**Практическое занятие**

**Тема 3.2 Материаловедение.**

.**Часть 1.**

***Прочтите текст и выполните следующие за ним задания:***

**METALS**

1. Mankind has used metals for centuries in gradually increasing quantities but only now they are employed in really great quantities.

2. Today we know more than seventy metals, the majority of which are used in industry.

3. Of all the metals iron is the most important one. Absolutely pure iron is never prepared except for laboratory purposes. The irons and steels in use today are really alloys of iron, carbon and other substances. They can be made elastic, tough, hard, or comparatively soft.

4. Mechanical properties of metals are the result of their atomic structure. They include hardness, ductility and malleability which are of special importance in engineering.

5. Ductility is the capacity of a metal to be permanently deformed in tension without breaking.

Malleability is the capacity of a metal to be permanently deformed by compression without rupture.

6. These properties are similar to each other but not the same. Most metals increase these properties at higher temperatures.

7. The strength of a metal is the property of resistance to external loads and stresses.

8. These mechanical properties are of great importance in industrial purposes because all parts and units made of iron and steel must meet up-to-date demands.

**Задание 1. Найдите в тексте ответы на вопросы:**

**Вопросы**

1. What is the most important metal?
2. What mechanical properties of metals do you know?
3. What is strength?
4. What is ductility?
5. What is malleability?

**Задание 2 Найдите в правой колонке русские эквиваленты слов и словосочетаний:**

| 1.lustre 2. property 3. quantity 4. conductivity 5. solid 6. brittle 7. undergo 8. to protect 9. environment 10. alloy 11. poor conductor 12. distinction 13. strength 14. hardness  | a. окружающая средаb. защищать отc. подвергатьсяd. плохой проводникe. количествоf. блескg. сплавh. свойствоi. проводимостьj. твердое состояниеk. хрупкийl. прочностьm. жесткостьn. различие |
| --- | --- |

**Задание 3 Переведите на русский язык в письменной форме абзацы 3,4,5 и 7.**

**Часть 2**

***Прочтите текст и выполните следующие за ним упражнения:***

**METALS AND NONMETALS**

1. There are some distinctions between metals and nonmetal. Metals are distinguished from nonmetals by their high conductivity for electricity, by metallic lustre and by their resistance to electric current. Their use in industry is explained not only by those properties and by the fact that their properties, such as strength and hardness, can be greatly improved by alloying them with other metals.

2. There are several important groups of metals and alloys. The common metals such as iron, copper, zinc, etc. are produced in great quantities.

3. The so-called precious metals include silver, gold, platinum and palladium. The light metals are aluminium, berillium and titanium. They are important in aircraft and rocket construction.

4. Many elements are classified as semimetals (bismuth, for example) because they have much poorer conductivity than common metals.

5. Nonmetals (carbon, silicon, sulphur) in the solid state are usually brittle materials without metallic lustre and are usually poor conductors of electricity. Nonmetals show greater variety of chemical properties than common metals do.

6. Metals can undergo corrosion, changing in this case their chemical and electromechanical properties. In order to protect metals from corrosion the products made of metals and steel are coated by some films (coatings). Organic coatings protect metals and steel from corrosion by forming a corrosion-resistant barrier between metal or steel and the corrosive environment.

**Задание 1. Найдите в тексте ответы на вопросы, запишите развернутый ответ:**

**Вопросы**

1. By what properties are metals distinguished from nonmetals?
2. What common metals are produced in great quantities?
3. What metals are called light?
4. What properties do nonmetals have?
5. What is done to protect metals from corrosion?

**Задание 2. Закончите предложения, найдя соответствующий вариант окончания в тексте, запишите предложения.**

1. There are some different groups of metals, such as:
2. Light metals …
3. Common metals: …
4. Precious metals: ...
5. Nonmetals are…

**Часть 3**

**Material types**

**A. Metals and non-metals**

Engineering materials can be divided into:

• metals- examples of metallic materials are iron (Fe) and copper (Cu)

• non-metals- examples of non-metallic materials are carbon (C) and silicon (Si).

**As iron is such a widely used material, metals can be divided into:**

• ferrous metals- those that contain iron

• non-ferrous metals- those that do not contain iron.

**Задание 1. Заполните пропуски словами в рамке, используя текст A**



1. Carbon (C) is a ................................ .
2. Copper (Cu) is a ................................ metal.
3. Aluminium (AI) is a common ................................ .
4. Steel (Fe + C) is a widely used ................................ metal.
5. Although it is used in steel, carbon is ................................ .
6. Aluminium is relatively lightweight for a ................................ material.

**B. Elements, compounds and mixtures**

With regard to the chemical composition of materials -the chemicals they contain, and how

those chemicals are combined- three main categories can be used:

• Elements are pure materials in their most basic form. They cannot be broken down into different constituents ('ingredients'). Examples of elements widely used in engineering materials are iron, carbon and aluminium (AI).

• Compounds consist of two or more elements that are chemically bound - that is, combined by a chemical reaction. An everyday example is water, which is a compound of hydrogen (H) and oxygen (0).

• Mixtures consist of two or more elements or compounds which are mixed together, but which are not chemically bound. In engineering, common examples are alloys -that is, metals which have other metals and/or non-metals mixed with them. A common example is steel, which is an iron-carbon alloy, and can include other alloying metals- metals which are added to alloys, in small quantities relative to the main metal. Examples of widely used alloying metals are chromium (Cr), manganese (Mn) and tungsten (W).

**Задание 2. Прочитайте текст B и напишите, верны данные ниже высказывания или нет (True or False).**

1. The elements that make up a compound are chemically bound.
2. Alloys are chemical compounds that are frequently used in engineering.
3. Alloys can contain both metallic and non-metallic constituents.
4. In an alloy, an alloying metal is the biggest constituent, by percentage.
5. Steel is a metallic element.

**С. Composite materials**

The article below is from an engineering journal.

When you think of examples of hi-tech materials, composite materials come to mind- such as carbon-fibre, used in aerospace and Formula 1 cars.

But although we think of composites as hi-tech and highly expensive, that's not always true. The earliest examples of composite materials were bricks made from mud and straw. Or, to use the correct composite terms, from straw reinforcement- the structural network that reinforces the material inside, and a mud matrix- the material surrounding the reinforcement. These terms explain what a composite material is: it is a matrix with a reinforcing material inside it. A modern, everyday example is fiberglass - correctly called glass reinforced plastic (GRP) -which has a plastic matrix reinforced with glass fibres.

**Задание 3. Прочитайте текст С. и ответьте на вопросы:**

1. What hi-tech material is used in aerospace and Formula 1 cars?
2. What is a composite material?
3. What is a modern everyday example of a composite material?

**Задание 4. Используя тексты А, В, С, заполните таблицу и напишите по 5 слов в каждую колонку**

| **Element** | **Compound** | **Alloy** | **Composite** |
| --- | --- | --- | --- |
|  |  |  |  |