**MESLEKİ YABANCI DİL**

**GÜZ DÖNEMİ:**

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https://lms.oss.unist.hr/mod/resource/view.php?id=12010

# 1. HISTORY OF ELECTRICITY



## 1.1. Evolution of Electricity

Many inventions have taken several centuries to develop into their modern forms and modern inventions are rarely the product of a single inventor's efforts. The inventions listed below were only one small step towards the ultimate goal.

Electricity has fascinated human kind since our ancestors first witnessed lightning. In ancient Greece, Thales observed that an electric charge could be generated by rubbing ***amber***, for which the Greek word is ***electron***.

1729
The English physicist ***Stephen Gray*** discovered electrical conductivity in 1729.

1752
***Benjamin Franklin*** proposes the notion of positive and negative charge. His famous kite experiments, identifying lightning as a form of electrical discharge, take place in 1752.

1800
***Alessandro Volta*** invents an electric battery, the first source of DC current.

1827
***Georg Simon Ohm*** determined that the current that flows through a wire is proportional to its cross sectional area and inversely proportional to its length or Ohm's law. These fundamental relationships are of such great importance,
that they represent the true beginning of electrical circuit analysis.

1831
***Michael Faraday*** experimentally characterizes magnetic induction. The most thorough of early electrical investigators, he formulates the quantitative laws of electrolysis, the principles of electric motors and transformers, investigates diamagnetic materials, and posits a physical reality for the indirectly observed magnetic and electrical lines of force.

1879
***Thomas Alva Edison*** invented the light bulb. He originated the concept and implementation of electric-power generation and distribution to homes, businesses, and factories – a crucial development in the modern industrialized world. His first power station was on Manhattan Island, New York.

1885
During his development of the braking and signalling systems, in the mid 1880s, ***George Westinghouse*** became quite interested in electricity. He began pursuing the technology of alternating current and he associated with those who were developing AC devices.

1886
On March 20, 1886, ***William Stanley*** demonstrated a system of high voltage transmission via a "parallel connected transformer." The device, combined with high-voltage transmission lines, made it possible to spread electric service over a wide area and allowed alternating current to be available at different voltages.

1888
***Heinrich Hertz*** discovers and measures the waves, radio waves, predicted earlier by Faraday and Maxwell.

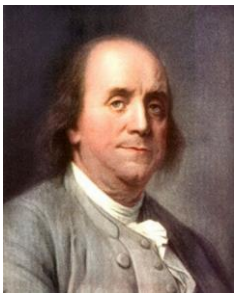
1888
***Nikola Tesla*** invented the first practicable AC motor and polyphase power transmission system. Westinghouse acquired exclusive rights to Nikola Tesla's patent for the polyphase system and lured Tesla to join the electric company and continue his work on the AC motor he had developed.

1901
***Elihu Thomson,*** electrical engineer, inventor, and entrepreneur, was an innovator in electrification in both a technical and corporate sense. Thomson acquired nearly 700 patents in his career, his major contributions included (electrostatic motors, electrical meters, high-pressure steam engines, dynamos, generators and, X-rays).

http://www.ideafinder.com/features/smallstep/electricity.htm (adapted)

### *Examples of Pronounciation (Evolution of Electricity)*

| | |
|---|---|
| Many inventions have taken several centuries to develop into their modern forms and modern inventions are rarely the product of a single inventor's efforts. The inventions listed below were only one small step towards the ultimate goal. | ˈmɛni ɪnˈvɛnʃənz həv ˈteɪkən ˈsɛvərəl ˈsɛntʃəriz tə dɪˈvɛləpˈɪntə ðɛr ˈmɑdərn fɔrmz ənd ˈmɑdərn ɪnˈvɛnʃənz ər ˈrɛrli ðəˈprɑdəkt əv ə ˈsɪŋgəl ɪnˈvɛntərz ˈɛfərts. ði ɪnˈvɛnʃənz ˈlɪstəd bɪˈloʊ wər ˈoʊnli wʌn smɔl stɛp təˈwɔrdz ði ˈʌltəmət goʊl. |
| Electricity has fascinated human kind since our ancestors first witnessed lightning. In ancient Greece, Thales observed that an electric charge could be generated by rubbing ***amber***, for which the Greek word is ***electron***. | ɪˌlɛkˈtrɪsəti həz ˈfæsəˌneɪtəd ˈhjumən kaɪnd sɪns aʊrˈænˌsɛstərz fɜrst ˈwɪtnəst ˈlaɪtnɪŋ. ɪn ˈeɪnʃənt gris, θælz əbˈzɜrvd ðət ən ɪˈlɛktrɪk ʧɑrʤ kəd bi ˈʤɛnəˌreɪtəd baɪ ˈrʌbɪŋ ˈæmbər, fər wɪʧ ðə grik wɜrd əz ɪˈlɛktrɑn. |
| ***Heinrich Hertz*** discovers and measures the waves, radio waves, predicted earlier by Faraday and Maxwell. | ˈhaɪnrɪk hɛrts dɪˈskʌvərz ənd ˈmɛʒərz ðə weɪvz, ˈreidiˌoʊ weɪvz, priˈdɪktəd ˈɜrliər baɪ ˈfærəˌdeɪ ənd ˈmækˌswɛl. |



***Benjamin Franklin***

***Stephen Gray***

***Alessandro Volta***

***Comprehension questions***

1- Where does the word electricity come from?

2- What did B. Franklin propose?

3- Who invented the first source of DC current?

4- What did Faraday formulate?

5- Why is Edison important in the history of electricity?

6- What did Hertz discover?

***Match the scientists to their inventions or discoveries.***

| | |
|---|---|
| a) B. Franklin | 1) light bulb |
| b) A. Volta | 2) magnetic induction |
| c) M. Faraday | 3) radio waves |
| d) T. Edison | 4) positive and negative charge |
| e) H. Hertz | 5) electric battery |

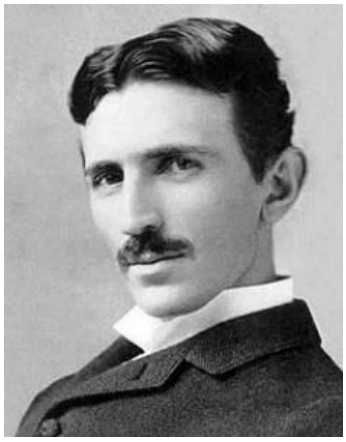
a) b) c) d) e)

***Complete the text with the words from the box.***

| | | | |
|---|---|---|---|
| electricity | forwards | magnetic | alternating |
| transport | plant | source | switching |

The turning point of the electric age came with the development of AC power systems. With_____1) current, power plants could _____ 2) electricity much further than before it. In 1895, G. Westinghouse opened the first major power plant at Niagara Falls using alternating current. While Edison's DC_____ 3) could only transport electricity within one square mile of his Pearl Street Power Station, the Niagara Falls plant was able to transport _____ 4) more than 200 miles. In DC, the electrons flow steadily in a single direction, or _____ 5). In AC, electrons keep _____ 6) directions, sometimes going "forwards" and then going "backwards." The power that comes from wall outlets is AC. Electricity is a very different energy _____ 7) than heat or light. In nature, electricity only rarely occurs, in some animals or with lightning. In the search to create electrical energy, scientists discovered that electrical and _____ 8) fields are related. A magnetic field near a wire causes electrons to flow in a single direction along the wire because they are repelled and attracted by the north or south poles. Thus, DC power from a battery was born, primarily attributed to Thomas Edison's work and promotion.

## 1.2. Nikola Tesla, the Man Who Lit up the World



Nikola Tesla was born in 1856 in Smiljan Lika, Croatia. He was the son of a Serbian Orthodox clergyman. Tesla studied engineering at the Austrian Polytechnic School. He emigrated to the United States in 1884 to work at the Edison Machine Works.

Nikola Tesla was Thomas Edison's rival at the end of the 19th century. Tesla and Edison battled bitterly and publicly over AC and DC electrical power. Tesla had joined up with entrepreneur George Westinghouse to build AC power stations, while Edison was pushing DC power.

Ultimately, Tesla was proved right: AC power is easier to generate (the generators are simpler, cheaper, and more reliable), it can be transmitted much further (DC power was limited to short distances and necessitated power stations close to consumers), and its voltage can be converted using a simple transformer.

During his lifetime, Tesla invented fluorescent lighting, the Tesla induction motor, the Tesla coil, and developed the alternating current (AC) electrical supply system that included a motor and transformer, and 3-phase electricity. In total, Nikola Tesla was granted more than one hundred patents and invented countless unpatented inventions. He is also credited with inventing modern radio.

The Tesla coil, invented in 1891, is still used in radio and television sets and other electronic equipment.

Ten years after patenting a successful method for producing alternating current, Nikola Tesla claimed the invention of an electrical generator that would not consume any fuel but cosmic rays. This invention has been lost to the public. His invention of polyphase electric power earned him worldwide fame and fortune. Yet Tesla died poor, on January 7, 1943, having lost both his fortune and scientific reputation.

http://www.arkcode.com/custom3_25.html (adapted)

***Fill in the gaps with a word from the box.***

| | | | | |
|---|---|---|---|---|
| ferromagnetic | magnet | negative | voltage | induced |
| transformer | changing | maximum | DC | sine |

**AC Versus DC**

Direct current, or 1) _____, is simple: it's the type of electricity that batteries supply. In a DC circuit, electricity flows in one direction only--for example, from the positive terminal of a battery through a circuit

to the 2) _____terminal. Alternating current, or AC, changes direction cyclically, typically in the form of a 3) _____wave.

AC varies in voltage from a positive 4) _____to a negative minimum over time. To generate AC power, a current can be 5) _____ in a pair of coils using a rotating magnet. The current varies as the 6)_____ rotates. Since the magnet does not touch the coils, AC generators are reliable and simple. DC generators, on the other hand, require a more complex mechanism.

It is simple to change the voltage of AC using a 7) _____. A basic transformer consists of a pair of coils, separated either by air or, more commonly, by some 8) _____material such as a bar of iron. As the AC voltage varies over time, it creates a 9) _____magnetic field around the coil it is connected to. This magnetic field induces an AC voltage in the other coil.

AC's biggest advantage is in power transmission. Since AC's voltage can be increased or decreased using transformers, it is possible to choose the most appropriate 10) _____for a given situation.

***Match the beginnings of the sentences with the proper endings.***

1) Tesla believed that alternating current was superior to Edison's direct current because of …

2) He also worked with ground electromagnetic waves and …

3) While working with radio waves, …

4) Tesla also had a deep desire …

5) He may be considered as a pioneer of the transistor …

a) invented the idea of radio as we know it today.

b) since two of his patents from 1903 contained the basic principles of the logical 'AND' circuit element.

c) the fact that it can be altered (converted) to suit a variety of situations.

d) he created the Tesla coil as a means to generate and receive this form of energy.

e) to provide global wireless communications and energy systems.

***Electronics and the Letter "F"***
***Match the definitions to the appropriate terms.***

1) This characteristic was formerly measured in cycles-per-second, but its modern unit of measure is named after a German physicist.

2) The unit of measure for a capacitor is the...?

3) The "FET" is a type of transistor. Its full name is _____ effect transistor.

4) Voltage is sometimes referred to as EMF or Electromotive...?

5) The FFT, a mathematical process, is used extensively in digital signal processing (DSP). What word does the second "F" in FFT stand for?

a) Field

b) Force

c) Frequency

d) Farad

e) Fourier

1) 2) 3) 4) 5)