appears to have opted for a different path. In early March, it submitted to the government a draft strategy to explore and develop Russia's continental shelf in the period to 2020. On the shelf today, about 20 large oil deposits have been discovered, such as Shtok-

manovskoye, Rusanovskoye and Leningradskoye in the Western Arctic, and several segments on Sakhalin's northeast shelf. The Natural Resources Ministry, headed by Yury Trutnev, has calculated that recoverable oil reserves on the shelf total 13.5 billion tons; gas reserves, 73 trillion cubic meters. To exploit these reserves will cost the state around 33 billion rubles, and the overall payback on the investment will be 3.2 trillion rubles. All that will happen before 2020. What will happen next?

State Aid Essential

After 2020, we will be left with the eternal sun, oceans, and winds — renewable sources of energy. They have been the subjects of study in Russia for some 100 years, but these studies have produced no practical results. When energy supplies became centralized, micro and mini hydro-power stations — which used the flows of small rivers and at one time saved the remote areas in Russia's south from dire straits — have all but disappeared. And thermal energy turned out by solar energy collectors is used only in sanatoria in Krasnodar and Stavropol Territories. The sun is not the only ignored source of energy. A nation with abundant oil and gas also fails to utilize the unique northerly winds, which possess tremendous potential as generator of electric power.

For example, Kola Peninsula's sole wind energy system, with a capacity of 200 kilowatts, is located near the Lights of Murmansk hotel. Four years ago, local scientists installed it in the city of Murmansk (on funds from Norway) to demonstrate the efficiency and profitability of wind "energy systems and the feasibility of their wide-scale use in the Murmansk Region and in the country as a whole. Thus far, however, only the Murmansk hotel appreciates the usefulness of its wind energy system, which generates all the electricity it needs.

Valery Minin, head of the laboratory for nontraditional renewable sources of energy at the Kola Research Center of the Russian Academy of Sciences, believes that wind-power engineering can really become relevant in our time. He says: "Fuel is becoming more and more costly, and energy tariffs are going up all the time. The Kola Nuclear Power Plant outlived its service life back in 2004. Therefore, it's high time we set up wind energy parks, like those in Germany, Denmark, and Spain. As for the versatility of the winds, the peninsula has 17 hydro-power stations to take care of that."

"That's the way it should be done — the alternative energy system should complement rather than replace the mainstream energy system," affirms Semyon Vainshtein, department head at the Moscow State University of Engineering Ecology. At present, alternative sources of energy cannot compete with the traditional ones in price: A kilowatt-hour of electricity generated by a wind or solar power system costs \$600 to \$1,000. That's too expensive a luxury. In the West, such projects are state-funded. Vainshtein explains: "As long as oil and gas are cheap in our country, people find it very hard to develop alternative sources of energy. If you have a permanent hot water supply at home, naturally you won't need a solar collector on your balcony. People's attitude would be different if there were heat and gas meters in every home, with everyone counting how much to spend on these utilities."

V. ИНТЕРАКТИВНЫЕ ТЕХНОЛОГИИ И ИННОВАЦИОННЫЕ МЕТОДЫ ИСПОЛЬЗУЕМЫЕ В ОБРАЗОВАТЕЛЬНОМ ПРОЦЕССЕ

Интерактивные технологии, применяемые в учебном процессе:

Технология стимуляции реального общения на иностранном языке – студенты должны уметь решать реальные коммуникативные задачи, которые возникают на уроке ИЯ в процессе реального общения «студент- преподаватель», «преподаватель- студент», «преподаватель-студенты», «студенты-студент», «студент- студенты» (поздороваться, попрощаться, поблагодарить за помощь (урок), поздравить с праздником, уточнить информацию и т.п.)

Групповой и индивидуальный методы работы со студентами. Групповой метод обеспечивает участие в работе каждого студента и предполагает вариативность участия в работе студентов с различной степенью речевой активности и инициативности. Индивидуальный метод заключается в раскрытии личностных возможностей обучающихся: их качеств, уровня языковой подготовки, умения самостоятельно включаться в процесс общения, управлять ситуацией общения.

Технология проблемного обучения и воспитания – направлена на обеспечение целостного многоаспектного развития личностных качеств студентов; опирается на принцип научно-

сти, креативности, вариативности; усиливает мотивацию к познавательной деятельности, способствует глубокому пониманию.

Информационно-компьютерные технологии реализуются в дидактических схемах компьютерного обучения на основе диалога «обучаемый-компьютер» с помощью различного вида обучающих программ (информационных, тренинговых, контролирующих и др.)

Технологии сотрудничества – современный подход к обучению иностранному языку подчеркивает важность сотрудничества студентов и преподавателя и их взаимодействия как мотивирующего фактора.

Тестовые технологии направлены на определение не только ЗУНов, но и компетенции, т.е. предполагает не только выбор правильных вариантов ответа, а включает в себя творческие задания (анализ текста и т.п.) и могут проводиться на всех этапах обучения и служить для промежуточного и итогового контроля.

Диалоговые технологии - форма организации и метод обучения, основанный на диалогическом мышлении во взаимодействующих дидактических системах

Дискуссия – один из эффективных интерактивных методов познания и нахождения истины (дискуссия диспут, прогрессивная дискуссия, дискуссия – соревнование)

Технология аудиторной дискуссии (круглого стола, конференции, собрания) – коллективное обсуждение какого-либо вопроса, проблемы или сопоставления информации, идей, мнений предложений. Цели дискуссий – обучение, тренинг, диагностика, изменение установок, стимулирование творчества. *Темы дискуссий* – проблемы морали, семейных отношений, политики, науки техники и др.

Игровые технологии – дидактические системы применения различных игр, формирующих умения решать задачи выбора на основе альтернативных вариантов.

Интеллектуальная игра - средство, формирующее не только интеллектуальное развитие, но и коммуникативные умения, и навыки, личностные и профессиональные качества человека. Она разрешает трудности межличностного и межгруппового общения; создает благоприятный психологический, в ней разрешаются какие-либо жизненные проблемы, закрепляются свойства, качества, состояния, умения, навыки, способности, необходимые личности для выполнения социальных, творческих и профессиональных функций.

Ролевая игра - это речевая, игровая и учебная деятельности одновременно; самая точная модель общения, так как она подражает действительности в самых существенных чертах и в ней переплетается речевое и неречевое поведение партнеров. Ролевая игра способствует расширению сферы общения, предполагает предварительное усвоение языкового материала в тренировочных упражнениях и развитие навыков, которые позволят учащимся сосредоточиться на содержательной стороне высказывания.

Контролируемые игры на основе диалога или текста. В первом случае обучаемые знакомятся с базовым диалогом и отрабатывают его: обсуждают содержание диалога, прорабатывают нормы речевого этикета и необходимую лексику; составляют свой вариант диалога. Вторым видом контролируемой ролевой игры является игра на основе текста. В этом случае после знакомства с текстом предлагается студентам сыграть роль какого-нибудь персонажа из текста, а другим - взять у него интервью. Студенты - репортеры могут задавать не только те вопросы, ответы на которые есть в тексте, но и любые другие, проявив свою фантазию. Задача таких игр - достижение намеченных целей путем «погружения» в среду, приближенную к условиям реального функционирования рыночной экономики.

Проектная технология обучения в условиях компетентного подхода - «позволяет формировать некоторые личностные качества, которые лишь развиваются в деятельности и не усваиваются вербально». Предлагается использовать различные варианты индивидуальных и групповых проектов и путей их реализации. Готовясь к студенческой научной конференции и работая над межпредметными проектами, студенты овладевают технологией проектов в деятельности: определяют цели, задачи, гипотезу исследования, планируют этапы своей деятельности и обсуждение возможностей использования опыта в других ситуациях. В результате, проектная методика позволяет создать естественную среду для формирования компетентностей будущего специалиста.

