МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ ХАРЧОВИХ ТЕХНОЛОГІЙ

ЗАТВЕРДЖУЮ
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АНГЛІЙСЬКА МОВА

МЕТОДИЧНІ ВКАЗІВКИ

до практичних занять та самостійної роботи над текстами фахового спрямування
для студентів 2 курсу напряму підготовки 6.050202
«Автоматизація та комп'ютерно-інтегровані технології»
денної форми навчання

Реєстраційний номер
електронних методичних
вказівок у НМУ _____

Схвалено
на засіданні кафедри
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Англійська мова: методичні вказівки до практичних занять та самостійної роботи над текстами фахового спрямування для студентів 2 курсу напряму підготовки 6.050202 «Автоматизація та комп'ютерно-інтегровані технології» денної форми навчання / Уклад.: Л.С. Каменчук, О.А. Левурда – К: НУХТ, 2010. – с.58

Рецензент: *Л.Ю. Шапран*

Укладачі: *Л.С. Каменчук*

О.А. Левурда

Відповідальний за випуск Л.Ю. Шапран, завідувач кафедри, доц

ВСТУП

Методичні вказівки призначені для студентів для студентів 2 курсу напряму підготовки 6.050202 «Автоматизація та комп'ютерно-інтегровані технології» денної форми навчання.

Дані методичні вказівки розраховані на студентів, які вичають англійську мову з метою використання її в професійній діяльності.

Тематика, лексичний мінімум, система вправ спрямовані на досягнення головної мети.

Мета даних методичних вказівок – формування комунікативної мовленнєвої компетенції на матеріалі оригінальних текстів фахової тематики.

Методичні вказівки містять автентичні тексти, післятекстові завдання та словник найбільш уживаних професійних термінів, які сприяють подальшому розвитку набутих мовних навичок для задоволення практичних та професійних потреб в сфері комп'ютерних технологій.

Система завдань будується на фаховій лексиці, спрямована на полегшення засвоєння поданого тематичного та мовного матеріалу, та містить ряд проблемних завдань, що розвивають творче мислення студентів.

Дані методичні вказівки сприятимуть формуванню у студентів професійно орієнтованих комунікативних мовленнєвих компетенцій та є додатковим спонукальним мотивом для удосконалення навичок усного та писемного мовлення в професійній сфері.

Unit 1 Electrical engineering (part 1)

1. Read the text and answer the questions.

Electrical engineering, sometimes referred to as electrical and electronic engineering, is a field of engineering that deals with the study and application of electricity, electronics and electromagnetism. Now it covers a range of subtopics including power, electronics, control systems, signal processing and telecommunications.

Electrical engineering is considered to deal with the problems associated with large-scale electrical systems such as power transmission and motor control, whereas electronic engineering deals with the study of small-scale electronic systems including computers and integrated circuits. Alternatively, electrical engineers are usually concerned with using electricity to transmit energy, while electronic engineers are concerned with using electricity to transmit information.

Electrical engineering has many sub-disciplines, the most popular of which are listed below.

Power engineering deals with the generation, transmission and distribution of electricity as well as the design of a range of related devices. These include transformers, electric generators, electric motors, high voltage engineering and power electronics. In many regions of the world, governments maintain an electrical network called a power grid that connects a variety of generators together with users of their energy. Users purchase electrical energy from the grid, avoiding the costly exercise of having to generate their own. Power engineers may work on the design and maintenance of the power grid as well as the power systems that connect to it. Power engineers may also work on systems that are not connected to the grid, called off-grid power systems, which in some cases are preferable to on-grid systems.

Control engineering focuses on the modeling of a diverse range of dynamic systems and the design of controllers that will cause these systems to behave in the desired manner. To implement such controllers electrical engineers may use electrical circuits, digital signal processors, microcontrollers and PLCs (Programmable Logic Controllers). Control engineering has a wide range of applications from the flight and propulsion systems of commercial airliners to the cruise control present in many modern automobiles. It also plays an important role in industrial automation.

Control engineers often utilize feedback when designing control systems. For example, in an automobile with cruise control the vehicle's speed is continuously monitored and fed back to the system which adjusts the motor's power output accordingly. Where there is regular feedback, control theory can be used to determine how the system responds to such feedback.

Electronic engineering involves the design and testing of electronic circuits that use the properties of components such as resistors, capacitors, inductors, diodes and transistors to achieve a particular functionality. The tuned circuit, which allows the user of a radio to filter out all but a single station, is just one example of such a circuit..

Before the invention of the integrated circuit in 1959, electronic circuits were constructed from discrete components that could be manipulated by humans. These discrete circuits consumed much space and power and were limited in speed, although they are still common in some applications. By contrast, integrated circuits packed a large number—often millions—of tiny electrical components, mainly transistors, into a small chip around the size of a coin. This allowed for the powerful computers and other electronic devices we see today.

1. What is Electrical engineering concerned with?
2. What is the area of concern for electronic engineering?
3. How does power engineering manifest itself in practical life?

4. How were early electronic circuits different from integrated circuits?

2. Match the words with the correct definition.

1. Application	a) a place where power or information leaves a system.
2. large-scale	b) a piece of equipment or a mechanism designed to serve a special purpose or perform a special function.
3. circuits	c) made up of distinct characteristics, qualities, or elements.
4. generation over	d) involving a large number of people or things, or happening large area
5. device	e) a configuration of electrically or electromagnetically connected components or devices.
6. power grid	f) a program (as a word processor or a spreadsheet) that performs one of the major tasks for which a computer is used.
7. feedback	g) the automatic operation or control of equipment, a process, or a system.
8. diverse	h) act in a specified way.
9. to behave	i) the modification of a software product, after delivery, to correct faults, to improve performance or other attributes, or to adapt the product to a changed environment.
10. automation	j) information given in response to a product, performance etc., used as a basis for improvement.
11. maintenance	k) a stage of technological development or innovation.
12. output	l) a system of high tension cables by which electrical power is distributed throughout a region.

3. Complete the sentences below with one of the words from the box.

Continuously	transmission	supply	distributions	range	network

1. Multitronic offers a stepless automatic transmission in which the ratio between the input shaft and output shaft can be varied _____ within a given range, providing a very large number of possible ratios.2. The term tele _____ involves the analog as well as digital communication. 3. A battery is a type of linear power _____ that offers benefits that traditional line-operated power supplies lack: mobility, portability and reliability.4.Linux packages are called _____ because the Linux vendor is distributing an open source operating system that it did not develop from scratch, although it may have enhanced it with its own modifications.
5. They also stock the full _____ of single switch software from Sensory Software.
6. With the new contract, Siemens is expanding its leading role in Voice over IP for cable_____ operators

4. Speaking. Think and tell the class what these people do at their work.

Electrical engineers Control engineers Power engineers electronic engineers Computer engineers

Unit 2 Electrical engineering (part 2)

1. Before you read this text discuss the following questions.

Why is the field of electronics so important today?
Is signal processing expanding? Why?
Are computer engineers in great demand on the market? Why?

Microelectronics engineering deals with the design and microfabrication of very small electronic circuit components for use in an integrated circuit or sometimes for use on their own as a general electronic component. The most common microelectronic components are semiconductor transistors, although all main electronic components (resistors, capacitors, inductors) can be created at a microscopic level. Nanoelectronics is the further scaling of devices down to nanometer levels.

Microelectronic components are created by chemically fabricating wafers of semiconductors such as silicon to obtain the desired transport of electronic charge and control of current. The field of microelectronics involves a significant amount of chemistry and material science and requires the electronic engineer working in the field to have a very good working knowledge of the effects of quantum mechanics.

Signal processing deals with the analysis and manipulation of signals. Signal Processing is a very mathematically oriented and intensive area forming the core of digital signal processing and it is rapidly expanding with new applications in every field of electrical engineering such as communications, control, radar, TV/Audio/Video engineering, power electronics and bio-medical engineering as many already existing analog systems are replaced with their digital counterparts.

The deep and strong relations between signals and the information they carry makes signal processing equivalent of information processing. Which is the reason why the field finds so many diversified applications. DSP processor ICs are found in every type of modern electronic systems and products including, SDTV / HDTV sets, radios and mobile communication devices, Hi-Fi audio equipments, Dolby noise reduction algorithms, GSM mobile phones, mp3 multimedia players, camcorders and digital cameras, automobile control systems, noise cancelling headphones, digital spectrum analyzers, intelligent missile guidance, radar, GPS based cruise control systems and all kinds of image processing, video processing, audio processing and speech processing systems.

Telecommunications engineering focuses on the transmission of information across a channel such as a coax cable, optical fiber or free space. Transmissions across free space require information to be encoded in a carrier wave in order to shift the information to a carrier frequency suitable for transmission, this is known as modulation. Popular analog modulation techniques include amplitude modulation and frequency modulation. The choice of modulation affects the cost and

performance of a system and these two factors must be balanced carefully by the engineer.

Instrumentation engineering deals with the design of devices to measure physical quantities such as pressure, flow and temperature. The design of such instrumentation requires a good understanding of physics that often extends beyond electromagnetic theory. For example, radar guns use the Doppler effect to measure the speed of oncoming vehicles. Similarly, thermocouples use the Peltier-Seebeck effect to measure the temperature difference between two points.

Computer engineering deals with the design of computers and computer systems. This may involve the design of new hardware, the design of PDAs or the use of computers to control an industrial plant. Computer engineers are involved in many aspects of computing, from the design of individual microprocessors, personal computers, and supercomputers, to circuit design. This field of engineering not only focuses on how computer systems themselves work, but also how they integrate into the larger picture.

Usual tasks involving computer engineers include writing software and firmware for embedded microcontrollers, designing VLSI chips, designing analog sensors, designing mixed signal circuit boards, and designing operating systems. Computer engineers are also suited for robotics research, which relies heavily on using digital systems to control and monitor electrical systems like motors, communications, and sensors.

Electronics is a branch of science and technology that deals with the controlled flow of electrons. The ability to control electron flow is usually applied to information handling or device control. Electronics is distinct from electrical science and technology, which deals with the generation, distribution, control and application of electrical power. This distinction started around 1906 with the invention by Lee De Forest of the triode, which made electrical amplification possible with a non-mechanical device. Until 1950 this field was called "radio technology" because its principal application was the design and theory of radio transmitters, receivers and vacuum tubes.

2. Complete these sentences with the appropriate information from the text.

1. The most common microelectronic components are…
2. The field of microelectronics involves a significant amount of chemistry and material science and requires the electronic engineer working in the field to have…
3. Signal processing is equivalent of information processing because of …
4. The field of engineering that focuses on the transmission of information across a channel such as a coax cable, optical fiber or free space is called….
5. Computer engineers deal with many aspects of computing…

3. Decide whether the statements are true or false.

Branch of science that relates to the controlled flow of electrons is called microelectronics.

Digital systems of control and monitoring electrical systems belong to the sphere of interest of instrumentation engineering.
Signal processing is seen as the equivalent to information processing.
The most common microelectronic components are resistors, capacitors, inductors.
Radios and mobile communication devices all contain integrated circuits.

4. Group these words according to the part of speech they belong to.

Further, created, chemically, working, continuously, filtering, existing, compression, digitally, processing, intensive, pressure, sampled, replaced, rapidly, diversified, electronic, suitable, affect, performance, carefully, measure, ability.

Unit 3 Electronic devices and components

1. Before you read the text match these words (1-6) to their meaning (a-f)

1. Semiconductor	a) permanently attached by a hard metal bond.
2. Consistent	b) an electronic component that stores an electric charge and releases it when required.
3. Soldered	c) the way in which someone or something functions
4. Capacitor	d) a small device, usually pushed up or down with your finger, that controls and turns on or off an electric current
5. Performance	e) in agreement with other facts or with typical or previous behaviour, or having the same principles as something else
6. Switch	f) a material, such as silicon, which allows electricity to move through it more easily when its temperature increases, or an electronic device made from this material

Most electronic devices today use semiconductor components to perform electron control.

An electronic component is any physical entity in an electronic system used to affect the electrons or their associated fields in a desired manner consistent with the intended function of the electronic system. Components are generally intended to be connected together, usually by being soldered to a printed circuit board (PCB), to create an electronic circuit with a particular function (for example an amplifier, radio receiver, or oscillator). Components may be packaged singly or in more complex groups as integrated circuits. Some common electronic components are capacitors, resistors, diodes, transistors, etc. Components are often categorized as active (e.g. transistors and thyristors) or passive (e.g. resistors and capacitors).

Types of circuits

Circuits and components can be divided into two groups: analog and digital.

Most analog electronic appliances, such as radio receivers, are constructed from combinations of a few types of basic circuits. Analog circuits use a continuous range of voltage as opposed to discrete levels as in digital circuits.

The number of different analog circuits so far devised is huge, especially because a 'circuit' can be defined as anything from a single component, to systems containing thousands of components.

Analog circuits are sometimes called linear circuits although many non-linear effects are used in analog circuits such as mixers, modulators, etc. Good examples of analog circuits include vacuum tube and transistor amplifiers, operational amplifiers and oscillators.

One rarely finds modern circuits that are entirely analog. These days analog circuitry may use digital or even microprocessor techniques to improve performance. This type of circuit is usually called "mixed signal" rather than analog or digital.

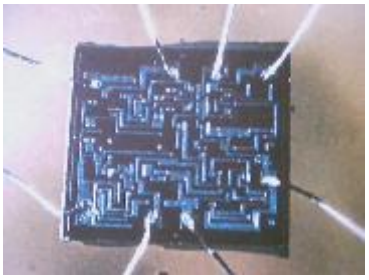
Sometimes it may be difficult to differentiate between analog and digital circuits as they have elements of both linear and non-linear operation. An example is the comparator which takes in a continuous range of voltage but only outputs one of two levels as in a digital circuit. Similarly, an overdriven transistor amplifier can take on the characteristics of a controlled switch having essentially two levels of output.

Digital circuits are electric circuits based on a number of discrete voltage levels. Digital circuits are the basis of all digital computers. To most engineers, the terms "digital circuit", "digital system" and "logic" are interchangeable in the context of digital circuits. Most digital circuits use two voltage levels labeled "Low" (0) and "High" (1). Often "Low" will be near zero volts and "High" will be at a higher level depending on the supply voltage in use.

Computers, electronic clocks, and programmable logic controllers (used to control industrial processes) are constructed of digital circuits.

Many different methods of connecting components have been used over the years. For instance, early electronics often used point to point wiring with components attached to wooden breadboards to construct circuits. Cordwood construction and wire wraps were other methods used. Most modern day electronics now use printed circuit boards made of materials such as FR4, or the cheaper (and less hard-wearing) Synthetic Resin Bonded Paper (SRBP, also known as Paxoline/Paxolin (trade marks) and FR2) - characterised by its light yellow-to-brown colour.

Looking like "silver cans," and acting like miniature storage batteries, capacitors are found on countless circuit boards such as this high-end display adapter. Wired between the power and ground planes, they quickly charge up when the computer is turned on. When more transistors switch simultaneously because the application demands extra processing, they are made to release their charge. (Image courtesy of NVIDIA Corporation.)


A medium-scale integrated circuit die, with bond wires attached.

2. Answer the following questions.

1. What is an electronic component?
2. What categories can the electronic components be divided into?
3. What is a circuit?
4. What types of circuits do you know?
5. How else can analog circuits be called?
6. Is it easy to differentiate between analog and digital circuits? Why?
7. Where are digital circuits used?
8. What are the methods of connecting components to construct circuits?

3. Complete the sentences using the words in box.

circuit	digital	performance	amplifier	modulated

1. Various symbols are used on_____ diagrams to represent earth or ground potential.
2. A large company in the telecom sector does not only sell internet, but also_____ TV and explores telephone lines.
3. Skype 2.0 allows users to conference call up to ten people simultaneously without affecting the_____ of other applications.
4. You can either connect the loop_____ directly to your television or sound system, or you can put a microphone near the loudspeaker.
5. This may allow the co-axial cable to carry multiple separate LANs whose transmission is being _____ at different frequencies.