Task 1

Прочтите тексты, постарайтесь написать определение понятия «инжиниринг» на английском и русском языках:

Engineering is the discipline, art, skill, profession, and technology of acquiring and applying scientific, mathematical,economic, social, and practical knowledge, in order to design and build structures, machines, devices, systems, materials and processes.

The American Engineers' Council for Professional Development (ECPD) has defined "engineering" as:

The creative application of scientific principles to design or develop structures, machines, apparatus, or manufacturing processes, or works utilizing them singly or in combination; or to construct or operate the same with full cognizance of their design; or to forecast their behavior under specific operating conditions; all as respects an intended function, economics of operation and safety to life and property.

VOCABULARY

Creative	творческий
To construct	построить
To operate	работать
Cognizance	знание, компетенция
To forecast	прогнозировать
As respect to	в отношении
Intended	предназначенный

History of engineering

Engineering has existed since ancient times as humans devised fundamental inventions such as the pulley, lever, and wheel. Each of these inventions is consistent with the modern definition of engineering, exploiting basic mechanical principles to develop useful tools and objects.

The term *engineering* itself has a much more recent etymology, deriving from the word *engineer*, which itself dates back to 1325, when an *engine'er* (literally, one who operates an *engine*) originally referred to "a constructor of military engines."

VOCABULARY

To exist	существовать
Ancient	древний
To devise	разрабатывать

Pulley	шкив
Lever	рычаг
To be consistent	быть последовательным
Tool	инструмент
Useful	полезный
To derive	происходить
Engine	двигатель

Чтение – прогнозирование содержания текста

Task 2

Составьте список основных отраслей технического производства. Сравните свой список с другими. Прочтите текст. Определите, сколько отраслей производства упоминается в нем.

Part 1

Engineering, much like other science, is a broad discipline which is often broken down into several sub-disciplines. These disciplines concern themselves with differing areas of engineering work. Although initially an engineer will usually be trained in a specific discipline, throughout an engineer's career the engineer may become multi-disciplined, having worked in several of the outlined areas. Engineering is often characterized as having four main branches.

The application of physics, chemistry, biology, and engineering principles in order to carry out chemical processes on a commercial scale is known as chemical engineering. Chemical Engineering, like its counterpart Mechanical Engineering, developed in the nineteenth century during the Industrial Revolution. Industrial scale manufacturing demanded new materials and new processes and by 1880 the need for large scale production of chemicals was such that a new industry was created, dedicated to the development and large scale manufacturing of chemicals in new industrial plants. The role of the chemical engineer was the design of these chemical plants and processes.

The design and construction of public and private works, such as infrastructure (airports, roads, railways, water supply and treatment etc.), bridges, dams, and buildings. The design of civilian structures such as bridges and buildings matured as a technical discipline, the term civil engineering entered the lexicon as a way to distinguish between those specializing in the construction of such non-military projects and those involved in the older discipline of military engineering.

Part 2

The design and study of various electrical and electronic systems, such as electricalcircuits, generators, motors, electromagnetic/electromechanical device, electronic devices, electronic circuits, optical fibers, optoelectronic

devices, computer systems, telecommunications, instrumentation, controls, and electronics is named electrical engineering.

The design of physical or mechanical systems, such as power and energy systems, aerospace/aircraft products, weapon systems, transportation productsengines, compressors, powertrains, kinematic chains, vacuum technology, and vibration isolation equipment is named mecanical engineering. Ancient Greece developed machines in both the civilian and military domains. The Antikythera mechanism, the first known mechanical computer, and the mechanical inventions of Archimedes are examples of early mechanical engineering. The inventions of Thomas Savery and the Scottish engineer James Watt gave rise to modern Mechanical Engineering. The development of specialized machines and their maintenance tools during the industrial revolution led to the rapid growth of Mechanical Engineering both in its birthplace Britain and abroad.

Beyond these four, sources vary on other main branches. Historically, naval engineering and mining engineering were major branches. Modern fields sometimes included as major branches include aerospace, petroleum, systems, audioengineering, architectural, biosystems , biomedical, industrial, materials science and nuclear engineering.

Aeronautical Engineering deals with aircraft design while Aerospace Engineering is a more modern term that expands the reach envelope of the discipline by including spacecraft design. Its origins can be traced back to the aviation pioneers around the turn of the century from the 19th century to the 20th although the work of Sir George Cayley has recently been dated as being from the last decade of the 18th century. Early knowledge of aeronautical engineering was largely empirical with some concepts and skills imported from other branches of engineering.

For each of these fields there exists considerable overlap, especially in the areas of the application of sciences to their disciplines such as physics, chemistry and mathematics.

Each of the major branches of engineering has numerous subdivisions. Civil engineering, for example, includes structural and transportation engineering, and materials engineering includes ceramic, metallurgical, and polymer engineering. Engineers also may specialize in one industry, such as motor vehicles, or in one type of technology, such as turbines or semiconductor materials.

VOCABULARY

Part 1	
Broad discipline	пограничная дисциплина
To concern with	относиться с
Initially	первоначально

Career	карьера
Outlined	выделенный
Commercial scale	промышленный масштаб
Large scale production	крупномасштабное производство
Dedicated	посвященный
Industrial plant	промышленное предприятие
Chemical plant	химический завод
Civil engineering	гражданское строительство
Chemical engineering	химическое машиностроение
Civilian structure	гражданские объекты
Design	дизайн, проект
To mature	созревать, перерастать
To distinguish	отличать
To be involved	быть вовлеченным
Part 2	
Circuit	электрическая цепь
Generator	генератор
Motor	двигатель
Device	устройство
Fiber	волокно
Weapon	оружие
Compressor	компрессор
Powertrain	электропоезд
Kinematic chain	кинематическая цепь
Domain	область
Maintenance	обслуживание
Growth	рост
Naval engineering	военно-морской инжениринг
Mining engineering	горное дело
Aircraft	самолет
Spacecraft	космический корабль
Empirical	эмпирический
To overlap	перекрывать
Application	приложение

Task 11

Прочтите текст и дополните содержание вашего рассказа об энергетике.

Electrical engineering

The first *electrical engineer* is considered to be William Gilbert, with his 1600 publication of De Magnete, who was the originator of the term "electricity".

Electrical engineering can trace its origins in the experiments of Alessandro Volta in the 1800s, the experiments of Michael Faraday, Georg Ohmand others and

the invention of the electric motor in 1872. The work of James Maxwell and Heinrich Hertz in the late 19th century gave rise to the field of Electronics. The later inventions of the vacuum tube and the transistor further accelerated the development of electronics to such an extent that electrical and electronics engineers currently outnumber their colleagues of any other Engineering specialty.

VOCABULARY

Originator	автор
To trace	проследить
Invention	изобретение
Vacuum tube	вакуумная трубка
Transistor	транзистор
To accelerate	ускорять
Extent	степень
To outnumber	превосходить по численности

Task 12

Текст для самостоятельного перевода со словарем.

Medical engineering

The study of the human body, albeit from different directions and for different purposes, is an important common link between medicine and some engineering disciplines. Medicine aims to sustain, enhance and even replace functions of the human body, if necessary, through the use of technology.

Modern medicine can replace several of the body's functions through the use of artificial organs and can significantly alter the function of the human body through artificial devices such as, for example, brain implants and pacemakers. The fields of Bionics and medical Bionics are dedicated to the study of synthetic implants pertaining to natural systems.

Conversely, some engineering disciplines view the human body as a biological machine worth studying, and are dedicated to emulating many of its functions by replacing biology with technology. This has led to fields such as artificial intelligence, neural networks, fuzzy logic, androbotics. There are also substantial interdisciplinary interactions between engineering and medicine.[34][35]

Both fields provide solutions to real world problems. This often requires moving forward before phenomena are completely understood in a more rigorous scientific sense and therefore experimentation and empirical knowledge is an integral part of both.

Medicine, in part, studies the function of the human body. The human body, as a biological machine, has many functions that can be modeled using Engineering methods.

The heart for example functions much like a pump, the skeleton is like a linked structure with levers, the brain produces electrical signals etc. These similarities as well as the increasing importance and application of Engineering principles in Medicine, led to the development of the field of biomedical engineering that uses concepts developed in both disciplines.

Newly emerging branches of science, such as Systems biology, are adapting analytical tools traditionally used for engineering, such as systems modeling and computational analysis, to the description of biological systems.

VOCABULARY

To albeit	
Purpose	цель
Link	ссылка, связь
To sustain	поддерживать
To enhance	повышать, продвигать
To replace	заменить
Artificial	искусственный
Implant	имплантат
Pacemaker	кардиостимулятор
Synthetic	синтетический
To pertain	относится
To emulate	
Neural	нервный
Fuzzy logic	нечеткая логика
Androbotics	
Pump	насос
Similarity	сходство
To adapt	адаптироваться

Task 13

Прочтите текст и обсудите его содержание. Базируясь на материале текста, сформулируйте свое мнение о значении инжениринга в обществе.

Social context

Engineering is a subject that ranges from large collaborations to small individual projects. Almost all engineering projects are beholden to some sort of financing agency: a company, a set of investors, or a government. The few types of

engineering that are minimally constrained by such issues are pro bono engineering and open design engineering.

By its very nature engineering is bound up with society and human behavior. Every product or construction used by modern society will have been influenced by engineering design. Engineering design is a very powerful tool to make changes to environment, society and economies, and its application brings with it a great responsibility. Many engineering societies have established codes of practice and codes of ethics to guide members and inform the public at large.

Engineering projects can be subject to controversy. Examples from different engineering disciplines include the development of nuclear weapons, the Three Gorges Dam, the design and use of Sport utility vehicles and the extraction of oil. In response, some western engineering companies have enacted serious corporate and social responsibility policies.

Engineering is a key driver of human development. Sub-Saharan Africa in particular has a very small engineering capacity which results in many African nations being unable to develop crucial infrastructure without outside aid. The attainment of many of the Millennium Development Goals requires the achievement of sufficient engineering capacity to develop infrastructure and sustainable technological development.

All overseas development and relief NGOs make considerable use of engineers to apply solutions in disaster and development scenarios. A number of charitable organizations aim to use engineering directly for the good of mankind.