**МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ**

**МИКОЛАЇВСЬКИЙ НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ**

**ІМЕНІ В. О. СУХОМЛИНСЬКОГО**

Філологічний факультет

Кафедра загальної та прикладної лінгвістики

## Навчально-методичнЕ ЗАБЕЗПЕЧЕННЯ НАВЧАЛЬНОЇ ДИСЦИПЛІНИ

**ТЕХНІЧНИЙ ПЕРЕКЛАД ЗА ПРОФЕСІЙНИМ СПРЯМУВАННЯМ**

Ступінь бакалавра

Галузь знань 11 Математика та статистика

12 Інформаційні технології

спеціальність 113 Прикладна математика, 122 Комп’ютерні науки

Освітньо-професійна програма «Комп’ютерні науки»

«Інформатика»

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Затверджено на засіданні кафедри «28» серпня 2020 р.

Затверджено на засіданні навчально-методичної комісії факультету «28» серпня 2020 р.

Затверджено на засіданні Вченої ради факультету «28» серпня 2020 р.

Миколаїв 2020

**Зміст НМЗ**

1. Титульна сторінка.
2. Зміст НМЗ.
3. Навчальний контент.
4. Завдання для самостійної роботи.
5. Завдання для поточного та підсумкового контролю знань і вмінь з навчальної дисципліни.

**НАВЧАЛЬНИЙ КОНТЕНТ**

**ПРАКТИЧНЕ ЗАНЯТТЯ 1**

Тема: **Словниковий запас англійської мови**

Мета: закріплення та актуалізація теоретичного матеріалу з теми

**Exercise 1.**

Study the following passage. **In which ways may the influence of a foreign language be exerted?**

The influence of a foreign language may be exerted in two ways, through the spoken word, by personal contact between the two peoples, or through the written word, by indirect contact, not between the peoples themselves but through their literatures. The former way was more productive in the earlier stages, but the latter has become increasingly important in more recent times. Direct contact may take place naturally in border regions, or by the transference of considerable number of people from one area to another, either by peaceful immigration, settlement or colonisation, or through invasion and conquest. It may also take place, though to a more limited extent, through travel to foreign countries and through residence abroad, for trade or other purposes, of relatively small numbers of people.

The type of words borrowed by personal contact would undoubtedly at first be names of objects unfamiliar to the borrowers, or products and commodities exchanged by way of trade. If the contacts were maintained over a long period then ideas concerned with government, law, religion, and customs might be absorbed, and perhaps the names of these would be adopted. Only in the case of nations in relatively advanced stages of civilisation would there be much influence exerted through the written word; concrete objects would come first, then abstract ideas learnt from what might actually be seen from their effects in everyday life and abstract ideas through the indirect contact achieved by books would come much later

(J.A.Sheard. The words we use).

**Exercise 2.** *Explain the origin of the following words*:

father, brother, mother, dog, cat, sheep, wolf, house, life, earth, man, apple, live, go, give, begin, strong, long, wide, to, for, from, and, with, I, he, two, well, much, little.

**Exercise 3.** *Analyse the following words from the point of view of the type and degree of assimilation.* *State which words are: a) completely assimilated; b) partially assimilated; c) non-assimilated:*

prima-donna, ox, caftan, city, school, etc., mazurka, table, street, they, century, sky, wall, stimulus, reduce, cup, present.

**Exercise 4.** *Comment on the different formation of the doublets and on the difference in meaning, if any*:

balm-balsam, suit-suite, senior-sir, legal-loyal, skirt-shirt, emerald-smaragdus, major-mayor, pauper-poor, of-off, history-story, catch-chase.

**Exercise 5.** *The following are loan translations (calques). What do they actually mean in English. How and when are they used?*

the moment of truth (Sp. el momenta de la verdad); with a grain of salt (L cum grano salis); famous case (Fr. cause celebre); master people (Gr herrenvolk). underground movement (Fr.L. mouvement souterrain); that goes without saying (Fr. cela va sans dire).

**Exercise 6.** *Read the following text. Find the international words. State to what sphere of human activity they belong.*

**British dramatists.**

In the past 20 years there has been a considerable increase in the number of new playwrights in Britain and this has been encouraged by the growth of new theatre companies. In 1956 the English Stage Company began productions with the object of bringing new writers into the theatre and providing training facilities for young actors, directors, and designers; a large number of new dramatists emerged as a result of the company productions Television has been an important factor in the emergence of other dramatists who write primarily for it; both the BBC and IBA transmit a large number of single plays each year as well as drama series and serials.

**ПРАКТИЧНЕ ЗАНЯТТЯ 2**

Тема: **Асиміляція запозичень в англійській мові.**

Мета: закріплення та актуалізація теоретичного матеріалу з теми

**Exercise 1.** *Group the following loans into 1) completely assimilated borrowings, 2) partially assimilated borrowings, 3) unassimilated borrowings or barbarisms.*

Cheese, street, wall, wine, formulae, husband, fellow, gate, root, addio, ciao, wing, call, take, die, want, coup d'Etat, happy, ill, low, old, wrong, bourgeois, prestige, memoir, table, face, chair, figure, finish, matter, ad libitum, animal, article, incognito, macaroni, soprano, tobacco, kapellmeister, ballet, buffet, corps, bouquet, brioche, Auto-da-fe, nucleus, chauffeur, nota bene, shaman, souvenir, spaghetti, à la carte, boulevard, torero, ad hoc, à la mode, têt-à- têt, déjà vu.

**Exercise 2.**  *Write out international words from the given sentences.*

1. He gave a false address to the police. 2. I‟ve seen many good films lately. 3. Do you take sugar in your coffee? 4. Arrange the words in alphabetical order. 5. Charlotte Brontë wrote under the pseudonym of Currer Bell. 6. He worked in radio for nearly 40 years. 7. Many people feel that their interests are not represented by mainstream politics. 8. We‟ve seen the open-air theatre in London‟s Regent Park. 9. I‟m worried about my son‟s lack of progress in English. 10. The government has promised to introduce reforms of the tax system. 11. He went on to study medicine at Edinburgh University.

**Exercise 3.**  *Give the cognates (‘false friends’) in the Ukrainian language to the given English words. State the difference in their meanings.*

Argument, baton, order, to reclaim, delicate, intelligent, revision, artist, sympathetic, capital, fabric, ambitious, concourse, romance, to pretend, command.

**Exercise 4.**  *Transcribe the following borrowings not completely assimilated graphically and / or phonetically. Pay special attention to their spelling and pronunciation.*

Torchére, chalet, parquet, chauffeur, corps, souvenir, spaghetti, memoir, incognito, sabotage, boulevard, macaroni.

**Exercise 5.***. Give the plural form of the nouns borrowed from Latin and Greek.*

Sanatorium, terminus, datum, nucleus, formula, bacillus, stratum, parenthesis, thesis, stimulus, criterion, hypothesis.

**Exercise 6.** *Arrange the words from the columns so that they form double or triple synonymous series.*

|  |  |  |  |
| --- | --- | --- | --- |
| **Native English words** | **French borrowings** | | **Latin borrowings** |
| guts | flame | | lassitude |
| ask | sacred | | felicity |
| fire | courage | | ascend |
| house | attire | | interrogate |
| kingly | mount | | regal |
| weariness | | mansion | |
| rise | | question | |
| happiness | | royal | |
| holy | | | |
| clothes | | | |

**Exercise 7.** *Give adjectives of Latin origin corresponding to the following nouns.*

Tooth, sun, youth, death, eye, star, sea, nose, town, sight.

**ПРАКТИЧНЕ ЗАНЯТТЯ 3**

Тема: **Словотворення в англійській мові: перекладацький підхід.**

Мета: закріплення та актуалізація теоретичного матеріалу з теми

**Exercise 1** *Distribute the given words formed by means of the polysemantic suffix -ship according to three meanings of this suffix into three corresponding groups: 1) ‘skills or ability’; 2) ‘position or occupation’; 3) ‘relationship or connection between people’*.

Workmanship, comradeship, musicianship, chairmanship, friendship, professorship, showmanship, lectureship, kinship, sportsmanship, acquaintanceship, studentship, salesmanship, doctorship, partnership.

**Exercise 2** *Classify suffixes forming the given nouns according to their generalizing meaning into three groups: 1) suffixes denoting people of different professions or of different kinds of activity; 2) suffixes denoting collectivity or collection of; 3) suffixes denoting diminutiveness*.

Membership, assistant, lecturette, trainee, sisterhood, actress, piglet, painter, machinery, aunty, yuppiedom, historian, duckling, finery, scientist, babykins, readership, supervisor, nightie, aristocracy.

**Exercise 3** *Translate the given combinations of words into English. Pay special attention to the formation of different in meaning adjectives by means of adding different suffixes to one and the same derivational base.*

Model: favour: улюблений автор – сприятлива погода

The English for улюблений автор is a favourite author. The English for сприятлива погода is favourable weather. 1) exhaust: виснажлива работа – вичерпна відповідь; 2) history: історична перемога – історичний фільм; 3) honour: почесний громадянин – почесний обов‟язок; 4) respect: ввічливий тон – пристойна поведінка; 5) skill: кваліфікований робітник – досвідчений, умілий хирург; 6) culture: культурне життя – культурна людина; 7) touch: зворушливі слова – вразлива людина; 8) delight: захоплені глядачі – чудові канікули; 9) economy: економічна криза – економні витрати; 10) contempt: нікчемний зрадник – презирлива посмішка.

**Exercise 4.** *Combine the prefixes in the box with the appropriate derivational base from the list. Classify the prefixes according to the lexico-grammatical character of the base they are attached to and according to the part of speech they form.*

Model: dis-The prefix dis- can be combined with the bases: -advantage, -favour, -order. It is added to the nominal bases to form new nouns. Thus, this prefix can be qualified as a denominal and noun-forming prefix.

dis-, il-, non-, ir-, un-, im-, in-, de-, a- Legal, relevant, mature, regulate, moral, ability, payment, happy, responsible, patient, stabilize, honour, smoker, learn, formally, typical, logical, rational, possible, classify, agreement, verbal, lock, practical, dependently, mystify, resistible, sensual, literate, obedience, academic, tie, adequately, septic, clean.

**Exercise 5** *Analyze different meanings of the prefix over- forming the given words. Classify these words according to the generalizing meaning of the prefix over- under the following headings: 1) ‘excess’; 2) ‘time (age)’; 3) ‘position or place’; 4) ‘addition’; 5) ‘outer, covering’; 6) ‘a person engaged in a certain activity or an agent of an action’.*

Model: overlord (n), overpaint (n), overeager (adj)

As the noun overlord means ‘a ruler, especially a feudal lord’, it refers to group 6. The word overpaint has the meaning ‘paint added as a covering layer’ and may be referred to group 5. The adjective overeager means ‘excessively eager’ and so it refers to group 1. Overlay (v, n), over-king (n), over-forty (n), overdevelop (v), overhang (v), overprint (v), overcoat (n), overambitious (adj), overseventeen (n), overhead (adv), overreacher (n), overtime (adv), overstitch (n), overman (n), overprotective (adj), overseer (n), overcast (v), overfly (v), overdose (n), overtwenty (n), overlap (v), overnighter (n), overleaf (adv), overdub (v), overboot (n), overcareful (adj), overside (adv), overlooker (n), overall (n), overdress (v), overground (adj), overlander (n).

**ПРАКТИЧНЕ ЗАНЯТТЯ 4**

Тема: **Структура слова. Морфемний аналіз.**

Мета: закріплення та актуалізація теоретичного матеріалу з теми

**Exercise 1**. *In accordance with the part that is cut off to form a new word classify cases of shortening into four groups: 1) initial shortenings (aphesis); 2) medial shortenings (syncope); 3) final shortenings (apocope); 4) both initial and final shortenings.*

Model: net < internet

The initial part of the original word is cut off. Consequently, the new word refers to the first group. hols < holidays; vac < vacuum cleaner; tec < detective; plane < aeroplane; Frisco < (San) Francisco; quiz < inquisitive; bus < omnibus; curio < curiosity; miss < mistress; sport < disport; soccer < Association Football; fan < fanatic; circs < circumstances; chute < parachute; Aline < Adeline; cert < certainty; tend < attend; mart < market; coke < coca-cola; Liz < Elizabeth; prep-school < preparatory-school; gator < alligator; cuss < customer.

**Exercise 2** *Determine the original components of the following blends. Define which type (additive or restrictive) the blends belong to.*

Model: to guesstimate, seadrome

The verb to guesstimate is formed by combining the words guess and estimate. The given blend may be transformed into a phrase consisting of complete stems combined by the conjunction and. Thus, to guesstimate belongs to the additive type of blends.

The noun seadrome is formed by combining the words sea and airdrome. The given blend may be transformed into a phrase, the first element of which Positron, brunch, absotively, motel, spam, flush, slanguage, twirl, bit, mingy, transceiver, paratroops, crocogator, oilitics, dipward, windoor, newtopia, glumpy, cablegram, smaze, flextime, Oxbridge.

**Exercise 3**. *Define which words have been combined to form the following computer terms. Give their meanings*.

Netiquette, emoticon, netizen, technophobe.

**Exercise 4.** *According to their pronunciation classify the given acronyms into two groups: 1) those that are read as ordinary English words; 2) those with the alphabetic reading.*

Model: NATFHE  – National Association of Teachers in Further and Higher Education (group 1);

MP  – Member of Parliament (group 2) NATO – North Atlantic Treaty Organization, UNO – United Nations Organization, WHO – The World Health Organization, BUPA – British United Provident Association, AGM – annual general meeting, WI – Women's Institute, UCAS – Universities and Colleges Admissions Service, IRA – Irish Republican Army, NASA – National Aeronautics and Space Administration, CID – Criminal Investigation Department, SALT – Strategic Arms Limitation Talks, UEFA – Union of European Football Associations, IQ – intelligence quotient, NAAFI – Navy, Army, and Air Force Institutes, MRBM – medium-range ballistic missile, FBI – Federal Bureau of Investigation, TEFL – teaching of English as a foreign language, UFO – unidentified flying object, UNRRA – United Nations Relief and Rehabilitation Administration, VIP – very important person, FIFA – Federal International Football Association, GI – government (or general) issue.

**Exercise 5** Group the words formed by sound-interchange into: 1) those formed by vowel-interchange or ablaut (& suffixation); 2) those formed by consonant-interchange; 3) those formed by combining both means, i.e. vowel- and consonant-interchange.

Model: relief (n) – relieve (v): consonant-interchange

Long (adj) – length (n), speak (v) – speech (n), wreathe (v) – wreath (n), bake (v) – batch (n), strike (v) – stroke (n), house (n) – house (v), breathe (v) – breath (n), believe (v) – belief (n), full (adj) – fill (v), lose (v) – loss (n), prove (v) – proof (n), knot (n) – knit (v), glaze (v) – glass (n), shelve (v) – shelf (n), wake (v) – watch (n), loathe (v) – loath (n), use (v) – use (n), sing (v) – song (n), clothe (v) – cloth (n), bite (v) – bit (n), halve (v) – half (n), abide (v) – abode (n),

**ПРАКТИЧНЕ ЗАНЯТТЯ 5**

Тема: **Продуктивні та непродуктивні морфеми.**

Мета: закріплення та актуалізація теоретичного матеріалу з теми

**Exercise 1**. *Combine the prefixes in the box with the appropriate derivational base from the list. Classify the prefixes according to the lexico-grammatical character of the base they are attached to and according to the part of speech they form.*

dis-, il-, non-, ir-, un-, im-, in-, de-, a- Legal, relevant, mature, regulate, moral, ability, payment, happy, responsible, patient, stabilize, honour, smoker, learn, formally, typical, logical, rational, possible, classify, agreement, verbal, lock, practical, dependently, mystify, resistible, sensual, literate, obedience, academic, tie, adequately, septic, clean.

**Exercise 2**. *Analyze different meanings of the prefix over- forming the given words. Classify these words according to the generalizing meaning of the prefix over- under the following headings: 1) ‘excess’; 2) ‘time (age)’; 3) ‘position or place’; 4) ‘addition’; 5) ‘outer, covering’; 6) ‘a person engaged in a certain activity or an agent of an action’.*

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**Exercise 3**. *The prefix pre- making up the italicized words has two different meanings. Write ‘X’ in the space provided if it means that one thing happens before another. Write ‘Y’ if it means that something has already been done.*

1. I hate the pre-Christmas panic that seems to hit my family in the middle of December. … 2. Eventually the pre-paid envelopes were sent from the mail order company. … 3. His preconceived ideas made it impossible for anyone to get him to listen to their side of the argument. 4. There were many pre-fourteenth century portraits in the exhibition. 5. The jury unanimously reached the decision that the killing was premeditated. 6. He married late and his wife predeceased him. 7. Bake the cake in a pre-heated oven for twenty minutes. 8. Ann had invited us round early for a pre-dinner drink. 9. Some football players develop a special routine to cope with pre-match nerves. 10. We had been given tickets to a preview of the film.

**Exercise 4**. *Form adjectives from the italicized words given in brackets by means of attaching appropriate suffixes to them. Analyze the valency of the adjective-forming affixes in terms of the bases they are attached to.*

Model: The time seemed to stretch out in a (dream...) manner

The adjective-forming suffix -like is attached to the nominal base dream- to form the adjective dreamlike. 1. She smiled a slightly (ironic...) smile. 2. He felt very (protect...) towards her and loved her dearly. 3. The newspapers printed a shocking and (shame...) story. 4. She slept on a (collapse...) bed with rough, (prickle...) sheets. 5. He filled the frequent silences with (comic...) anecdotes. 6. There were two letters from Michael, warm, (humor...), and full of information. 7. Mr and Mrs Bixby lived in a (small,..) apartment. 8. His voice was cold and (dead...). 9. I have extra French lessons with a (retire...) schoolmaster. 10. Judy was very (compliment...) about my work. 11. There is the danger of an (accident...) explosion that could be caused by a gas leak. 12. I understood that it was (permit...) to ask a question. 13. She thought how (fool...) he‟d been and was not angry any more. 14. It‟s time you chose between the two (alternate...) lifestyles.

**Exercise 5**. *Add appropriate suffixes to the verbal bases to form words corresponding to the meaning of the given sentences. Analyze the valency of the verbal bases in terms of the suffixes they can be combined with.*

Model: There was an ... story in the paper this morning. (amuse)

The verbal base amuse- is combined with the adjective-forming suffix -ing to form the adjective amusing.

1. He made himself ... by handing round the coffee cups. (use) 2. He felt strongly that schools did not provide the kind of ... needed for the development of good leadership qualities which should be instilled from early childhood. (encourage) 3. The photos made him look quite ... . (attract) 4. He explained that he would like to become ... in industry (manage) 5. Mr Smith told me a lot about ... of printing in the 15th century. (invent) 6. Deaths caused by reckless driving are ... . (avoid) 7. Her ... on staying in the best hotel was very ... and ... . (insist, tire, annoy) 8. She is suing the company for unfair ... . (dismiss) 9. My little daughter has an ... friend. (imagine) 10. I did not want to encounter other ... to the post. (appoint)

**ПРАКТИЧНЕ ЗАНЯТТЯ 6**

Тема: **Конверсія. Словоскладання. Складні слова.**

**Exercise 1**. *Define the part of speech of the italicized words. State what parts of speech they are derived from and what word-formation means is applied here. Translate the sentences into Ukrainian.*

Model: Still water of the lake mirrors the trees.

The word mirror is a verb which is derived from the noun mirror by means of conversion. 1. That fellow really whatevers me. 2. She made a two-part documentary about the war in Kosovo. 3. Local politicians were found to pocket the money of fund-raisers. 4. This video is a must for everyone. 5 The story was in all the dailies. 6. Will you holiday in Switzerland? 7. He busied himself with plans for the future. 8. There is a great deal of difference between before and after. 9. I asked him to modem this information tomorrow. 10. It was a good buy. 11.1 don‟t like a chemistry practical. 12. His skin was weathered almost black by his long outdoor life. 13. The path is steep and dangerous in the wet. 14. I won‟t join your plan. There are too many ifs and buts in it. 15. The army‟s actions dirtied its reputation.

**Exercise 2**. *Apply the criterion of derivational relations to define the derived member in the given conversion pairs.*

Model: float (n, v): floatable, floater, floatation, floating

As the derived words of the first degree of derivation have affixes added to the verbal base, the noun float is the derived member. Nouns derived from verbs: … Verbs derived from nouns: … Call (n, v), time (n, v), break (n, v), age (n, v), effect (n, v), recover (n, v), harm (n, v), mix (n, v), sleep (n, v), wash (n, v).

**Exercise 3**. *State the difference in meaning of the given compounds possessing different distributional patterns. Find examples of your own.*

Model: finger-ring – ring-finger

The compound word finger-ring denotes ‘a ring which is worn on a finger’, whereas the compound word ring-finger means ‘the finger next to the little finger, especially of the left hand, on which the wedding ring is worn’. The different order and arrangement of the same ICs (i.e. different distributional patterns) signal the difference in meaning. Boathouse – houseboat; play-boy – boy-play; pot-flower – flower-pot; life-boat – boat-life; board-school – school-board; dog-house – house-dog; pot-pie – pie-pot; boy-toy – toy-boy, plant-house – house-plant.

**Exercise 4**. *Distribute the given compound words according to their derivational patterns into three groups: 1) compounds of the n + n → N pattern; 2) compounds of the a + a → A pattern; 3) compounds of the n + ving → N pattern. Define the generalized meaning of these patterns.*

Model: greenhouse, sweetmeat, lazybones, low-class, darkroom

The derivational pattern a + n → N expresses the generalized meaning: 1) of purpose: greenhouse, darkroom; 2) of certain qualities of an object: sweetmeat, lazybones, low-class. Dog-fighting, garden-party, white-hot, summer-house, south-east, peace-loving, raincoat, breath-taking, light-green, sea-front, picture-going, suitcase, blue-black, day-train, summer-flowering, dark-purple, textbook, tea-teaching, season-ticket, awe-inspiring, red-hot, bath-robe.

**Exercise 5**. *Choose one of the compound words from the box to fill in the gaps in the sentences given below. Give lexical meanings of these compound words.*

to keyboard, a shareholder, a breakdown, awestruck, to blackball, a plantswoman, an argy-bargy, lowbrow, pea-souper, a bodyguard, a go-getter, a scatterbrain 1. Today‟s ... forced drivers to slow down that caused an enormous traffic congestion. 2. All the data then has to be ... . 3. You are getting on my nerves. I won‟t discuss this matter with such a... as you are. 4. She moved to London after the ... of her marriage. 5. Fred has been working as a ... for the last few years. 6. He has to leave the club as all its members... him. 7. Her aunt is a ... of a big prosperous company. 8.I can‟t stand many ... programmes showed on TV every day. 9. She has a reputation as a real... . 10. We sat in ... silence hearing the truth at last. 11. We didn‟t know how to plant these bushes and asked a ... to consult us. 12. We became unintentional witnesses of a bit ... between actors and their director.

**Exercise 6**. *Group the given compound words according to the relations between the ICs into: 1) coordinative compounds; b) subordinative compounds. Within the coordinative type of compound words single out: a) reduplicative compounds; b) phonically variated rhythmic twin forms; c) additive compounds.*

Model: tip-top, snow-white

The compound tip-top meaning ‘of the very best class or quality; excellent’ is a coordinative compound formed by joining the phonically variated rhythmic twin forms (group b). The compound word snow-white meaning ‘very white’ is a subordinative compound. Wolf-dog, duty-free, blah-blah1, secretary-stenographer, ticky-tacky2, road-building, chi-chi3, wrist-watch, dark-brown, ping-pong, ha-ha4, a baby-sitter, Anglo-Saxon, riff-raff5, knowledge-hungry (eyes), willy-willy6, fighter-bomber, week-long, rugger-bugger7, fact-filled (report), easy-peasy8, boy-friend, war-weary (people), hush-hush9, iron-poor (blood), hob-nob10, home-sick, oak-tree, hand-made, willy-nilly11, world-famous. 1 blah-blah – „used to refer to something which is boring or without meaningful content‟ 2 ticky-tacky – „(especially of a building or housing development) made of inferior material cheap or in poor taste‟ 3 chi-chi – „attempting stylish elegance but achieving only an over-elaborate affectedness‟ 4 ha-ha – „a ditch with a wall on its inner side below ground level, forming a boundary to park or garden without interrupting the view‟ 5 riff-raff – „disreputable or undesirable people‟ 6 willy-willy – „a whirlwind or dust storm‟ 7 rugger-bugger –„a boorish, aggressively masculine young man who is devoted to sport‟ 8 easy-peasy – (inf) „very straightforward and easy (used by or as if by children)‟ 9 hush-hush – „(especially of an official plan or project) highly secret or confidential‟ 10 hob-nob – „to mix socially, especially with those of perceived higher social status‟ 11 willy-nilly – „whether one likes it or not‟

**ПРАКТИЧНЕ ЗАНЯТТЯ 7**

Тема: **Лексична та граматична валентність. Структура та класифікація словосполучень**

**Exercise** 1. *Fill in the blanks in the sentences with the correct form of the italicized words. Pay special attention to the restrictions of their collocability. Give meanings of the italicized words.*

a) to mend, to repair 1. These socks need to be .... 2. It is difficult to find anyone who knows how ... a clock. 3. The convicts were employed in ... the highway. 4. He had been ... a tiny hole in the lining of his leather coat. 5. Please have this typewriter ... . 6. The gate needs to be ... so it closes properly. 7. I know how ... my car myself but I can't do without necessary tools. 8. Let me ... your shirt. 9. In those days, all the farming equipment was made and ... in the village. 10. I got into conversation with the man who came ... the roof.

b) mistake, error 1. I was trying to dial my mother‟s number but I ended up phoning my friend by .... 2. Goods dispatched to your branch were in ... . 3. The crash was caused by human ... . 4. She made the ... of thinking they were important. 5. It's time you pointed out to him the ... of his ways. 6. Children learn from their ... . 7. Mrs Smith‟s huge phone bill was the result of a computer ... . 8. The accident was caused by a(n) ... of judgment on the part of the pilot. 9. He is an odd character and no ... . 10. If we don't finish the job today they won't pay us; make no ... about it. 11. I taught myself how to cook through trial and ... .

**Exercise** **2**. *State meanings of the given polysemantic adjectives on the basis of their lexical valency, i.e. with the help of nouns they are combined with.*

M o d e l: smart: 1) shirt, car, garden, officer; 2) person, child, carpenter 3) blow, rise/fall, attack; 4) restaurant, set (society)

According to its lexical valency the adjective smart has the following meanings: 1) neat and stylish in appearance; 2) good or quick in thinking, clever; 3) quick and forceful; 4) being or used by very fashionable people. full: 1) bottle, glass, train, drawer, mouth; 2) truth, name, address year, height; 3) speed, marks, force, gallop; dry: 1) shirt, soil, paint; 2) climate, month, heat, summer; 3) sherry, wine; 4) book, subject, lecture, text; 5) joke, answer, humour, thanks, manners; broad: 1) shoulders, river, chest, staircase, smile; 2) lands, plains, fields; 3) opinions, view, taste, ideas; 4) outline of a plan (framework), sense; 5) hint, statement, purpose, distinction; 6) joke, laugh, story, humour; ugly: 1) face, man, houses, furniture, building, picture, surroundings; 2) scene, wound, confrontation, clouds; 3) ideas, feelings, rumours, moment; wide: 1) road, gate, river, gap, avenue, foot; 2) interests, experience, support, variety, selection, choice.

**Exercise** **3.** *Analyze the lexical valency of the polysemantic words to run and to charge. Translate the sentences into Ukrainian.*

to run 1. The horse runs. 2. The film runs for two hours. 3. The water runs 4. The tap runs. 5. His nose runs. 6. The motor runs. 7. The wine ran over the floor. 8. The whole argument runs on this point. 9. She ran the water into the bath-tub. 10. He ran his business well. 11. The ice-cream is beginning to run. to charge 1. He charged the man ten cents for the pencil. 2. He charged the battery. 3. He charged them to do their duty. 4. He charged these goods to the man‟s account. 5. The soldiers charged the enemy. 6. I don‟t want to charge my memory with trifles. 7. The judge charged him with the crime.

**Exercise 4.** *State which of the italicized units are phraseologisms and which are free word-combinations. Give proof of your answer.*

1. He asked to warm a glass of juice but they left it rather cold on the table. 2. Instrumental music, oddly enough, left me rather cold. 3. Where do you think you lost your purse. 4.I couldn‟t stand that noise any longer. I lost my temper. 5. Have a look at the reverse side of the coat. 6. The reverse side of the medal is that we'll have to do it ourselves. 7. Keep the butter in the refrigerator. 8. Keep the eye on the child. 9. He threw some cold water on his face to wake up. 10. I didn‟t expect that he would throw cold water upon our project. 11. The tourists left the beaten track and saw a lot of interesting places. 12. The author leaves the beaten track and offers a new treatment of the subject.

**Exercise** **5**. *Replace the italicized words by the corresponding phraseological units from the box*.

|  |
| --- |
| the stronger sex, to get smb‟s drift, as cool as a cucumber, blood and thunder, in two ticks, as green as grass, by leaps and bounds, to get out of hand, the apple of discord, all at sea, to join hands, to hold one's horses, hot under the collar, the upper crust, out of a blue sky |

1. She was naive when she was sixteen but other girls in the typing pool taught her the ways of the world. 2. The girls had got on well together until the rivalry in the person of a handsome young apprentice appeared in their midst. 3. I understand you now, I think. If you mean by „integrity‟ what I would call „consistency‟ then we‟ve been arguing at cross-purposes. 4. We must unite with our friends in Europe. 5. She dropped upon me unexpectedly and began asking questions which I had to answer. 6. I thought there would have been protestations and tears when I told her I wanted to move out of the flat, but no, she stayed calm. 7. When his son was in Paris, the boy ill-behaved and caused many difficulties. 8. He got very angry when I suggested that he might be mistaken. 9. After listening a few minutes to their conversation, I was bewildered. Botany is not my subject. 10. There were at least six murders in that violent story. 11. Joan belongs lo the aristocracy; you can tell by the way she walks and talks. 12. Publishers are well aware that rumours of possible prosecution of a book are likely to send the scales up rapidly. 13. All the people involved in the Commonwealth Architects‟ competition were told to wait – because time would be needed to organize an exhibition in which the entries could be put on show. 14. You should not exaggerate her attraction for men. 15. I don't like to hear people sneering at positions and titles they‟d have accepted immediately if they‟d got the offer.

**ПРАКТИЧНЕ ЗАНЯТТЯ 8**

Тема: **Вільні сполучення та фразеологічні сполучення.**

**Exercise** **1**. *Choose the correct phraseological unit from the box to fill in the gaps in the sentences below.*

|  |
| --- |
| dark horse, to work like a dog, sour grapes, to lord it over, Achilles heel, to put one's cards on the table, red tape, to see somebody in the flesh, fat cats, around the clock |

1. Workers are losing their jobs while the ... who run the company are getting richer. 2. Stuart‟s getting married? He's a ... – I never even knew he had a girlfriend. 3. He was a gifted businessman, but greed was his ... . 4. If I criticize her book, people will think it's just... . 5. There's so much ... involved in getting a visa. 6. Doctors and nurses worked ... to help the people injured in the train crash. 7. She thought it was time ... and tell him that she had no intention of marrying him. 8. He likes ... the more junior staff in the office. 9. I knew his face so well from the photographs that it felt a bit strange when I finally ... . 10. He ... all day to finish the wallpapering.

**Exercise** **2**. *True or false? Say whether the phraseological units in the following sentences are used correctly (true) or incorrectly (false).*

I. He goes there often – at least once in a blue moon. 2. He didn‟t have much power; he has only a figurehead 3- It's not new; it's second-rate. 4. My grandmother has been married for fifty years and she‟s still a very happy оld maid. 5. I don't understand it; it's all Greeek to me. 6. You would probably feel very proud if someone gave you the sack. 7. He was so hungry that he ate his heart out: 8. We ate potatoes in their jackets last night. 9. He loved animals and spent a lot of his free time in the doghouse. 10. This book is dog-eared. I can't possibly sell it.

**Exercise** **3**. *Complete the following proverbs choosing from those marked a-р. Then try to explain what each proverb means.*

|  |  |
| --- | --- |
| 1. Honesty… | a) … less speed. |
| 2. Better late... | b) ... gathers no moss. |
| 3. Still waters... | c) ... twice shy. |
| 4. Actions... | d) ... lie. |
| 5. More haste... | e) … while the sun shines. |
| 6. A fool and his money... | f) … is the best policy. |
| 7. All's well... | g) … was not built in a day. |
| 8. A rolling stone... | h) … than never. |
| 9. A stitch in time... | i) … leap. |
| 10. Don't count your chickens... | j) … are soon parted. |
| 11. Strike... | k) … run deep. |
| 12. Let sleeping dogs... | l) … that ends well. |
| 13. Look before you... | m) … while the iron is hot. |
| 14. Once bitten... | n) … before they are |
| 15. Make hay... | o) … saves nine. |
| 16. Rome... | p) speak louder than words |

**Exercise** **4**. *Match up the definitions on the left (a-g) with the correct phraseological unit on the right (1-7).*

|  |  |
| --- | --- |
| a) to be impudent enough to | 1. to have two faces |
| b) to become opposed to | 2. to face the music |
| c) to grimace | 3. to face someone with |
| d) to appear courageous | 4. to set one‟s face against |
| e) to make one‟s appearance | 5. to make a face or faces |
| f) to accuse someone with | 6. to show one‟s face |
| g) to be hypocritical | 7. to have the face to |

**Exercise** **5**. *Analyze the origin of the following phraseological units and explain their meaning.*

Cross the Rubicon, Solomon‟s judgement, shed crocodile tears, the sword of Damocles, a doubting Tom, the hub of the universe, in the seventh heaven, Achilles‟ heel, Procrustean bed, an apple of discord, the horn of plenty, a baker‟s dozen, a Peeping Tom, Hobson‟s choice

**ПРАКТИЧНЕ ЗАНЯТТЯ 9**

Тема: **Типи семантичних відносин між словами. Еквівалентність. Гіпонімічність.**

**Exercise 1**. *Compare the meanings of the given words. Define what semantic features are shared by all the members of the group and what semantic properties distinguish them from each other.* 1)

|  |  |
| --- | --- |
| *wage* | a fixed regular payment, typically paid on a daily or weekly basis, made by an employer to an employee, especially to a manual or unskilled worker |
| *salary* | a fixed regular payment, typically paid on a monthly basis but often expressed as an annual sum, made by an employer to an employee, especially a professional or white-collar worker |
| *pay* | the money paid to someone for regular work |
| *fee* | a payment made to a professional person (e.g. to a lawyer, writer) or to a professional or public body in exchange for advice or services |
| *income* | money received, especially on a regular basis, for work or through investments |

2)

|  |  |
| --- | --- |
| *reputation* | the general opinion that people have about a person, organization based on what they have heard, read, seen, or experienced |
| *image* | the idea or opinion that people have about a person, organization, especially when this has been deliberately made or planned |
| *name* | the reputation a person or an organization has because of something they do or because of the quality of what they produce, usually when this is good |
| *prestige* | the respect and good reputation a person, organization has because they have a high position in society, are admired by people |
| *stature* | a reputation for being very good at something very important or influential that makes people respect you |

1. common feature: differentiating features: 2) common feature: differentiating features:

**Exercise** **2**. *Organize the given words in accordance with their hyponymic relations. Enumerate the general terms (hyperonyms).*

1) train, light lorry, bicycle, vehicle, cabriolet, car, heavy lorry, estate car, motorcycle, bus, lorry, three-door hatchback, three-way dump truck; 2) turtle, mammal, squirrel, animal, reptile, seal, tiger, lizard, leopard, fox, wolf, iguana, bear, snake, feline, panther.

**Exercise** **3**. *Group the sentences into pairs so that in one sentence there should be a hyperonym (the more general term) and in the other – the hyponym (the more concrete term).*

Model: The man was murdered. – The man was poisoned.

1. He gave her a ring with five emeralds as a birthday present. 2. The man was poisoned. 3. She looked at him. 4. He heard a nightingale singing. 5. He is an officer. 6. It‟s an old car. 7. She was wearing a black dress. 8. They built a boat. 9. The man was murdered. 10. She stared at him. 11. He is a colonel. 12. It‟s an old vehicle. 13. He gave her a ring with five precious stones as a birthday present. 14. They bought flowers in the shop. 15. She was wearing a dark dress. 16. She has got a child. 17. They built a yacht. 18. They bought lilacs in the shop. 19. She has got a daughter. 20. He heard a bird singing.

**Exercise** **4**. Give meanings of the following synonyms. State the difference in the connotational aspect of their meaning.

Model: love – worship Love – an intense feeling of deep affection

Worship – the feeling of profound reverence and strong adoration

Emotive charge and expressiveness (intensity) are different. Confidence – assurance; to satisfy – to delight; alone – lonely; to create – to manufacture; to blush – to redden; to tremble – lo shudder.

**Exercise** **5**. State the difference in the pragmatic aspect of meaning of the given synonyms. Consult a dictionary.

Model: to see – to behold

The verb to behold is formal, whereas the verb to see is neutral. Car – automobile; refreshment – bite; soldier – warrior; to begin – to commence; face – puss; to leave – to abandon; hearty – cordial, hand – fin; to cry – to weep.

**Exercise 6**. Look up in a dictionary meanings of the given pairs of synonyms. Classify synonyms into stylistic, ideographic and ideographic-stylistic.

Model: mum – mother

The words have the same denotational meaning ‘a female parent’, but they differ in the pragmatic aspect of meaning as the word mum is informal. Thus, this pair of synonyms belongs to the group of stylistic synonyms. Information – data; associate – pal; infectious – contagious; to ask – to interrogate; to meet – to encounter; to reckon – to estimate; mum – mother, faculty – talent; to foretell – to predict; to walk – to promenade; blemish – flaw; heaven – sky; intelligent – smart; affair – business.

**ПРАКТИЧНЕ ЗАНЯТТЯ 10**

Тема: **Зміна значення слова. Полісемія.**

**Exercise 1**. *Analyze the meanings of the given words. State what common associations, given by the graphic/sound-clusters sp- , -ash and gl- unite these words.*

Sprinkle (to shake small amounts of a liquid over the surface of something), spray (to send liquid through the air in tiny drops either by the wind or some instrument), splash (to wet or soil by dashing masses or particles of water), spit (send liquid out from the mouth), spatter (to scatter drops of a liquid on a surface), spilt (to accidentally pour a liquid out of its container), spurt (if a liquid spurts from smth., it comes out in a sudden strong flow). Smash (break violently into small pieces), dash (move or be moved violently), crash (strike suddenly violently and noisily), bash (to hit hard and violently), gash (a long deep cut or wound), slash (to move in a violent way that causes a lot of damage), trash (to criticize in a very strong way). Glamour (a special quality that makes a person, place, or situation seem very exciting, attractive, or fashionable), gleam (a bright light reflected from something), glisten (to shine and look wet or oily), glossy (shiny in an attractive way), glint (to shine with quick flashes of light), glow (to shine with a soft light), glimmer (a soft weak light that is not steady).

**Exercise** **2**. *Analyze the meanings of the italicized words. Group the words according to their type of motivation: a) words morphologically motivated; b) words semantically motivated.*

Driver – someone who drives a vehicle, especially as his/her job; careless – not taking enough care; leg – the part of a piece of furniture such as a table or chair that supports it and raises it off the floor; horse – a piece of equipment shaped like a large box that is used in gymnastics; singlehood – the state of being single rather than married; wall – emotions or behaviour that prevent people from feeling close to each other; hand-made – made by hand, not machine; piggish – selfish; blue-eyed – having blue eyes; sound bite – a short comment by a politician or another famous person that is taken from a longer conversation or speech and broadcast alone because it is especially interesting or effective; leaflet – a small, often folded piece of printed paper, often advertising something, usually given free to people; streamlet – a small stream (a natural flow of water).

**Exercise** **3*.*** *Define the kind of association involved in the semantic change*.

Model: glass (a transparent solid substance used for making windows, bottles, etc.) – a glass (a container used for drinking, made of glass)

The kind of association involved in the semantic change in the words glass – a glass is known as metonymy or the contiguity of meaning. 1) the foot of a person – the foot of a mountain; 2) jean (heavy twilled cotton cloth, esp. denim) – jeans (trousers made of denim); 3) Matisse (proper name) – a Mattisse (a painting); 4) the wing of a bird – the wing of a building; 5) the key to a door – the key to a mystery; 6) copper (metal) – copper (coin); 7) the heart of a man – the heart of a city; 8) crown (a circular ornamental headdress worn by a monarch) – crown (monarchy); 9) a whip (a lash used to urge horses on) – a whip (an official in the British Parliament to see that members are present at debates); 10) China (a country) – china (dishes made of porcelain).

**Exercise 4.** *Analyze the meanings of the italicized words. Identify the result of changes of the denotational aspect of lexical meaning in the given words.*

Model: loan: ‘a gift from a superior; a thing borrowed’ – ‘a sum of money which is borrowed, often from a bank, and has to be paid back, usually together with an additional amount of money that you have to pay as a charge for borrowing’

The result of the change of the denotational aspect of lexical meaning of the word loan is that the word became more specialized in meaning (restriction of meaning, specialization).

1) camp: „a place where troops are lodged in tents‟ – „a place where people live in tents or hunts‟; 2) girl: „a small child of either sex‟ – „a small child of the female sex‟; 3) bird: „a young bird‟ – „a creature with wings and feathers which can usually fly in the air‟; 4) arrive: „reach the shore after a voyage‟ – „reach a place at the end of a journey or a stage in a journey‟; 5) deer: „any quadruped (четверонога тварина)‟ – „a hoofed grazing or browsing animal, with branched bony antlers that are shed annually and typically borne only by the male‟; 6) rug: „rough woolen stuff‟ – „a small carpet‟; 7) barn: „a place for keeping barley‟ – „a large farm building used for storing grain, hay, or straw or for housing livestock‟; 8) glide: „to move gently and smoothly‟ – „fly with no engine‟; 9) room: „space‟ – „a part or division of a building enclosed by walls, floor, and ceiling‟; 10) fly: „move with wings‟ – „to move through the air or in the outer space‟; 11) artist: „master of the liberal arts (гуманітарні науки)‟ – „a person who produces paintings or drawings as a profession or hobby‟; 12) champion: „a fighting man‟ – „a person who has defeated or surpassed all rivals in a competition, especially a sporting contest‟; 13) campaign: „army‟s operations in the field‟ – „a connected set of actions intended to obtain a particular result, in military operations, in politics and business‟.

**Exercise 5**. *Analyze the meanings of the italicized words. Identify the result of the changes of the connotational aspect of lexical meaning in the given words.*

Model: villain: ‘a feudal serf, peasant cultivator in subjection to a lord’ –‘a person guilty or capable of a crime or wickedness’

The result of the change of the connotational aspect of lexical meaning of the word villain is that the word acquired a derogatory emotive charge (deterioration of meaning). 1) cunning: „possessing erudition or skill‟ – „clever in deceiving‟; 2) knight: „manservant‟ – „noble courageous man‟; 3) fond: „foolish, infatuated‟ – „loving, affectionate‟; 4) gang: „a group of people going together‟ – „an organized group of criminals‟; 5) marshal: „manservant attending horses‟ – „an officer of the highest rank in the armed forces‟; 6) coarse: „ordinary, common‟ – „rude or vulgar‟; 7) minister: „a servant‟ – „a head of a government department‟; 8) enthusiasm: „a prophetic or poetic frenzy‟ – „intense and eager enjoyment, interest, or approval‟; 9) violent: „having a marked or powerful effect‟ – „using or involving physical force intended to hurt, damage, or kill someone or something‟; 10) gossip: „a godparent, a person related to one in God‟ – „the one who talks scandal; tells slanderous stories about other people‟.

**ПРАКТИЧНЕ ЗАНЯТТЯ №11**

**I. Організаційна частина.**

1. Повідомлення теми, мети заняття.

**Дидактична мета:**

* оволодіння лексичним мінімумом з теми;
* оволодіння граматичними навичками;
* формування умінь здійснювати різні види читання текстів;

**Виховна мета:**

* формування комунікативних навичок;
* формування позитивної мотивації до вивчення англійської мови;
* розвиток навичок логічного мислення;
* розвиток аналітичних навичок.

2. Актуалізація опорних знань і контроль вихідного рівня знань студентів.

3. Мотивація навчальної діяльності.

**II. Зміст основної частини заняття (перелік практичних завдань):**

1. Вивчення нового матеріалу.

**Theory and practice of translation. Scientific literature. Scientific text features.**

**1**. Прочитайте текст. Подумайте, яку назву можна йому дати.

When Charles Babbage, a professor of Mathematics at Cambridge University, invented the first calculating machine in 1812 he couldn’t imagine the situation we find ourselves in today. Nearly everything we do in the world is helped, or even controlled by computers, the complicated descendants of his simple machine. Computers are used more and more often in the world today, for the simple reason that they are far more efficient than human beings. They have much better memories and they can store much information. No man alive can do 500000 sums in one second, but a computer can. In fact, computers can do many of the things we do, but faster and better. They can predict weather, and even play chess, write poetry or compose music.

**complicated –** складний

**descendant –** нащадок

**efficient –** ефективний

**to predict** – предсказувати

**2**. Головна думка тексту:

1. Computer doesn’t control everything today.

2. Computers are more efficient than human beings.

3. Everyone can easily buy a computer.

4. Calculating machine isn’t so popular now.

5. One can do a lot of things by means of computer.

**3.** Дайте відповідь на запитання:

1. Who invented the first calculating machine?
2. When did Charles Babbage invent the first calculating machine?
3. Why are computers far more efficient than human beings?
4. What can you do by means of computer?
5. What cannot man do?
6. What spheres do we use computer most frequently?

**4.** Перекладіть слова та словосполучення:

Уявити ситуацію, обчислювальна машина, контролюється комп’ютерами, зберігати інформацію, проста причина, швидше та краще, писати музику.

**5.** Заповніть пропуски, використовуючи наведені слова:

*Professor, predicted,* *descendant*, *efficient, imagine, complicated.*

Our teacher of computer science is a \_\_\_\_ of Cambridge University.

I cannot even \_\_\_ that some day everything will be controlled by computers.

Sometimes computers are much more \_\_\_ than human beings.

This mechanism is too \_\_\_\_ for our workers.

Some wise man \_\_\_\_ that the Earth will be destroyed because of machines, but I don’t believe such things.

This noble man was a \_\_\_\_ of a famous family.

**6**. Закінчіть речення:

By means of computer people can…

Nowadays we cannot live without computer because …

We need to learn computer science because …

**7.** Перекладіть речення англійською:

Комп’ютер розширив сфери свого впливу у щоденному житті.

Комп’ютери можуть ефективно замінити людей на важкому виробництві.

Не зважаючи на те, що комп’ютерні технології були розроблені порівняно нещодавно, комп’ютери здатні виконувати складні операції.

8. Прочитайте текст та знайдіть в ньому відповіді на запитання після тексту.

**Computers**

We might list the essential constituent parts of a digital general – purpose computer as follows. **First,** core store (sometimes called memory) for holding numbers, both those forming the data of the problem and those generated in the course of the calculation. It is also used for storing program instructions. **Second,** an arithmetic unit, a device for performing calculations on those numbers. **Third,** a control unit, a device for causing the machine to perform the desired operations in the correct sequence. **Fourth,** input devices whereby numbers and operating instructions can be supplied to the machine. And **fifth,** output devices for displaying the results of a calculation. The input and output devices are called peripherals.

The usual method for inputting data for processing into a computer is via an input peripheral such as a punched card reader or punched paper tape recorder or from magnetic tape. The computer is programmed to accept data in any or all of these media. The computer operator, in order to start the input process, will type a ‘g’ message on the console typewriter. For real time processing the operator will use an interrogating typewriter. This asks a question of the computer about the state of specific files of data already on line to the computer. The data may be stored, or it may be sorted according to a plan desired by the programmed. It may be merged with existing information already in the store. Or, if we want immediate ‘answers’ or output it could be by printer, that is an output device for spelling out computer results as numbers, symbols or words. These vary from high – speed printers to electric typewriters.

**typewriter –** друкарська машинка

**immediate –** негайний

**to store**– зберігати

**device** – засіб, прилад

**9.** Перекладіть слова та словосполучення:

essential constituent parts, calculation, magnetic tape, inputting data, existing information, program instructions, displaying the results, high – speed printers.

**10.** Заповніть пропуски, використовуючи наведені слова:

*Store, typewriter, stored, calculations, constituent parts,*

1. I know five essential \_\_\_ of a digital general – purpose computer.
2. My friend has a pretty electric \_\_\_.
3. The data may be \_\_\_ according to a plan desired by the programmed.
4. I suppose, that a device for performing \_\_\_on those numbers is an arithmetic unit.
5. The data may be merged with existing information already in the\_\_\_.

11. Закінчіть речення:

1. You may use an interrogating typewriter …

2. The usual method for inputting data for processing into a computer is …

3. Printer is …

**12.** Перекладіть речення англійською:

На нашу думку, проблеми виникають саме з цим приладом.

Їх компанія придбала деякі периферійні прилади.

Інструкції до програм зберігаються у прикореневому каталозі.

Найважливіша інформація фірма зберігається у головному комп’ютері.

Цей комп’ютер використовується суто для арифметичних обчислювань.

**ІІІ. Підбиття підсумків заняття.**

1. Узагальнення та систематизація вивченого.
2. *Prepare a short presentation about yourself* Оголошення оцінок за роботу на занятті та їх обґрунтування.
3. Оголошення завдання для самостійної роботи.

**ПРАКТИЧНЕ ЗАНЯТТЯ №12**

**I. Організаційна частина.**

1. Повідомлення теми, мети заняття.

**Дидактична мета:**

* оволодіння лексичним мінімумом з теми «Граматичні проблеми науково-технічного перекладу»;
* оволодіння граматичними навичками вживання часових форм дієслів їхній адекватний переклад українською мовою;
* формування умінь здійснювати різні види читання текстів;

**Виховна мета:**

* формування звичок організації професійної діяльності;
* формування позитивної мотивації до вивчення англійської мови;
* розвиток навичок логічного мислення;
* розвиток аналітичних навичок.

2. Актуалізація опорних знань і контроль вихідного рівня знань студентів.

*What are grammar difficulties of tranlsation?*

3. Мотивація навчальної діяльності.

*Why is grammatical adequtcy important?*

**II. Зміст основної частини заняття (перелік практичних завдань):**

**1.** Прочитайте текст.

**The use of computers**

Just as television has extended human sight across the barriers of time and distance, so the computers extend the power of the human mind across the existing barriers.

Computers in medicine

Computers are one of great importance in modern hospital. The chief use of computers is the storing and sorting the medical knowledge, which has been accumulated in the last 50 years. No doctor can possible keep up with all discoveries. The only solution of the problem is store medical knowledge in a computer. Today there are medical computers centers were all existing knowledge of symptoms of various diseases and of their treatment are stored. Doctors feed data on symptoms in the computer and get the necessary information on correct diagnostics and treatment.

Computers that can be learnt

Ordinary computer can remember only the data stored in the hard disk. Now scientists have designed machines, that are capable of learning from experience and remembering what they have learned. Such a machine is capable of recognizing objects without human help or control. Of course, they made many mistakes.

There is another similar machine that can look at letter alphabet and simple words and it “says” through a louder speaker what it has seen. The machine has as certain learning power.

Computers at the school

Information science with the ideas and message of processing and storing information is of great importance today. That’s why computer technology must be taught in secondary school. Contact with the machine increases the interest in learning, makes them more serious about studying new subject. School computers are used not only for studying information science, but also examination purposes. Young people who finish the school must be trained to operate computers.

**solution** – рішення

**to** **store** – зберігати

**diseases** –захворювання

**hard** **disk** – жосткий диск

**capable** – здібний

**processing** – обробка

**treatment** – лікування

**purpose** – мета

**2**. Дайте відповідь на запитання:

Why are computers of great importance in modern hospital?

What can be stored in medical computers?

How computer can be learnt?

Why should we learn computers at school?

What are school computers used for?

**3**. Перекладіть слова та словосполучення:

Подібна машина, людський погляд, бар’єри часу і простору, вирішення проблеми, накопичувати, подавати дані, необхідна інформація, правильна діагностика, колонки, новий предмет.

**4.** Заповніть пропуски, використовуючи наведені слова:

*Science, experience, extend,*  *store, operate*, *chief, hard disk,*

The \_\_\_\_\_ use of computers in medicine is the storing and sorting the medical knowledge.

Medical computers \_\_\_\_ all existing knowledge of symptoms of various diseases and of their treatment.

Ordinary computer can remember only the data stored in the \_\_\_\_.

But some computers are capable of learning from \_\_\_\_ and remembering what they have learned.

Information \_\_\_\_ is of great importance today.

Young people who finish the school must be trained to \_\_\_\_ computers.

Computers \_\_\_\_ the power of the human mind across the existing barriers

**5.** Закінчіть речення:

The main function of computers in medicine is …

Computer technology must be taught in secondary school, because …

Children’s contact with the machine increases …

The computers that can be learnt are …

**6.** Перекладіть речення англійською:

Фірма придбала комп’ютер, що може навчатись. Усі співробітники у захваті.

Інформація звичайно зберігається на жорстких дисках.

Значення комп’ютера в медицині не піддається сумніву.

Комп’ютер допомагає лікарям поставити правильний діагноз та призначити лікування.

У школі моя сестра почала вивчати “обчислюванні машини”. Вона ні про що інше розмовляти не хоче.

**7.** Прочитайте текст. Подумайте, яку назву можна йому дати.

As we hurtle toward the 21st century, digital technology’s dizzying capacity to shuffle, combine, alter and duplicate images and words raises evermore daunting questions for the arts. “We can scarcely calculate,” critic George Steiner has remarked, “the mutations in our experience of texts, music and art in the new worlds of the CD-ROM, of virtual reality, of cyberspace and the Internet.”

# Will the computer make everybody a creator? Will it undermine the very idea of the individual creator whose work has form, permanence and its own essence? For now, things are shifting too fast to say. True to its theme, our century, which began by changing the old constancies, ends by making change the only constant.

**hurtle –** нестись

**capacity -**  можливість

**shuffle -**  переміщувати

**alter -**  змінюватись

**duplicate -**  дублювати

**daunt -** лякати

**scarcely -**  ледве

**undermine -** підривати

**8**. Утворіть іменники від поданих слів за допомогою суфіксів: -ence, -ance, -or, -tion, -cy,

Constant**,** creat, classificate, calculate, mutate, exist, important, transform,

**9.** Головна думка тексту:

1. Computer art is fashionable and valuable.
2. Computer makes everybody a creator.
3. Art is valuable constant that is being changing with the help of computer.
4. Art is an unchangeable constant and individual creator’s work is the highest value.

**10.** Дайте відповідь на запитання:

1. What is the main idea of the text?
2. Why does computer rais evermore daunting questions for the arts?
3. What are the mutations in our experience of texts, music and art in the Internet?
4. What is a creator?
5. Can the computer make everybody a creator?
6. What is the individual creator’s work?
7. Do you consider computer pictures to be the art?
8. Which “the only constant” is being changed by our century?

**11**. Перекладіть речення англійською:

1. Сучасні цифрові технології показують можливість пересувати, копіювати, комбінувати, змінювати різноманітні образи.
2. Такі можливості дозволяють створювати нові альтернативні твори, а іноді і види мистецтва.
3. Але це викликає суперечку, чи є це власне мистецтвом.
4. Чи має машина натхнення і чи вона може створити щось варте музею?
5. Справжній творець створює шедеври, які мають свою форму, постійність, стиль та сутність.
6. Чи знаєте ви хоч одного “комп’ютерного митця”, чиї твори захоплювали б безліч людей.
7. Отже, чи має мистецтво бути справжнім людським, або штучним, машинним?
8. Іншими словами чи має мистецтво бути індивідуальним або безособовим?

12. Дайте письмові відповіді на питання, поставлені у тексті. Обґрунтуйте свою точку зору.

1. Will the computer make everybody a creator?
2. Will it undermine the very idea of the individual creator whose work has form, permanence and its own essence?

**ІІІ. Підбиття підсумків заняття.**

1. Узагальнення та систематизація вивченого.
2. Оголошення завдання для самостійної роботи.
3. Оголошення оцінок за роботу на занятті та їх обґрунтування.

**ПРАКТИЧНЕ ЗАНЯТТЯ № 13**

**I. Організаційна частина.**

1. Повідомлення теми, мети заняття.

**Дидактична мета:**

* оволодіння лексичним мінімумом з теми «Форми наказового способу дієслів. Складний присудок»;
* оволодіння граматичними навичками вживання форм наказового способу;
* формування умінь здійснювати різні види читання текстів;
* удосконалення навичок перекладу.

**Виховна мета:**

* формування звичок організації професійної діяльності;
* формування позитивної мотивації до вивчення англійської мови;
* розвиток навичок логічного мислення;
* розвиток аналітичних навичок.

2. Актуалізація опорних знань і контроль вихідного рівня знань студентів.

3. Мотивація навчальної діяльності.

**II. Зміст основної частини заняття (перелік практичних завдань):**

1. Вивчення нового матеріалу.

1. Прочитайте текст та знайдіть в ньому відповіді на запитання після тексту.

**Computers-masters or servants.**

The "Reading Evening Post" is a newspaper that might never have been born if it were not for computers. Up to the moment when the reporters' stories are ready to be set up in type, it is very like any other local newspaper but from then on it is unique. Instead of the usual row of noisy, dirty typesetting machines, casting molten metal into a line at a time, there are 12 men in clean white collars sitting at a typewriter keyboards. And the 12 operators get through a quantity of work, which would have required 24 men using ordinary typesetting machines.

For example, instead of taking a quarter of an hour to change from one typeface and length of line to another, it takes only seconds to type out the necessary instructions to the computer.

Computers are going to be the driving force behind a second industrial revolution, just as the steam engine was in the first. Many people will be reduced to acting as servants of a computer, doing jobs such as reading handwriting, which it is difficult or impossible to build a machine to do.

At the other end of the scale there will be the elite who design the computers, write the programmes, and decide what work the machine should be to.

The computer servants get good money and short hours in return for their drudgery, but no prospect of satisfaction or advancement through their work. The alternative is to plan computer systems so that everyone plays a part in directive the machine as well as serving it.

**molten** – розплавлений

**collar** – комірець

**quantity** – кількість

**steam engine** – паровий двигун

**2.** Дайте відповідь на запитання:

1. Who computer servants are?
2. Do agree that many people will be reduced to acting as servants of a computer?
3. What is the function of computer servants?
4. Who will be the elite?
5. What is the alternative to such a process?

**3.** Перекладіть слова та словосполучення:

розплавлений метал, білі комірці, місцева газета, кількість роботи, необхідні інструкції, рухома сила, друга індустріальна революція, читання почерку

**4**. Заповніть пропуски, використовуючи наведені слова:

*Instructions, quantity, designs, typesetting, servants*

Earlier the usual noisy, dirty \_\_\_ machines were popular enough.

It demands a great \_\_\_ of work.

It takes the worker only seconds to type out the necessary \_\_\_ to the computer.

Many people will be reduced to acting as \_\_\_ of a computer.

My uncle \_\_\_ the computers writes the programmes.

**5**. Закінчіть речення:

1. Typesetting machines were …

2. Computers are going to be …

3. The alternative is …

**6.** Перекладіть речення англійською:

# Таких людей раніше називали “білі комірці”.

1. Такий тип комп’ютерів може виконувати велику кількість роботи одночасно.
2. Цей програміст вирішує яку роботу виконуватиме комп’ютер.
3. В нього займе не більше півгодини поставити цю програму.
4. Мій брат отримує задоволення від обслуговування комп’ютерів.

**7.** Напишіть власний опис ролі комп’ютерів у майбутньому.

**8.** Прочитайте текст. Знайдіть у ньому слова, які означають:

* математичні задачі;
* інформаційний вік;
* аналітична машина;

**Masters of Invention**

**T**heir **C**omputers **H**ave **C**hanged the **W**ay **W**e **W**ork and **P**lay

Computers are everywhere. You can use a computer to write a letter, design a house, draw a picture or exchange messages with someone around the world. But it wasn’t too long ago that computers could only work math problems. Those machines cost millions of dollrs, and only a few huge companies had them. Now, more than a third of all U.S. families have a computer at home.

Computers have changed the way we live. The Information Age has jumped on the Information Super-highway. Meet some of them who made it possible.

**Charles Babbage (1792-1871).** *The Englishman designed the first modern digital computer, but never built it. He did build other useful devices, though, including a submarine.*

English mathematician Charles Babbage designed the first modern computer in the 1830’s. He called it an analytical engine.

If Babbage had been able to get enough money to build the computer, the analytical engine would have been as big as a locomotive. It would have been able to store 1,000 50-digit numbers. That was unheard of back then – even though today’s machines can store *millions* of times more information.

Charles Babbage was born the day after Christmas in 1792. As a child, he liked to take toys apart to see how they were made. He loved to work with math problems. He eventually became a professor at Cambridge University in England.

Babbage could be mean, and he sometimes yelled at people who disagreed with him. But he had a brilliant mind. In addition to designing the forerunner of today’s digital computer, Babbage invented a railroad signal system, a device for examining eyes, a submarine and a system of flashing lights for lighthouses.

During the 70 years following Babbage’s death in 1871, computer scientists improved on Babbage’s original idea.

**to store** – зберігати, містити

**digita**l – цифровий

**mean** – поганий

**to yell** – кричати

**forerunner** – попередник

**9.** Виберіть правильний варіант закінчення думки:

We can use a computer…

1. to change the way we live
2. to work only math problems
3. to sew a dress
4. to exchange messages, draw pictures and many other things

10. Знайдіть у тексті синоніми до слів:

Big, means, figures, to keep, bad, to shout, brain, traffic lights.

**11.**Дайте відповідь на запитання:

Did Charles Babbage build the first modern digital computer?

2. What was called an analytical engine?

3. What was Charles’s hobby when he was a child?

4. What kind of person was a great mathematician?

5. What were Babbage’s another inventions?

**12.** Виберіть речення, що відповідають змісту тексту:

Charles Babbage was very unhappy person because he could not build a digital computer.

The first computers were very big and very expensive.

Charles Babbage thought about his invention since his childhood.

He became a professor at Cambridge University in 1792.

After Babbage’s death scientists improved his invention - the analytical engine.

**13.**Перекладіть речення:

Ще зовсім недавно комп’ютери тільки використовувались для рішення математичних задач.

Англійський математик сконструював перший цифровий комп’ютер, але не зміг побудувати його.

Сучасні комп’ютери запам’ятовують в мільйон разів більше інформації.

Чарльз міг бути грубим, іноді кричав на тих хто з ним не погоджувався.

Бабидж вийнашов сигнальну систему для залізної дороги, пристрій для перевірки очей, підводний човен та систему вогнів для світлофорів.

**ІІІ. Підбиття підсумків заняття.**

1. Узагальнення та систематизація вивченого.
2. Оголошення завдання для самостійної роботи.
3. Оголошення оцінок за роботу на занятті та їх обґрунтування.

**ПРАКТИЧНЕ ЗАНЯТТЯ № 14**

**I. Організаційна частина.**

1. Повідомлення теми, мети заняття.

**Дидактична мета:**

* оволодіння лексичним мінімумом з теми «Герундій. Інфінітив. Переклад означення»;
* оволодіння граматичними навичками вживання герундію та інфінітиву;
* формування умінь здійснювати різні види читання текстів;
* удосконалення навичок перекладу.

**Виховна мета:**

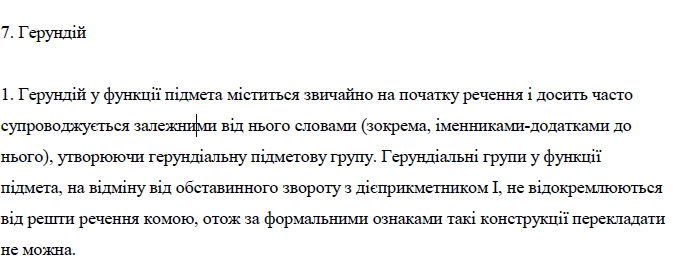
* формування звичок організації професійної діяльності;
* формування позитивної мотивації до вивчення англійської мови;
* розвиток навичок логічного мислення;
* розвиток аналітичних навичок.

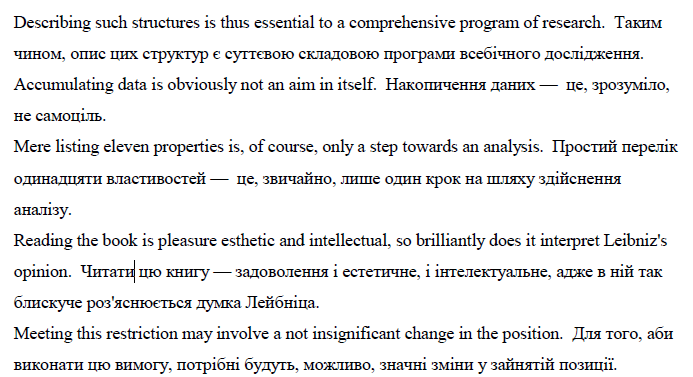
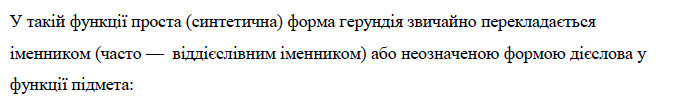
2. Актуалізація опорних знань і контроль вихідного рівня знань студентів.

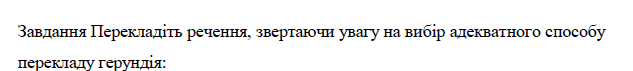
3. Мотивація навчальної діяльності.

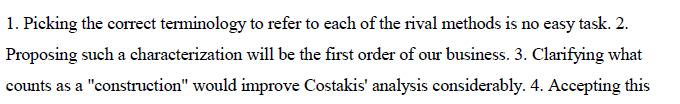
**II. Зміст основної частини заняття (перелік практичних завдань):**

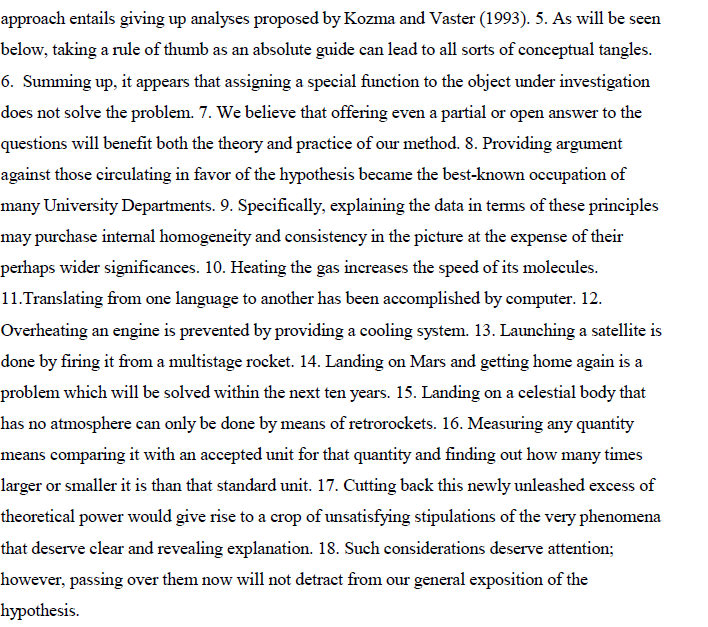
1. Вивчення нового матеріалу.





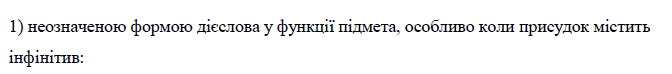


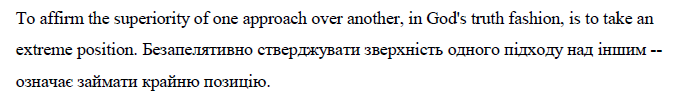


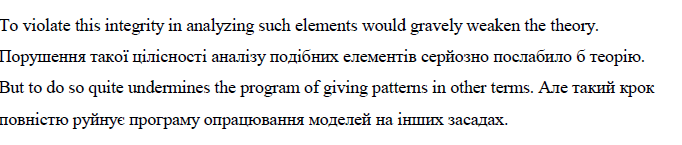
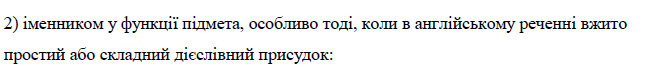


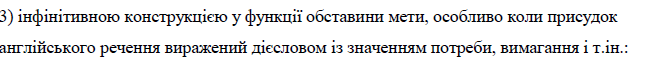


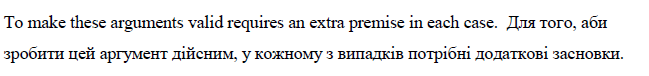


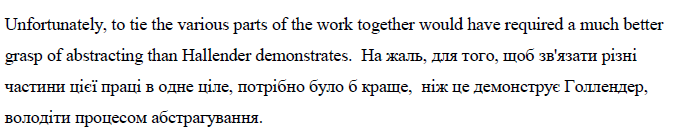






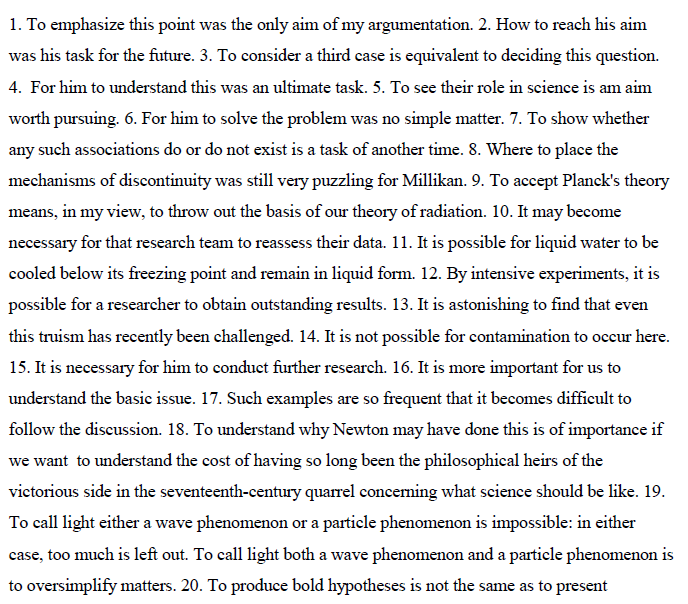








інфінітиву у функції підмета



**ПРАКТИЧНЕ ЗАНЯТТЯ № 15**

**I. Організаційна частина.**

1. Повідомлення теми, мети заняття.

**Дидактична мета:**

* оволодіння лексичним мінімумом з теми «Переклад дієприкметника, модальних дієслів. Часові форми дієслова у науково-технічних текстах»;
* оволодіння навичками вживання лексичних одиниць;
* формування умінь здійснювати різні види читання текстів;
* удосконалення навичок перекладу.

**Виховна мета:**

* формування звичок організації професійної діяльності;
* формування позитивної мотивації до вивчення англійської мови;
* розвиток навичок логічного мислення;
* розвиток аналітичних навичок.

2. Актуалізація опорних знань і контроль вихідного рівня знань студентів.

3. Мотивація навчальної діяльності.

**II. Зміст основної частини заняття (перелік практичних завдань):**

1. Вивчення нового матеріалу.

**1**. Прочитайте текст. Дайте відповідь на запитання після тексту.

**WEB JAM**

Res Rocket Surfer has not headlined a major concert, and they do not have any gold records. But they’ve played all over the Internet globe as the world’s first cyber – band.

Computer software called the Distributed Real – Time Groove Network (DRGN) lets groups of musicians jam on the Internet. It is like being in a chat room, but instead of talking, you play instruments.

Each player sends his part of the impromptu jam session live through the Internet. A musician in Germany might the start the beat by playing drums. Then someone else in England adds bass, and a person in the United States plays the melody with a lead guitar – all at once.

When you start playing, DRGN blends the music together, making it seem like everyone is playing at the same time in the same place – even if there are delays on the Internet.

DRGN was developed by Matt Moller and Canton Becker in the March 1995. “DRGN provides the opportunity for people to meet and play music together who would have never met otherwise,” Moller said. “People will be able to form global bands easily without the hassles of geographical boundaries”.

**headline –** заголовок

**impromptu –** експромтом, імпровізований

**drum –** барабан

**to blend**  - змішувати

**delay -** затримка

**otherwise -**  інакше

**hassle -** сперечання

**boundary -** межа

**2**. Дайте відповідь на запитання:

What was the first cyber – band?

What software lets groups of musicians jam on the Internet?

What is it like?

Whom and when DRGN was developed by?

What does DRGN provide?

Have you ever used software like this?

**3**. Виберіть вірний варіант перекладу:

1. Computer software lets groups of musicians jam on the Internet.

а) Комп’ютерне програмне забезпечення дозволяє групам музикантів збиратися в Інтернеті.

b) Комп’ютерні програми створюються музикантами, які збираються в Інтернеті.

с) Групи музикантів заполоняють Інтернет у пошуку нових комп’ютерних програм.

2. It is like being in a chat room, but instead of talking, you play instruments.

а) Це як істота у чаті, але замість розмов, ти граєш на інструментах.

b) Це схоже на перебування у чаті, але замість того щоб розмовляти, ви граєте на музичних інструментах.

с) Це бесідка, де ви можете розмовляти і грати на музичних інструментах.

3. It seems like everyone is playing at the same time in the same place – even if there are delays on the Internet.

а) Здається, що кожен грає у той самий час у тому самому місті, навіть якщо в Інтернеті є затримки.

b) Це є грою кожного одночасно у тому самому місті, навіть якщо в Інтернеті є затримки.

с) Здається, що кожен грає одночасно у тому самому місті, але затримки в Інтернеті заважають.

**4**. Заповніть пропуски, використовуючи наведені слова:

*Blends, chat room, otherwise, opportunity, delays, jam*

The Distributed Real – Time Groove Network lets groups of musicians \_\_\_\_ on the Internet.

When you start playing, DRGN \_\_\_\_\_ the music together

DRGN provides the \_\_\_\_\_ for people to meet and play music together who would have never met \_\_\_\_\_.

Sometimes there are \_\_\_\_\_ on the Internet.

This is like being in a \_\_\_\_\_, but instead of talking, you play instruments.

**5**. Складіть із поданих слів та словосполучень речення:

1. “Res Rocket Surfer”, first, the world’s, cyber – band, the Internet, in.
2. Lets, this, computer software, jam, the Internet, groups of musicians, on.
3. Part of the jam session, through, everyone, send, his, the Internet, can, impromptu.
4. You, playing, when, this program, start, the music together, blends.
5. People, bands, easily, to form, global, will be able.

**6**. Перекладіть наведене визначення:

**Definition for: MP3**

MP3 stands for Motion Picture Experts Group, Audio Layer 3.A popular music download format.MP3 produces CD-quality music in a compressed file that can be transferred quickly, and played on any multimedia computer with MP3 player software.The technology creates sound files a tenth the size of standard CD music files with very little loss of sound quality.

**7.** Прочитайте текст. Дайте відповідь на запитання після тексту.

**All the News**

You can’t carry a computer as easily as you can a newspaper, but you’ll find a lot of other things to like about online newspapers.

More than 100 daily papers in the United States and Canada publish electronic editions. You can connect with them using your computer, a modem and an Internet browser.

Online newspapers have the most up-to-date news. Both USA Today and The San Jose (Calif). Mercury News add stories to their electronic editions throughout the day.

“A good example was the Oklahoma City bombing (in April 1995),” said Steve Anderson of USA Today. “We had a photo and a story online within minutes of it happening.” Most newspaper readers had to wait until the next morning for their news.

Electronic newspapers also allow you to instantly learn more about a news story through***hypertext links***. For example, at the end of an online article about the New York Knicks might be headlines of other online articles on the basketball team. Just click on what you want to see next.

Ever wish you had saved a newspaper article after you threw it away? With electronic newspapers, you can go online and find old articles you need for class discussions, reports or your own personal use.

“Everything that’s appeared in The Mercury News for the last 10 years is available on our Web site or America Online,” said Barry Parr of The San Jose Mercury News.

“There are more than a million news stories in our database.”

And you can search papers from all over the United States for the information you need – The Mercury News has links to 16 other papers.

In the future, electronic may add all kinds of new features, like audio and video clips of news you can see and hear on your computer.

Will traditional newspapers ever disappear? Not likely – electronic newspapers are just one more way to reach more people.

Cruising the Internet? Here are a few online newspaper addresses to get you started:

USA Today: http://www.usatoday.com

The San Francisco Examiner: http://www.examiner.com

The Chicago Tribune: http://www.Chicago.tribune.com

The New York Times: http://www.nytimes.com

The Detroit News: http://detnews.com

St.Petersburg (Fla.) Times: http://www.sptimes.com

**edition** – видання

**up-to-date** – сучасний

**to allow** – дозволяти

**available** – доступний

**database** – база даних

**to add** – додавати

**to reach** – досягати

**8.** Дайте відповідь на запитання:

1. What do you need to have electronic newspapers every day?
2. What hypertext links are?
3. What are the main advantages of online newspapers?
4. How many stories are there in database of The San Jose Mercury News?
5. What kind of newspapers do you prefer?
6. What are the most popular traditional newspapers of your region?
7. Have you ever read online newspapers?
8. Which online newspapers do you prefer? Why?
9. Will traditional newspapers ever disappear?

9. Перекладіть словосполучення:

online newspapers, electronic editions, Internet browser, up-to-date news, hypertext links, personal use, new features, the Oklahoma City bombing, links to other papers.

**10**. Складіть із поданих слів та словосполучень речення:

1. You, using, connect with them, a computer, and, a modem, can, an Internet browser.
2. You, search papers, you need, can, the United States, for the information, from all over.
3. Add, Mercury News, to their, throughout the day, electronic editions, stories.
4. Had to wait, most, the next morning, for news, until, newspaper readers.
5. In our database, are, there, stories, a million news, more than.

**11**. Випишіть з тексту речення з поданими словами та визначте час дієслова – присудка:

Publish, up-to-date news, photo, allow, reach more people, click.

**12.** Перекладіть речення англійською мовою:

Сьогодні електронні газети стають все більш популярними.

Електронні газети щодня поповнюється новими історіями та плітками про зірок.

В них можна знайти найсвіжішу інформацію, а також інформацію за кілька минулих років, що зберігається в електронній базі.

Найвідоміші американські та англійські традиційні газети публікують також свій електронний аналог.

Гіпертекстові ссилки полегшують пошук необхідної інформації.

Іноді я продивляюсь електронний варіант газети “Daily”.

Однак мій друг вважає, що найкращий шлях – підписатись на щоденну розсилку новин.

**ІІІ. Підбиття підсумків заняття.**

1. Узагальнення та систематизація вивченого.

2. Оголошення завдання для самостійної роботи.

3. Оголошення оцінок за роботу на занятті та їх обґрунтування

**ПРАКТИЧНЕ ЗАНЯТТЯ № 16**

**I. Організаційна частина.**

1. Повідомлення теми, мети заняття.

**Дидактична мета:**

* оволодіння лексичним мінімумом з теми «Переклад термінів»;
* оволодіння навичками вживання лексичних одиниць;
* формування умінь здійснювати різні види читання текстів;
* удосконалення навичок перекладу.

**Виховна мета:**

* формування звичок організації професійної діяльності;
* формування позитивної мотивації до вивчення англійської мови;
* розвиток навичок логічного мислення;
* розвиток аналітичних навичок.

2. Актуалізація опорних знань і контроль вихідного рівня знань студентів.

3. Мотивація навчальної діяльності.

**II. Зміст основної частини заняття (перелік практичних завдань):**

1. Вивчення нового матеріалу.

**Early Start**

Computers have been around for quite a few years. Some of your parents were probably around in 1951 when the first computer was bought by a business firm. Computers have changed so rapidly that many people cannot keep up with the changes. One newspaper tried to describe what the auto industry would look like if it had developed at a similar pace to changes in computer technology: “Had the automobile developed at a pace equal to that of the computer during the past twenty years, today a Rolls Royce would cost less than $3.00, get 3 million miles to the gallon, deliver enough power to drive (the ship) the Queen Elizabeth II, and six of them would fit on the head of a pin!” These changes have occurred so rapidly that many people do not know how our modern computer got started.

**The First Computing Machines “Computers”**

Since ancient times, people have had ways of dealing with data and numbers. Early people tied knots in rope and carved marks on clay tablets to keep track of livestock and trade. Some people consider the 5000-year-old ABACUS - a frame with beads strung on wires - to be the first true computing aid. As the trade and tax system grew in complexity, people saw that faster, more reliable and accurate tools were needed for doing math and keeping records. In the mid-600’s, Blaise Pascal and his father, who was a tax officer himself, were working on taxes for the French government in Paris. The two spent hours figuring and refiguring taxes that each citizen owed. Young Blaise decided in 1642 to build an adding and subtraction machine that could assist in such a tedious and time-consuming process. The machine Blaise made had a set of eight gears that worked together in much the same way as an odometer keeps track of a car’s mileage. His machine encountered many problems. For one thing, it was always breaking down. Second, the machine was slow and extremely costly. And third, people were afraid to use the machine, thinking it might replace their jobs. Pascal later became famous for math and philosophy, but he is still remembered for his role in computer technology. In his honor, there is a computer language named Pascal.The next big step for computers arrived in the 1830s, when Charles Babbage decided to build a machine to help him complete and print mathematical tables. Babbage was a mathematician who taught at Cambridge University in England. He began planning his calculating machine, calling it the Analytical Engine. The idea for this machine was amazingly like the computer we know today. It was to read a program from punched cards, figure and store the answers to different problems, and print the answer on paper. Babbage died before he could complete the machine. However, because of his remarkable ideas and work, Babbage is known as the Father of Computers. The next huge step for computers came when Herman Hollerith entered a contest organized by the U.S. Census Bureau. The contest was to see who could build a machine that would count and record information the fastest. Hollerith, a young man working for the Bureau, built a machine called the Tabulating Machine that read and sorted data from punched cards. The holes punched in the cards matched each person’s answers to questions. For example, married, single, and divorced were answers on the cards. The Tabulator read the punched cards as they passed over tiny brushes. Each time a brush found a hole, it completed an electrical circuit. This caused special counting dials to increase the data for that answer.

Thanks to Hollerith’s machine, instead of taking seven and a half years to count the census information it only took three years, even with 13 million more people since the last census. Happy with his success, Hollerith formed the Tabulating Machine Company in 1896. The company was later sold in 1911 and in 1912 his company became the International Business Machines Corporation, better known today as IBM.

**The First Electric Powered Computer**

What is considered to be the first computer was made in 1944 by Harvard Professor Howard Aiken. The Mark I computer was very much like the design of Charles Babbage’s Analytical Engine, having mainly mechanical parts but with some electronic parts. His machine was designed to be programmed to do many computing jobs. This all-purpose machine is what we now know as the PC or personal computer. The Mark I was the first computer financed by IBM and was about 50 feet long and 8 feet tall. It used mechanical switches to open and close its electric circuits. It contained over 500 miles of wire and 750,000 parts.

**Exercises**

Comprehension questions

**1. Why was Pascal honored with a computer language named for him?**

• This programming language was named as a tribute to Blaise Pascal, because of his contribution to computer development. He was the first to build a precursor of the modern computer-an adding an subtraction machine that could assist in tedious and time-consuming computational process.

**2. Who was the first to invent a machine whose operating principle is very similar to present-day computers? Describe these similarities.**

• Charles Babbage, whose idea was remarkably similar to the way modern computers work: read program from punched cards (input), figure and store the answers to different problems, and print the answer on paper (output)

**3. In which process was Hollerith’s machine involved and what was its role?**

• Hollerith’s machine helped with the counting of census information. It took three years, instead of seven and half, even with 13 million more people since the previous census. “The machine read and sorted data from punched cards. The holes punched in the cards matched each person’s answers to questions. For example, married, single, and divorced were answers on the cards. The Tabulator read the punched cards as they passed over tiny brushes. Each time a brush found a hole, it completed an electrical circuit. This caused special counting dials to increase the data for that answer.

**4. Describe all the technical parameters of the first electric powered computer.**

• 50 feet long, 8 feet tall, electrical circuits are opened and closed by mechanical switches, contained 500 miles of wire and 750 000 parts

**5. What were the differences between the Mark I and the ENIAC?**

• Mark I - electric powered, 50 feet long and 8 tall, used mechanical switches to open/close electrical circuits

• ENIAC - all electronic computer, used 18,000 vacuum tubes instead of mechanical

switches, 1000 times faster than Mark I, 100 feet long and 10 feet tall

**6. What is the main advantage of using binary code in storing data and instructions?**

• First computers like the ENIAC could do only one task, then they had to be rewired to perform a different task or program. The binary code concept of storing different programs on punched cards instead of rewiring computers led to computers that we know today.

**The Millennium Bug**

Part 1

About 100.000 people are planning to leave American cities before 31st December 1999. Others, calling themselves ‘Year 2000 survivalists’, intend to take more extreme action; not only are they stocking up on food and gas canisters, they’re also buying mobile homes. Why? Because they believe that 1st January 2000 will be TEOTWAKI – The End Of The World As We Know It. They are convinced that the Millennium bug will create utter chaos. Are they overreacting?

The problem is that when computers were first introduced, the date in their memory system was stored by entering the last two digits of the year. This means that 1999 is stored as 99 and when 2000 arrives, it will be stored as 00 and the computer will lose 100 years because it reads the year as 1900.

Although the programmers who created the systems in the 70s must have suspected this would be OK as they thought we would have changed systems by then anyway.

People’s main concern is that life-saving equipment in hospitals will not function properly and may shut down without warning. The other major life-threatening situation that people are scared of that air traffic control will not be co-ordinated. This could mean that airline computers are unaware of where other companies’ planes are supposed to be in the sky and lead to air-borne collisions. Whether this is a rational fear or not, 63 per cent of US executives who were surveyed said they would refuse to travel by air on January 1st 2000. Worryingly, the computers that control nuclear reactors have not yet been declared immune from the bug either. Experts claim that worries about hospitals, air travel and nuclear disaster are unfounded as technology death’ situations will be the first to be sorted out well in advance of the millennium as they are priority cases.

There is almost no denying that as computer chips are in most electrical devices, most things are likely to be affected including kettles, washing machines and lighting systems. They also control things such as air-conditioning and plumbing systems. In some cases, problems will occur but for the majority of things, a simple adjustment will be able to prevent disasters.

**utter** – сплошной

**digit** - цифра

**suspect** – підозрювати

**concern** – турбота

**unaware** – непідозрюючий

**refuse** – відмовлятись

**immune** – стійкий, надійний

**bug** – дефект

**nuclear** – ядерний

**plumbing** – сантехнічний

**prevent** – запобігти

**2**. Дайте відповіді на запитання:

How many people were planning to leave American cities before 31st December 1999?

What were ‘Year 2000 survivalists’ going to do?

What TEOTWAKI is?

What the Millennium bug is?

What was the problem about the year 2000?

What was people’s main concern before 2000?

What would you do in such a situation?

**3**. Знайдіть у тексті відповідники:

Відвернути біду, суцільний хаос, відповідно функціонувати, загрозлива для життя ситуація, повітряні зіткнення, раціональне побоювання, ядерні реактори, стійкий щодо дефектів, пріоритетна справа, системи освітлювання.

**4**. Заповніть пропуски, використовуючи наведені слова:

*Digits, properly, computer, affected, concern, co-ordinated, stored, unfounded.*

In the first computers the date in memory system was stored by entering the last two \_\_\_\_ of the year.

The year 1999 is \_\_\_\_\_ as 99, for example.

The scientists were afraid that \_\_\_\_\_ would read the year 2000 as 1900.

People’s main \_\_\_\_\_ was that life-saving equipment in hospitals would not function \_\_\_\_\_.

Also people were scared of that air traffic control would not be \_\_\_\_\_\_.

Most things were likely to be \_\_\_\_\_ including kettles, washing machines and lighting systems.

Now experts claim that worries about hospitals, air travel and nuclear disaster were \_\_\_\_\_.

**5**. Виберіть вірний варіант перекладу:

They are convinced that the Millennium bug will create utter chaos.

Вони переконані, що жук Міленіуму створить суцільний хаос.

Вони думають, що проблема Міленіуму викличе внутрішній безлад.

Вони переконані, що проблема Міленіуму викличе суцільний хаос.

The programmers who created the systems in the 70s thought we would have changed systems by then anyway.

Програмісти, які створили ці системи у 70-х роках, думали, що ми так чи інакше змінимо їх потім.

Програмісти, які створили ці системи у 70-х роках, думали, що ми зовсім не зможемо змінити їх потім.

Програмісти, які створили цю систему у 70-х роках, думали, що ми залишимо цю систему незмінною.

This could mean that airline computers are unaware of where other companies’ planes are supposed to be in the sky and lead to air-borne collisions.

Це могло означати, що комп’ютерні авіалінії не знатимуть чи передбачається наявність літаків інших компаній в небі і це призведе до повітряних зіткнень.

Це могло означати, що комп’ютерні авіалінії будуть не впевнені, де саме в небі будуть літаки інших компаній і це призведе до повітряних зіткнень.

Це могло означати, що комп’ютерні авіалінії не знатимуть, де саме в небі мають бути літаки інших компаній і це призведе до повітряних зіткнень.

**6**. Складіть із поданих слів та словосполучень речення:

These, the programmers, in the 70s, systems, created, digital.

Refused, 63 percent, by air, to travel, on January 1st 2000, of US executives.

There, computer chips, are, electrical, most devices, in.

Most, including, things, are likely kettles, etc, lighting systems, to be affected.

A simple, in some cases, disasters, will be able, adjustment, to prevent.

1. Прочитайте та перекладіть текст

**The Millennium Bug**

Part 2

The ridiculous thing, in many people’s opinion, is that many of the programmers who are responsible for the problems in the first place are the ones who are being paid a fortune to put it right. Also, as there are so many computer systems and microchips in the world, the question is whether they will all be fixed in time. Some companies are so worried about this, they are prepared to pay through the nose to ensure their systems are not the ones in trouble.

One of the most popular myths is that everything will go wrong at the stroke of midnight. In fact, many systems are expected to start playing up well before then. Many delete dates for computer files were set at the latest possible programmable date which was 9.9.99. It is no wonder panic is setting in amongst some people who worry that vital information might be lost forever and they won’t be able to edit their documents. It is also expected that thousands of people will withdraw most of their money from their bank might lose all record of it ever existing.

Some might say it just shows how we all rely on technology too much. However one group of people who need not worry about their home computers is Apple Macintosh owners. Their machines use a different system and are not expected to have problems. Only time will tell whether people like the year 2000 survivalists are crazy or whether we’ll just be slightly inconveniences. Who knows? Looking on the bright side, it seems that it will be the best excuse we’ve had in almost 99 years for everything that goes wrong, is late, broken or just a load of rubbish. If only it was the millennium sooner!

**ridiculous**- смішний

**to pay through the nose –** платити втридорога

**to ensure** – упевнитись

**stroke** **of midnight** – північ

**withdraw** – від withdrеw – забирати

**to rely** – покладатися

**inconvenience** – незручність

**rubbish** - дурниця

**7.** Дайте відповідь на запитання

1. Who is ready to pay through the nose and what for?
2. What is the most popular myth about the 2000 problem?
3. What system didn’t expect any problems because of the 2000 year?
4. Why there was such a panic amongst people?
5. How did people try to avoid the problem?

8. Знайдіть у тексті відповідники:

Життєвоважлива інформація, смішна річ, редагувати документи, покладатися на технологію, вчасно зафіксовано, назавжди загублений.

**9.** Заповніть пропуски, використовуючи наведені слова:

*Relies, to pay through the nose, editing, trouble, ridiculous, files*

She badly wanted a hose of her own and was ready \_\_\_\_.

The most \_\_\_\_ thing was that she could use the scanner properly.

He was worried and wanted to ensure his system is not in \_\_\_\_.

My friend has deleted the \_\_\_\_ by mistake.

She always makes copies before \_\_\_\_ her documents.

Our boss \_\_\_\_ on technology too much.

10. Складіть із поданих слів та словосполучень речення:

Apple Macintosh owners, not, need, their, about, home computers, worry.

Everything, go wrong, of midnight, at the, stroke, will.

The latest, possible, 9.9.99., date, was, programmable.

Worry, that, some people, information, might be lost, vital, forever.

Some, to have, don’t, people, expect, problems.

**11.** Перекладіть речення англійською мовою:

Мій брат не боїться проблеми 2000, тому що в нього комп’ютер Еппл Макінтош.

Найбільше за усе я боюсь, що життєвоважлива інформація загубиться назавжди.

Його дядько забрав усі гроші з банку для покупки нового комп’ютера.

Він говорить про деякі незручності при роботі у цій системі.

Деякі люди занадто покладаються на свої комп’ютери.

Наш бос готовий заплатити у тридорога за комп’ютер Еппл Макінтош. Це просто смішно!

**ІІІ. Підбиття підсумків заняття.**

1. Узагальнення та систематизація вивченого.
2. Оголошення завдання для самостійної роботи.
3. Оголошення оцінок за роботу на занятті та їх обґрунтування.

**ПРАКТИЧНЕ ЗАНЯТТЯ № 17**

**I. Організаційна частина.**

1. Повідомлення теми, мети заняття.

**Дидактична мета:**

* оволодіння лексичним мінімумом з теми «Переклад складних термінів»;
* оволодіння навичками вживання лексичних одиниць;
* формування умінь здійснювати різні види читання текстів;
* удосконалення навичок перекладу.

**Виховна мета:**

* формування звичок організації професійної діяльності;
* формування позитивної мотивації до вивчення англійської мови;
* розвиток навичок логічного мислення;
* розвиток аналітичних навичок.

2. Актуалізація опорних знань і контроль вихідного рівня знань студентів.

3. Мотивація навчальної діяльності.

**II. Зміст основної частини заняття (перелік практичних завдань):**

1. Вивчення нового матеріалу.

**ILOVEYOU Worm**

Keywords

• **malware** - software designed to infiltrate or damage a computer system without the owner’s informed consent

• **VBScript** - Visual Basic Scripting Edition - an Active Scripting; technology used in Windows to implement component-based scripting support; a language developed by Microsoft

• **social engineering** - practice of obtaining confidential information by manipulating users

• **Barok trojan** - this trojan horse gathers information such as user name, IP address and passwords, and attempts to send the information to the creator of the virus

**Useful vocabulary**

**social engineering** practice of obtaining confidential information by manipulating users

**VBScript** Visual Basic Scripting Edition - an Active Scripting (technology used in Windows to implement component-based scripting support) language developed by Microsoft

**malware** software designed to infiltrate or damage a computer system without the owner’s informed consent

**Barok trojan** this trojan horse gathers information such as user name, IP address and passwords, and attempts to send the information to the creator of the virus

Pre-reading questions

1. What attacks have you heard about?

2. Have you ever had a virus or worm in your mail?

3. Name a few of the most famous viruses.

**ILOVEYOU Worm**

The ILOVEYOU worm, also known as VBS/Loveletter and Love Bug worm, is a computer

worm written in VBScript.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The worm, first discovered in Hong Kong, arrived in e-mail boxes on May 4, 2000, with the simple subject of “ILOVEYOU” and an attachment “LOVE-LETTER-FOR-YOU.

TXT.vbs”. Two aspects of the worm made it effective:

• It relied on social engineering to entice users to open the e-mail and ensure its continued propagation.

• It employed a mechanism — VBScripts — that, while not entirely novel, had not been exploited to such a degree previously to direct attention to their potential, reducing the layers of protection that would have to be navigated for success.

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Its massive spread moved westward as workers arrived at their offices and encountered messages generated by people from the East. Because the virus used mailing lists as its source of targets, the messages often appeared to come from an acquaintance and so might be considered “safe”, providing further incentive to open them. All it took was a few users at each site to access the VBS attachment to generate the thousands and thousands of e-mails that would cripple e-mail systems under their weight, not to mention overwrite thousands of files on workstations and accessible servers.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

It began in the Philippines on May 4, 2000, and spread across the world in one day (travelling from Hong-Kong to Europe to the United States), infecting 10 percent of all computers connected to the Internet and causing about $5.5 billion in damage. Most of the “damage” was the labor of getting rid of the virus. The Pentagon, CIA, and the British Parliament had to shut down their e-mail systems to get rid of the worm, as did most large corporations.

This particular malware caused widespread outrage, making it the most damaging worm ever. The worm overwrote important files, as well as music, multimedia and more, with a copy of itself. It also sent the worm to everyone on a user’s contact list. This particular worm only affected computers running the Microsoft Windows operating system. While any computer accessing e-mail could receive an “ILOVEYOU” e-mail, only Microsoft Windows systems would be infected.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The ILOVEYOU worm is believed to have been written by Michael Buen. The Barok trojan horse used by the worm is believed to have been written by Onel de Guzman, a Filipino student of AMA Computer University in Makati, Philippines.

An international manhunt for the perpetrator finally led to a young programming student. On May 11 (one week after the virus spread), he held a news conference and said that he did not mean to cause so much harm. He was unable to graduate because the university rejected his thesis on the basis of its illegality. Helped by a group of friends called the Grammersoft Group, he distributed his virus the day before the school held their graduation ceremony.

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Narinnat Suksawat, a 25-year-old Thai software engineer, was the first person to write software that repaired the damage caused by the worm, releasing it to the public on May 5, 2000, 24 hours after the worm had spread. “Rational Killer”, the program he created, removed virus files and restored the previously removed system files so they again functioned normally. Two months later, Narinnat was offered a senior consultant job at Sun Microsystems and worked there for two years. He resigned to start his own business. Today, Narinnat owns a software company named Moscii Systems, a system management software company in Thailand.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The worm is written using Microsoft Visual Basic Scripting (VBS), and requires that the end-user run the script in order to deliver its payload. It will add a set of registry keys to the Windows registry that will allow the malware to start up at every boot. The worm will then search all drives which are connected to the infected computer and replace files with the extensions \*.JPG, \*.JPEG, \*.VBS, \*.VBE, \*.JS, \*.JSE, \*.CSS, \*.WSH, \*.SCT, \*.DOC \*.HTA with copies of itself, while appending to the file name a .VBS. extension. The malware will also locate \*.MP3 and \*.MP2 files, and when found, makes the files hidden, copies itself with the same file name and appends a .VBS.

The worm propagates by sending out copies of itself to all entries in the Microsoft Outlook address book. It also has an additional component, in which it will download and execute an infected program called variously “WIN-BUGSFIX.EXE” or “Microsoftv25.exe”.

This is a password-stealing program which will e-mail cached passwords.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Attachment: LOVE-LETTER-FOR-YOU.TXT.vbs

Subject Line: ILOVEYOU

Message Body: kindly check the attached LOVELETTER coming from me.

2. Attachment: Very Funny.vbs

Subject Line: fwd: Joke

Message Body: empty

3. Attachment: mothersday.vbs

Subject Line: Mothers Day Order Confirmation

Message Body: We have proceeded to charge your credit card for the amount of

$326.92 for the mothers day diamond special. We have attached a detailed invoice

to this email. Please print out the attachment and keep it in a safe place. Thanks

Again and Have a Happy Mothers Day! mothersday@subdimension.com

4. Attachment: virus\_warning.jpg.vbs

Subject Line: Dangerous Virus Warning

Message Body: There is a dangerous virus circulating. Please click attached picture

to view it and learn to avoid it.

5. Attachment: protect.vbs

Subject Line: Virus ALERT!!!

Message Body: a long message regarding VBS.LoveLetter.A

6. Attachment: Important.TXT.vbs

Subject Line: Important! Read carefully!!

Message Body: Check the attached IMPORTANT coming from me!

7. Attachment: Virus-Protection-Instructions.vbs

Subject Line: How to protect yourself from the IL0VEYOU bug!

Message Body: Here’s the easy way to fix the love virus.

8. Attachment: KillEmAll.TXT.VBS

Subject Line: I Cant Believe This!!!

Message Body: I Cant Believe I have Just received This Hate Email .. Take A Look!

b) \_***Legislative aftermath***

As there were no laws against virus-writing at the time, on August 21, 2000, the prosecutors dropped all charges against Onel A. de Guzman in a resolution signed by Jovencito Zuno. The original charges brought up against de Guzman dealt with the illegal use of passwords for credit card and bank transactions. The Philippines E-Commerce Law (Republic Act No. 8792), passed on June 14, 2000, laid out penalties for cybercrime. Under the law, those who spread computer viruses or otherwise engage in cybercrime (including copyright infringement and software cracking) can be fined a minimum of 100,000 pesos (about USD$2,000), and a maximum commensurate with the damage caused, and imprisoned for six months to three years.

**Exercises**

*Ex.I. Match the headings to the paragraphs. Look at the example*

1. Effects
2. Legislative aftermath
3. Variants
4. Detection
5. Authorship
6. Description.
7. Architecture of the worm
8. Spread

*Ex.II Pre-reading exercises*

1. What attacks have you heard about?

2. Have you ever had a virus or worm in mail?

3. Name a few of the most famous viruses.

*Ex.III Comprehension questions*

1. What kind of attachment was in the ILOVEYOU worm?

2. In what language was the ILOVEYOU worm written?

3. When was the ILOVEYOU worm detected?

4. Who created the Barok trojan?

5. What action did the Pentagon take in order to protect itself from the ‘I Love You’ virus?

*Ex.IV There are several different variants of emails with this virus in the article. Write your own variant of email that will encourage people to open the attachment.*

Ex.V Topics for discussion

1. Why was this virus so dangerous and harmful?

with a copy of itself. It also sent the worm to everyone on a user’s contact list.

2. Why did it attack only Windows Operating Systems?

3. What legal consequences should be faced by the authors of computer viruses?

4. What action each computer user can take to protect their computers against computer worms?

*Ex.VI Complete the summary of the text*

The article provides information about \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

The first section \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

The following sections describe \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

The article gives information about \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_-.

This is followed by a section on how the ‘ILOVEYOU’ worm affects computers. The text ends with brief information about \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**ІІІ. Підбиття підсумків заняття.**

1. Узагальнення та систематизація вивченого.
2. Оголошення завдання для самостійної роботи.
3. Оголошення оцінок за роботу на занятті та їх обґрунтування.

**ПРАКТИЧНЕ ЗАНЯТТЯ № 18**

**I. Організаційна частина.**

1. Повідомлення теми, мети заняття.

**Дидактична мета:**

* оволодіння лексичним мінімумом з теми «Переклад слів-реалій, іншомовних виразів, абревіатур»;
* оволодіння навичками вживання лексичних одиниць;
* формування умінь здійснювати різні види читання текстів;
* удосконалення навичок перекладу.

**Виховна мета:**

* формування звичок організації професійної діяльності;
* формування позитивної мотивації до вивчення англійської мови;
* розвиток навичок логічного мислення;
* розвиток аналітичних навичок.

2. Актуалізація опорних знань і контроль вихідного рівня знань студентів.

3. Мотивація навчальної діяльності.

**II. Зміст основної частини заняття (перелік практичних завдань):**

1. Вивчення нового матеріалу.

**COMPUTER SIMULATION**

**Keywords**

• **mathematical model** - an abstract model that uses mathematical language to describe a system.

• **stochastic process** - a process with an indeterminate or random element as opposed to a deterministic process that has no random element.

• **discrete** - not supporting or requiring the notion of continuity; discrete objects are countable sets such as integers.

• **Computer Generated Imagery (CGI)** - an application of the field of computer graphics (or, more specifically, 3D computer graphics) to special effects in films, television programs, commercials and simulation.

• **differential equation** - a mathematical equation for an unknown function of one or several variables that relates the values of the function itself and of its derivatives.

• **gamut** - a complete range or extent.

• **Monte Carlo method** - a computational algorithm which relies on repeated random sampling to compute its results.

***Computer Simulation***

A computer simulation (also referred to as a computer model or a computational model) is a computer program, or network of computers, that attempts to simulate an abstract model of a particular system. Computer simulations have become a useful part of the mathematical modelling of many natural systems in physics (computational physics), chemistry and biology; human systems in economics, psychology, and social science, and in the process of engineering new technology, so as to gain insight into the operation of those systems or to observe their behaviour.

Computer simulations vary from computer programs that run a few minutes, to network- -based groups of computers running for hours or ongoing simulations that run for days. The scale of events being simulated by computer simulations has far exceeded anything possible (or perhaps even imaginable) using the traditional paper-and-pencil mathematical modelling: over 10 years ago. A desert-battle simulation, of one force invading another, involved the modelling of 66,239 tanks, trucks and other vehicles on simulated terrain around Kuwait, using multiple supercomputers in the DoD High Performance Computer Modernization Program. Another simulation ran a 1-billion- -atom model, where previously, a 2.64-million-atom model of a ribosome, in 2005, had been considered a massive computer simulation. And the Blue Brain project at EPFL (Switzerland) began in May 2005 to create the first computer simulation of the entire human brain, right down to the molecular level.

*Simulation versus modelling*

Traditionally, the formal modelling, or modelling, of systems has been via a mathematical model, which attempts to find analytical solutions to problems, which enables the prediction of the behaviour of the system from a set of parameters and initial conditions.

While computer simulations might use some algorithms from purely mathematical models, computers can combine simulations with the reality of actual events, such as generating input responses to simulate test subjects who are no longer present. Although the missing test subjects (i.e. the users of equipment or systems) are being modelled/simulated, the whole process can be conducted with the actual equipment or system they use, revealing performance limits or defects in long-term use by the simulated users.

Note that the term computer simulation is broader than computer modelling, which implies that all aspects are being modelled in the computer representation. However, computer simulation also includes generating inputs from simulated users to run actual computer software or equipment, with only part of the system being modelled: an example would be flight simulators which can run machines as well as actual flight software.

Computer simulations are used in many fields, including science, technology, entertainment, and business planning and scheduling

*History*

Computer simulation was developed hand-in-hand with the rapid growth of the computer, following its first large-scale deployment during the Manhattan Project in World War II to model the process of nuclear detonation. It was a simulation of 12 hard spheres using a Monte Carlo algorithm. Computer simulation is often used as an adjunct to, or substitution for, modelling systems for which simple closed form analytic solutions are not possible. There are many different types of computer simulation; the common feature they all share is the attempt to generate a sample of representative scenarios for a model in which a complete enumeration of all possible states of the model would be prohibitive or impossible. Computer models were initially used as a supplement for other arguments, but their use later became rather widespread.

*Data preparation*

The data input/output for the simulation can be either through formatted text files or a pre- and post processor.

*Types of computer simulation*

Computer models can be classified according to several criteria including: • stochastic or deterministic (and as a special case of deterministic, chaotic)

• steady-state or dynamic

• continuous or discrete (and as an important special case of discrete, discrete event or DE models)

• local or distributed.

For example, steady-state models use equations defining the relationships between elements of the modelled system and attempt to find a state in which the system is in equilibrium. Such models are often used in simulating physical systems as a simpler modelling case before dynamic simulation is attempted. Dynamic simulations model changes in a system in response to (usually changing) input signals. Stochastic models use random number generators to model chance or random events; they are also called Monte Carlo simulations.

A discrete event simulation (DES) manages events in time. Most computer, logic-test and fault-tree simulations are of this type. In this type of simulation, the simulator maintains a queue of events sorted by the simulated time in which they should occur. The simulator reads the queue and triggers new events as each event is processed. It is not important to execute the simulation in real time. It’s often more important to be able to access the data produced by the simulation, to discover logic defects in the design or the sequence of events. A continuous dynamic simulation performs numerical solutions of differential-algebraic equations or differential equations (either partial or ordinary). Periodically, the simulation program solves all the equations, and uses the numbers to change the state and output of the simulation.

Applications include flight simulators, simulation games, chemical process modelling, and simulations of electrical circuits. Originally, these kinds of simulations were actually implemented on analogue computers, where the differential equations could be represented directly by various electrical components such as op-amps.

By the late 1980s, however, most “analogue” simulations were run on conventional digital computers that emulate the behaviour of an analogue computer. A special type of discrete simulation which does not rely on a model with an underlying equation, but can nonetheless be represented formally, is agent-based simulation. In agent-based simulation, the individual entities (such as molecules, cells, trees or consumers) in the model are represented directly (rather than by their density or concentration) and possess an internal state and set of behaviours or rules which determine how the agent’s state is updated from one time-step to the next. Distributed models run on a network of interconnected computers, possibly through the Internet. Simulations dispersed across multiple host computers like this are often referred to as “distributed simulations”. There are several standards for distributed simulation, including Aggregate Level Simulation Protocol (ALSP), Distributed Interactive Simulation (DIS), the High Level Architecture (HLA) and the Test and Training Enabling Architecture (TENA).

*CGI computer simulation*

Formerly, the output data from a computer simulation was sometimes presented in a table, or a matrix, showing how data was affected by numerous changes in the simulation parameters. The use of the matrix format was related to the traditional use of the matrix concept in mathematical models; however, psychologists and others noted that humans could quickly perceive trends by looking at graphs or even moving-images or motion-pictures generated from the data, as displayed by computer -generated-imagery (CGI) animation. Although observers couldn’t necessarily read out numbers, or spout maths formulas, from observing a moving weather chart, they might be able to predict events (and “see that rain was headed their way”), much faster than scanning tables of rain-cloud coordinates. Such intense graphical displays, which transcended the world of numbers and formulae, sometimes also led to output that lacked a coordinate grid or omitted timestamps, as if straying too far from numeric data displays. Today, weather forecasting models tend to balance the view of moving rain/snow clouds against a map that uses numeric coordinates and numeric timestamps of events.

Similarly, CGI computer simulations of CAT scans can simulate how a tumour might shrink or change, during an extended period of medical treatment, presenting the passage of time as a spinning view of the visible human head, as the tumour changes.

Other applications of CGI computer simulations are being developed to graphically display large amounts of data in motion, as changes occur during a simulation run.

*Computer simulation in science*

The following are generic examples of types of computer simulations in science, which are derived from an underlying mathematical description: A numerical simulation of differential equations which cannot be solved analytically. Falling into this category are:

• theories which involve continuous systems such as phenomena in physical cosmology • fluid dynamics (e.g. climate models, roadway noise models, roadway air dispersion models)

• continuum mechanics and chemical kinetics

A stochastic simulation, typically used for discrete systems where events occur probabilistically, and which cannot be described directly with differential equations (this is a discrete simulation in the above sense). Phenomena in this category include:

• genetic drift

• biochemical or gene regulatory networks with small numbers of molecules (See also: Monte Carlo method).

Specific examples of computer simulations follow:

• statistical simulations based upon an agglomeration of a large number of input profiles, such as the forecasting of equilibrium temperature of receiving waters, allowing the gamut of meteorological data to be input for a specific locale. This variability in the agents cannot be neglected, such as population dynamics of salmon and trout (most purely mathematical models assume all trout behave identically)

• time stepped dynamic model; in hydrology there are several such hydrology transport models such as the SWMM and DSSAM Models developed by the U.S. Environmental Protection Agency for river water quality forecasting

• computer simulations have also been used to formally model theories of human

cognition and performance, e.g. ACT-R

• computer simulation using molecular modelling for drug discovery

• computational fluid dynamics simulations are used to simulate the behaviour of flowing air, water and other fluids. There are one-, two- and three- dimensional models used. A one dimensional model might simulate the effects of water hammer in a pipe. A two-dimensional model might be used to simulate the drag forces on the cross-section of an aeroplane wing. A three-dimensional simulation might estimate the heating and cooling requirements of a large building.

Understanding of statistical thermodynamic molecular theory is fundamental to the appreciation of molecular solutions. Development of the Potential Distribution Theorem (PDT) allows one to simplify this complex subject to down-to-earth presentations of molecular theory.

Notable, and sometimes controversial, computer simulations used in science include:

• Donella Meadows’ World3 used in the Limits to Growth

• James Lovelock’s Daisyworld

• Thomas Ray’s Tierra.

*Simulation environments for physics and engineering*

Graphical environments to design simulations have been developed. Special care was taken to handle “events” (situations in which the simulation equations are not valid and have to be changed). The open project Open Source Physics was started in order to develop reusable libraries for simulations in Java, together with Easy Java Simulations, a complete graphical environment that generates code based on these libraries.

*Pitfalls in computer simulation*

Although sometimes ignored in computer simulations, it is very important to perform sensitivity analysis to ensure that the accuracy of the results is properly understood. For example, the probabilistic risk analysis of factors determining the success of an oilfield exploration program involves combining samples from a variety of statistical distributions using the Monte Carlo method. If, for instance, one of the key parameters (i.e. the net ratio of oil-bearing strata) is known to only one significant figure, then the result of the simulation might not be more precise than one significant figure, although it might (misleadingly) be presented as having four significant figures.

*Computer simulation in practical contexts*

Computer simulations are used in a wide variety of practical contexts, such as:

• analysis of air pollutant dispersion using atmospheric dispersion modelling

• design of complex systems such as aircraft and logistics systems

• design of noise barriers to effect roadway noise mitigation

• flight simulators to train pilots

• weather forecasting

• behaviour of structures (such as buildings and industrial parts) under stress and other conditions

• design of industrial processes, such as chemical processing plants

• strategic management and organizational studies

• reservoir simulation for the petroleum engineering to model the subsurface reservoir

• Process Engineering Simulation tools

• robot simulators for the design of robots and robot control algorithms

The reliability and the trust people put in computer simulations depends on the validity of the simulation model, therefore verification and validation are of crucial importance in the development of computer simulations. Another important aspect of computer simulations is that of reproducibility of the results, meaning that a simulation model should not provide a different answer for each execution. Although this might seem obvious, this is a special point of attention in stochastic simulations, where random numbers should actually be semi-random numbers. An exception to reproducibility are “human-in-the-loop” simulations, such as flight simulations and computer games. Here a human is part of the simulation and thus influences the outcome in a way that is hard if not impossible to reproduce exactly.

Computer graphics can be used to display the results of a computer simulation. Animations can be used to experience a simulation in real-time e.g. in training simulations. In some cases animations may also be useful in faster than real-time or even slower than real-time modes. For example, faster than real-time animations can be useful in visualizing the build-up of queues in the simulation of humans evacuating a building. Furthermore, simulation results are often aggregated into static images using various ways of scientific visualization.

In debugging, simulating a program execution under test (rather than executing natively) can detect far more errors than the hardware itself can detect and, at the same time, log useful debugging information such as instruction trace, memory alterations and instruction counts. This technique can also detect buffer overflow and similar “hard to detect” errors as well as produce performance information and tuning data.

**EXERCISES**

Exersise 1. Read and translate the article. Make a list of 10 words/phrases from the text.

Exersise 2. Answer the questions

1. How can we solve problems in cases where physical models are too complex or expensive to build?

2. Name some problems which can be solved using computer simulation?

Exersise 3.Explain the differences between discrete/continuous and stochastic/deterministic simulation, giving examples.

Exercise 4. Complete the Summary of the article

The article presents a general view \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. It explains what \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the differences between \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. It provides a brief overview of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and divides computer simulation into \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. It sets out the advantages of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and describes the impact of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The final partof the article \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Programs and Programming Languages I**

Computers can manage with different kinds of problems if they are given the right instructions for what to do. Instructions are first written in one of the high-level languages, e.g. FORTRAN, COBOL, ALGOL, PL/I, PASCAL, BASIC, or C, depending on the type of problem to be solved. A program written in one of these languages is often called a source program and it cannot be directly processed by the computer until it has been compiled, which means interpreted into machine code. Usually a single instruction written in a high-level language, when transformed into machine code, results in several instructions. Here is brief description of some of the many high-level languages:

**FORTRAN** acronym for FORmula TRANslation. This language is used for solving scientific and mathematical problems. It consists of algebraic formulae and English phrases. It was first introduced in the United State in 1954.

**COBOL** acronym for Common Business – Oriented Language. This language is used for commercial purposes. COBOL, which is written using English statements, deals with problems that do not involve a lot of mathematical calculations. It was first introduced in 1959.

**ALGOL** acronym for ALGOrithmic Language. Originally called IAL, which means International Algebraic Language. It is used for mathematical and scientific purposes. ALGOL was first introduced in Europe in 1960.

**PL\I** Programming Language I. Developed in 1964 to combine features of COBOL and ALGOL. Consequently, it is used for data processing as well as scientific applications.

**C** developed in the 1970 to support the UNIX operating system. C is a highly portable general-purpose language.

Other such languages are APL (developed in 1962), PASCAL (named after Blaise Pascal and developed in 1971), and LIPS and PROLOG, both of which are used for work in artificial intelligence. LOGO is a development of LISP, which has been used to develop computer-based training (CBT) packages.

**to manage (with)** – справлятись (з)

**source** – джерело

**to** **compile** – компілювати

**brief** - короткий

**purpose** – мета

**to** **deal** **with** – мати справу

**to** **involve** - залучати

**to** **combine** – об’єднувати

**application** – приложение

**portable** – портативний

**artificial** **intelligence** – штучний інтелект

**2**. Дайте відповідь на запитання:

How many languages do you speak?

How many languages do you know?

What artificial languages do you know?

What “artificial language” is?

What programming languages do you know?

What is the functions of programming languages?

Whom was PASCAL named after?

What year was it developed?

**3**. Знайдіть у тексті відповідники:

Мова загального призначення, мова високого рівня, машинний код, алгебраїчні формули, англійські фрази, короткий опис, комерційні цілі, математичний облік, обробка інформації,

**4**. Заповніть пропуски, використовуючи наведені слова:

*High-level languages, COBOL, manage, ALGOL, FORTRAN, PL\I, portable, C.*

These computers can \_\_\_ with different kinds of problems.

Instructions are first written in one of the \_\_\_\_.

\_\_\_ was first introduced in the United State in 1954.

C is a highly \_\_\_ general-purpose language.

Common Business – Oriented Language is usually called \_\_\_\_.

\_\_\_\_ is used for mathematical and scientific purposes.

\_\_\_\_ combines features of COBOL and ALGOL.

\_\_\_\_ is a highly portable general-purpose language that supports the UNIX operating system.

**5**. Перекладіть речення англійською мовою:

1. Нещодавно я подивився фільм Спілберга “ Штучний розум”.
2. Цей програміст може справитись із будь-якими проблемами Вашого комп’ютера.
3. Існує кілька різновидів комп’ютерних мов загального призначення.
4. Ці мови виникли у середині 20 століття і досі є популярними.
5. У тексті наведений короткий опис деяких головних комп’ютерних мов.
6. Мови високого рівня служать різним цілям.
7. Деякі мови використовуються для обробки інформації, математичного обліку, а також використовуються в комерційних цілях.

**ПРАКТИЧНЕ ЗАНЯТТЯ № 19**

**I. Організаційна частина.**

1. Повідомлення теми, мети заняття.

**Дидактична мета:**

* оволодіння лексичним мінімумом з теми «Жанрово-стилістичні проблеми науково-технічного перекладу. Переклад метафоричних термінів»;
* оволодіння навичками вживання лексичних одиниць;
* формування умінь здійснювати різні види читання текстів;
* удосконалення навичок перекладу.

**Виховна мета:**

* формування звичок організації професійної діяльності;
* формування позитивної мотивації до вивчення англійської мови;
* розвиток навичок логічного мислення;
* розвиток аналітичних навичок.

2. Актуалізація опорних знань і контроль вихідного рівня знань студентів.

3. Мотивація навчальної діяльності.

**II. Зміст основної частини заняття (перелік практичних завдань):**

1. Вивчення нового матеріалу.

**ANATOMY OF THE LINUX KERNEL**

Keywords

• **kernel** - the central component of most computer operating systems (OS). Its functions include managing the system’s resources (the communication between hardware and software components)

• **Linux kernel** - Unix-like operating system kernel

• **VFS(Virtual file system)** - an abstraction layer on top of a more concrete file system

• **GNU** - a computer operating system composed entirely of free software, initiated in 1984 by Richard Stallman

• **GPL** - a widely used free software license, originally written by Richard Stallman for the GNU project

• **Minix** - free/open source, Unix-like operating system (OS) based on a microkernel architecture

• **Unix** - a computer operating system originally developed in 1969 by a group of AT&T employees at Bell Labs including Ken Thompson, Dennis Ritchie and Douglas Ilroy

• **operating system** - the software that manages the sharing of the resources of a computer and provides programmers with an interface used to access those resources

• **buffer** - a region of memory used to temporarily hold data while it is being moved from one place to another

• **buffer cache** - a collection of data duplicating original values stored elsewhere or computed earlier, where the original data is expensive to fetch (owing to longer access time) or to compute, compared to the cost of reading the cache

**Anatomy of the Linux Kernel**

The Linux® kernel is the core of a large and complex operating system, and while it is huge, it is well organized in terms of subsystems and layers. In this article, you can explore the general structure of the Linux kernel and get to know its major subsystems and core interfaces. Where possible, you get links to other IBM articles to help you dig deeper.

Given that the goal of this article is to introduce you to the Linux kernel and explore its architecture and major components, let’s start with a short tour of Linux kernel history, then look at the Linux kernel architecture from 30,000 feet, and, finally, examine its major subsystems. The Linux kernel is over six million lines of code, so this introduction is not exhaustive. Use the pointers to more content to dig in further.

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While Linux is arguably the most popular open source operating system, its history is actually quite short considering the timeline of operating systems. In the early days of computing, programmers developed on the bare hardware in the hardware’s language. The lack of an operating system meant that only one application (and one user) could use the large and expensive device at a time. Early operating systems were developed in the 1950s to provide a simpler development experience. Examples include the General Motors Operating System (GMOS) developed for the IBM 701 and the FORTRAN Monitor System (FMS) developed by North American Aviation for the IBM 709.

In the 1960s, the Massachusetts Institute of Technology (MIT) and a host of companies developed an experimental operating system called Multics (or Multiplexed Information and Computing Service) for the GE-645. One of the developers of this operating system, AT&T, dropped out of Multics and developed their own operating system in 1970 called Unics. Along with this operating system was the C language, for which C was developed and then rewritten to make operating system development portable.

Twenty years later, Andrew Tanenbaum created a microkernel version of UNIX®, called MINIX (for minimal UNIX), that ran on small personal computers. This open source operating system inspired Linus Torvalds’ initial development of Linux in the early 1990s.

Linux quickly evolved from a single-person project to a world-wide development project involving thousands of developers. One of the most important decisions for Linux was its adoption of the GNU General Public License (GPL). Under the GPL, the Linux kernel was protected from commercial exploitation, and it also benefited from the user-space development of the GNU project (of Richard Stallman, whose source dwarfs that of the Linux kernel). This allowed useful applications such as the GNU Compiler Collection (GCC) and various shell support.

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Now on to a high-altitude look at the GNU/Linux operating system architecture. You can think about an operating system from two levels. At the top is the user, or application, space. This is where the user applications are executed. Below the user space is the kernel space. Here, the Linux kernel exists.

There is also the GNU C Library (glibc). This provides the system call interface that connects to the kernel and provides the mechanism to transition between the user-space application and the kernel. This is important because the kernel and user application occupy different protected address spaces. And while each user-space process occupies its own virtual address space, the kernel occupies a single address space. For more information, see the links in the resources section.

The Linux kernel can be further divided into three gross levels. At the top is the system call interface, which implements the basic functions such as read and write. Below the system call interface is the kernel code, which can be more accurately defined as the architecture-independent kernel code. This code is common to all of the processor architectures supported by Linux. Below this is the architecture-dependent code, which forms what is more commonly called a BSP (Board Support Package). This code serves as the processor and platform-specific code for the given architecture.

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When discussing the architecture of a large and complex system, you can view the system from many perspectives. One goal of an architectural decomposition is to provide a way to understand the source better and that’s what we’ll do here.

The Linux kernel implements a number of important architectural attributes. At a high level, and at lower levels, the kernel is layered into a number of distinct subsystems. Linux can also be considered monolithic because it lumps all of the basic services into the kernel. This differs from a microkernel architecture, where the kernel provides basic services such as communication, I/O, and memory and process management, and more specific services are plugged in to the microkernel layer. Each has its own advantages, but I’ll steer clear of that debate.

Over time, the Linux kernel has become efficient in terms of both memory and CPU usage, as well as extremely stable. But the most interesting aspect of Linux, given itssize and complexity, is its portability. Linux can be compiled to run on a huge number of processors and platforms with different architectural constraints and needs. One example is the ability of Linux to run on a process with a memory management unit (MMU), as well as those that provide no MMU. The uClinux port of the Linux kernel provides for non-MMU support. See the resources section for more details.

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Now let’s look at some of the major components of the Linux kernel using the breakdown.

System call interface The SCI is a thin layer that provides the means to perform function calls from user space into the kernel. As discussed previously, this interface can be architecture dependent, even within the same processor family. The SCI is actually an interesting function-call multiplexing and demultiplexing service. You can find the SCI implementation in ./linux/kernel, as well as architecture-dependent portions in ./linux/arch. More details for this component are available in the resources section.

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Process management is focused on the execution of processes. In the kernel, these are called threads and represent an individual virtualization of the processor (thread code, data, stack, and CPU registers). In user space, the term process is typically used, though the Linux implementation does not separate the two concepts (processes and threads). The kernel provides an application program interface (API) through the SCI to create a new process (fork, exec, or Portable Operating System Interface [POSIX] functions), stop a process (kill, exit), and communicate and synchronize between them (signal, or POSIX mechanisms).

Also in process management there is a need to share the CPU between the active threads. The kernel implements a novel scheduling algorithm that operates in constant time, regardless of the number of threads vying for the CPU. This is called the O(1) scheduler, denoting that the same amount of time is taken to schedule one thread as it is to schedule many. The O(1) scheduler also supports multiple processors (called Symmetric MultiProcessing, or SMP). You can find the process management sources in ./linux/kernel and architecture-dependent sources in ./linux/arch). You can learn more about this algorithm in the resources section.

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Another important resource that’s managed by the kernel is memory. For efficiency, given the way that the hardware manages virtual memory, memory is managed in what are called pages (4KB in size for most architectures). Linux includes the means to manage the available memory, as well as the hardware mechanisms for physical and virtual mappings.

But memory management is much more than managing 4KB buffers. Linux provides abstractions over 4KB buffers, such as the slab allocator. This memory management scheme uses 4KB buffers as its base, but then allocates structures from within, keeping track of which pages are full, partially used, and empty. This allows the scheme to dynamically grow and shrink based on the needs of the greater system.

Supporting multiple users of memory, there are times when the available memory can be exhausted. For this reason, pages can be moved out of memory and onto the disk. This process is called swapping because the pages are swapped from memory onto the hard disk. You can find the memory management sources in ./linux/mm.

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The virtual file system (VFS) is an interesting aspect of the Linux kernel because it provides a common interface abstraction for file systems. The VFS provides a switching layer between the SCI and the file systems supported by the kernel.

At the top of the VFS is a common API abstraction of functions such as open, close, read, and write. At the bottom of the VFS are the file system abstractions that define how the upper-layer functions are implemented. These are plug-ins for the given file system (of which over 50 exist). You can find the file system sources in ./linux/fs.

Below the file system layer is the buffer cache, which provides a common set of functions to the file system layer (independent of any particular file system). This caching layer optimizes access to the physical devices by keeping data around for a short time (or speculatively read ahead so that the data is available when needed). Below the buffer cache are the device drivers, which implement the interface for the particular physical device.

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The network stack, by design, follows a layered architecture modeled after the protocols themselves. Recall that the Internet Protocol (IP) is the core network layer protocol that sits below the transport protocol (most commonly the Transmission Control Protocol, or TCP). Above TCP is the sockets layer, which is invoked through the SCI.

The sockets layer is the standard API to the networking subsystem and provides a user interface to a variety of networking protocols. From raw frame access to IP protocol data units (PDUs) and up to TCP and the User Datagram Protocol (UDP), the socketslayer provides a standardized way to manage connections and move data between endpoints. You can find the networking sources in the kernel at ./linux/net.

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The vast majority of the source code in the Linux kernel exists in device drivers that make a particular hardware device usable. The Linux source tree provides a drivers subdirectory that is further divided by the various devices that are supported, such as Bluetooth, I2C, serial, and so on. You can find the device driver sources in ./linux/drivers.

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While much of Linux is independent of the architecture on which it runs, there are elements that must consider the architecture for normal operation and for efficiency. The /linux/arch subdirectory defines the architecture-dependent portion of the kernel source contained in a number of subdirectories that are specific to the architecture (collectively forming the BSP). For a typical desktop, the i386 directory is used. Each architecture subdirectory contains a number of other subdirectories that focus on a particular aspect of the kernel, such as boot, kernel, memory management, and others. You can find the architecture-dependent code in ./linux/arch.

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If the portability and efficiency of the Linux kernel weren’t enough, it provides some other features that could not be classified in the previous decomposition. Linux, being a production operating system and open source, is a great test bed for new protocols and advancements of those protocols. Linux supports a large number of networking protocols, including the typical TCP/IP, and also extension for high-speed networking (greater than 1 Gigabit Ethernet [GbE] and 10 GbE). Linux also supports protocols such as the Stream Control Transmission Protocol (SCTP), which provides many advanced features above TCP (as a replacement transport level protocol).

Linux is also a dynamic kernel, supporting the addition and removal of software components on the fly. These are called dynamically loadable kernel modules, and they can be inserted at boot when they’re needed (when a particular device is found requiring the module) or at any time by the user.

A recent advancement of Linux is its use as an operating system for other operating systems (called a hypervisor). Recently, a modification to the kernel was made called the Kernel-based Virtual Machine (KVM). This modification enabled a new interface to user space that allows other operating systems to run above the KVM-enabled kernel. In addition to running another instance of Linux, Microsoft® Windows® canalso be virtualized. The only constraint is that the underlying processor must support the new virtualization instructions. See the resource section for more information.

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This article just scratched the surface of the Linux kernel architecture and its features and capabilities. You can check out the Documentation directory that is provided in every Linux distribution for detailed information about the contents of the kernel.

**EXERCISES**

1. There are 12 passages in this article. Give the title to each passage.
2. Answer the questions

1. What are the most popular operating systems?

2. What are the advantages of Linux?

3. What are the disadvantages of Linux?

isn’t available in a Linux version

3) Comprehension questions

1. Name a few of the earliest operating systems.

2. Who created MINIX?

3. How many lines of code does the Linux kernel have now?

4. What are the advantages of Linux adoption of the GPL?

5. Name the three gross levels of the Linux kernel.

• system call interface

• kernel code

• architecture-dependant code (BSP)

6. What are the major components of the Linux kernel?

7. Describe in a few words what process management does?

8. What could you do if you have Linux and you want to run a Windows program?

4) Topics for discussion

1. Which operating system, Windows or Linux, is better and why? What is your

opinion?

2. Which operating system architecture is better: one with a number of distinct

subsystems or one with a single microkernel?

3. Is it better to build small kernels which are easy to understand or large ones with

all the necessary functions?

5) Complete the Summary of the article

As the title suggests, this article is about………………... It starts with …………………. The next section is about ………………………. The third section is divided into sub-sections which describe ……………. Subsequent sections deal with ………………………………... The article is not very complex, being only an introduction to …………….. It concludes with

**Programs and Programming Languages II**

When a program written in one of these high-level languages is designed to do a specific type of work such as calculate a company’s payroll or calculate stress factor on a roof, it is called an applications program. Institutions either purchase these programs as packages or commissions of the users.

The program produced after the source program has been converted into machine code is referred to as an object program or object module. This is done by a computer program called the compiler, which is unique for each computer. Consequently, a computer needs its own compiler for the various high-level languages if it is expected to accept programs written in those languages. For example, in order that an IBM RS/6000 may process a program in FORTRAN, it needs to have a compiler that would understand that particular model and the FORTRAN language as well.

The compiler is a system program which may be written in any language, but the computers operating system is a true systems program which controls the central processing unit (CPU), the input, the output, and the secondary memory devices. Another systems program is the linkage editor, which fetches required systems routines and links them to the object module (the source program in machine code). The resulting program is then called the load module, which is the program directly executable by the computer. Although system programs are part of the software, they are usually provided by the manufacturer of the machine.

Unlike systems programs, software packages are sold by various vendors and not necessarily by the computer manufacturer. They are a set of programs designed to perform certain applications which conform to the particular specifications of the user. Payroll is an example of such a package which allows the user to input data-hours worked, pay rates, special deductions, names of employees- and get salary calculations as output. These packages are coded in machine language (Os and 1s) on magnetic tapes or discs which can be purchased, leased, or rented by users who choose the package that most closely corresponds to their needs.

**payroll** – платіжна відомість

**to convert** – перетворювати

**to purchase –** купувати

**unique –** унікальний

### consequently – отже

**secondary –** другорядний

**fetche –** вибирати

**vendor –** постачальник

**lease -** арендувати

**2**. Дайте відповідь на запитання:

What specific type of work can a program written in of high-level languages do?

What an applications program is?

When is such a program produced?

What compiler is?

What does the linkage editor do?

What the load module is?

Who sells software packages?

**3**. Знайдіть у тексті відповідники:

Платіжна відомість компанії, перетворений у машинний код, пакет програм, приймати (розпізнавати) програми, обробляти програму, головний обробляючий пристрій, вторинні пристрої пам’яті, модуль загрузки, спеціальні обчислення, (той, що) безпосередньо виконується.

**4.** Заповніть пропуски, використовуючи наведені слова:

*Allows, language, packages, compiler, coded, software.*

1. A computer needs its own \_\_\_\_ for the high-level languages.

2. The compiler may be written in any \_\_\_\_.

1. System programs are part of the \_\_\_\_.
2. Both the computer manufacturers and vendors sell software \_\_\_\_.
3. Such a package \_\_\_\_ the user to input the necessary data.
4. These packages are \_\_\_\_ in machine language on magnetic tapes or discs.

**5**. Складіть із поданих слів та словосполучень речення:

Are, they, a, programs, set, designed, of, to perform, applications, certain.

Applications, these, conform, specifications, to, of the user, the particular.

Packages, are, software, sold, by, vendors, various.

Allows, payroll, to input, the user data-hours worked, etc, pay rates.

May, the package, choose, users, most closely, their needs, corresponds, to, that.

**6**. Закінчіть речення:

1. The compiler is …

2. The applications program is …

3. The linkage editor is …

**7**. Перекладіть речення англійською мовою:

Звичайно системні програми забезпечують виробники комп’ютерів.

Наш офіс придбав необхідну програму для обробки платіжних відомостей.

Постачальники програмного забезпечення запропонували нові пакети програм.

Додатки цієї ОС відповідають спеціалізації нашого програміста.

Користувачі звичайно вибирають пакети програм, які більше відповідають до їх потреб.

**ІІІ. Підбиття підсумків заняття.**

1. Узагальнення та систематизація вивченого.
2. Оголошення завдання для самостійної роботи.
3. Оголошення оцінок за роботу на занятті та їх обґрунтування.

**ПРАКТИЧНЕ ЗАНЯТТЯ № 20**

**I. Організаційна частина.**

1. Повідомлення теми, мети заняття.

**Дидактична мета:**

* оволодіння лексичним мінімумом з теми «Варіативність у перекладі багатокомпонентних термінів. Переклад неологізмів»;
* оволодіння навичками вживання лексичних одиниць;
* формування умінь здійснювати різні види читання текстів;
* удосконалення навичок перекладу.

**Виховна мета:**

* формування звичок організації професійної діяльності;
* формування позитивної мотивації до вивчення англійської мови;
* розвиток навичок логічного мислення;
* розвиток аналітичних навичок.

2. Актуалізація опорних знань і контроль вихідного рівня знань студентів.

3. Мотивація навчальної діяльності.

**II. Зміст основної частини заняття (перелік практичних завдань):**

1. Вивчення нового матеріалу.

**Exercise 1. Read and translate the text:**

**Technical innovations in stereo sound**

After World War II the near-simultaneous arrival of **full-frequency-range disc recording (1)** and **magnetic tape recording (2)** stimulated popular interest in **“high-fidelity” (Hi-Fi) sound (3)** and a rapid expansion of the record industry.

Since then, interest in better and more convenient sound reproduction has been stimulated by a constant parade of innovations- **stereo tapes (4)** (1954); **stereo records (5)** (1958); **stereo FM radio (6)** (1962).

The spread of **multitrack recording (7)** during the 1960s, added new variety and creativity to rock music; the arrival of **transistors (8)** during the same period, made equipment smaller, cheaper, and more reliable. Further achievements were:

Dolby **noise reduction (9)** (1967); **stereo cassette tapes (10)** (1970); **four-channel sound (11)** (early 1970s); Dolby Stereo sound for movies (1976); **digital recording (12)** (late 1970s); "Walkman" **portable headphone stereo player (13)** (1980); the **compact disc (14)** (1983); the Hi-Fi **stereo VCR (15)** (1984); stereo television sound (1985); the **DAT-digital audio tape (16)** (1987); video “home theater” systems with Dolby Surround Sound (late 1980s);digital radio **via cable-TV hookups (17)** (1991); the **Digital Compact Cassette (18)** (1992); and the **MiniDisc (19)** (1993).

Today’s music listener has a very broad range of equipment choices. The highest sound quality and the greatest operating flexibility are obtained by connecting individual audio components to form a system. A similarly broad range of cost and potential sound quality is available in **car stereo systems (20)** designed for installation in automobiles.

**Exercise 2.** **Match English phrases and words from the text with their Ukrainian equivalents**

1) числова компакт-касета, 2) автомагнітола, 3) ФМ радіо в стереозвучанні, 4) запис на магнітну стрічку, 5) стереоплеєр, 6) квадро фонічне звучання, 7) числовий запис, 8) багатодоріжковий запис, 9) широкосмуговий запис на платівку, 10) високоякісне (хай-фай) звучання, 11) стереоплатівки, 12) стереофонічний відео-магнітофон, 13) стереоплівки, 14) транзистори, 15) послаблення акустичного шуму, 16) стереокасета, 17) ком пакт-диск, 18) числова аудіо плівка, 19) підключення через систему кабельного телебачення, 20) міні диск

**Exercise 3. Match the phrases in column A with their equivalents in column B.**

|  |  |
| --- | --- |
| 1. The newest non-professional camera  technology is the camcorder, introduced in the early 1980s. | A. Ще одним досягненням на шляху вдосконалення відеотехніки стала поява числового камкодера, який надає користувачам низку нових, невідомих раніше можливостей |
| 2. A step ahead in video camera technology is the digital camcorder which has a range of new capabilities, previously inaccessible by camera users. | В. За допомогою відеокамери можна записувати зображення та звук на магнітну відеоплівку, яку потім можна демонструвати на телеекрані за допомогою відеомагнітофону або через пряме підключення до телевізора. |
| 3. Most camcorders have built-in play- back capability, so that the operator can review the pictures already taken. | С. Найостаннішим винаходом у ца­рині непрофесійних відеокамер є “камкодер”, тобто портативна відеокамера, яка з’явилася на початку 80-х років. |
| 4. A video camera is capable of recor- ding pictures and sound on magnetic videot­ape, which can then be shown on a television screen, via a videocassette recorder (VCR) or by direct connection to a TV set. | D. До того ж, майже всі типи камко- дерів можна приєднувати до телевізора за допомогою кабелю, аби проглядати запис вдома. |
| 5. In addition, almost all camcorders can be hooked up by means of a cable to a television receiver, in order that one may screen pictures at home. | Е. Елементами типової відеокамери є: окуляр, об’єктив зі змінною фокусною відстанню (варіооб’єктив), візир, підкасетник, батареї та система керування. |
| 6. A typical video camera includes an eyepiece, zoom lens, viewfinder, cassete compartment, battery and controls. | F. Більшість моделей камкодерів мають вбудовану функцію відтворення запису, що дозволяє оператору переглядати вже зняті кадри. |

Exercise 2. Translate the following two texts into Ukrainian Home Stereo System

The following audio components, in combination, make up a complete stereo system.

The CD Player. Compact Disc players may be either single-disc models or multi-disc .dangers. A changer may be either a “carousel” changer, which accepts 5 CDs in a large circular tray, or a “magazine” changer for which 5 to 10 CDs are pre-installed in a slotted carrier. A “combi” player handles CDs (single or multiple) and also plays video laser­discs.

The Tape Deck. This usually is a cassette player or recorder with compartments for two tape cassettes for easy copying. Audiophiles who prefer higher sound quality may use other recording systems: DAT, MiniDisc, reel-to-reel, or a Hi-Fi VCR.

The Tuner. This component receives radio broadcasts, usually from both AM and FM stations. In FM stereo, reception quality depends on the size, aiming, and location of the receiving antenna. Stereo sound may be distorted by signal reflections. Digital radio sig- nals, which are relatively immune to this fault, are delivered to homes via the same wires that deliver cable-TV.

Text 2 Home Stereo System. Continued

Amplifiers. An integrated, or complete, amplifier consists of a preamplifier and a pew­s’ amplifier. The amplifier drives the loudspeakers. It usually includes volume and tone controls.

The receiver is a tuner and an integrated amplifier, combined in a single chassis for convenience and economy.

Loudspeakers. A loudspeaker system usually consists of two or more drivers; a crossover circuit that channels low frequencies to the woofer and high frequencies to the tweeter; and a cabinet. For well-balanced stereo, the left and right speakers should be equally distant from the listener. If you are slightly nearer one speaker, its sound will arrive first, unbalancing the stereo image. Most speakers should be elevated on stands shelves so that their sound can travel in a straight line to your ears, unobstructed by furniture.

Headphones. Headphones are simply miniature loudspeakers that fire directly into the ears. They provide clear stereo sound, and they require so little power that they can be driven from battery-operated radios and tape players.

**ІІІ. Підбиття підсумків заняття.**

1. Узагальнення та систематизація вивченого.

2. Оголошення завдання для самостійної роботи.

3. Оголошення оцінок за роботу на занятті та їх обґрунтування

**ПРАКТИЧНЕ ЗАНЯТТЯ № 21**

**I. Організаційна частина.**

1. Повідомлення теми, мети заняття.

**Дидактична мета:**

* оволодіння лексичним мінімумом з теми «Додатки та компютерні програми»;
* оволодіння навичками вживання лексичних одиниць;
* формування умінь здійснювати різні види читання текстів;
* удосконалення навичок перекладу.

**Виховна мета:**

* формування звичок організації професійної діяльності;
* формування позитивної мотивації до вивчення англійської мови;
* розвиток навичок логічного мислення;
* розвиток аналітичних навичок.

2. Актуалізація опорних знань і контроль вихідного рівня знань студентів.

3. Мотивація навчальної діяльності.

**II. Зміст основної частини заняття (перелік практичних завдань):**

1. Вивчення нового матеріалу.

**Wearable Technology in Medical Applications and Healthcare**

The medical and healthcare sector, primarily characterized as “digital health,” represents the single largest opportunity for the wearable technology industry. [Patients want it](http://www.trustmarque.com/digital-nhs-survey/), [some physicians are embracing it](https://www.ipsos-mori.com/_assets/digitaldoctor/index.html), insurance companies are starting to fund some of it, regulators are approving some of it and companies ― big and small ― all want in. The healthcare sector presents some of the largest and most fundamental problems that society faces. IDTechEx forecasts that the healthcare, medical, fitness and wellness sectors of wearable technology will be worth $30 billion by 2025.

Healthcare is by far the [most complicated](https://www.google.co.uk/search?q=the+healthcare+ecosystem&espv=2&biw=1366&bih=683&source=lnms&tbm=isch&sa=X&ved=0CAYQ_AUoAWoVChMIutnBouO0xwIVAQQaCh3nqAFY#imgrc=gQf1mjOCPAZ6GM%3A) ecosystem of the areas that wearable technology will impact. This article will focus on back health applications, including issues related to posture, pain and growth, for example. From developing and maintaining posture as a preventative measure against back pain, to training exercises in the form of therapy, to spinal motion characterization, there are many solutions that are already, or will soon be, available. This is one of several prominent areas to broadly adopt many different wearable technology solutions.

**Evolution of Back Pain Solutions**

First, let us look at the problem that needs solving: Two easy clicks from the American Chiropractic Association homepage lands you on a page entitled, [“Back Pain Facts & Statistics”](http://www.acatoday.org/level2_css.cfm?T1ID=13&T2ID=68), complete with facts emphasizing the size of problem that society faces. *“80% of the population will experience a back problem,*” corresponding to *“one-half of all working Americans … each year,”* or *“31 million Americans … at any given time.”*  This kind of statement should sound familiar to those who have been at countless investor relations *pitches* and read reports on the subject.

This means that the use of wearable technology (of sorts) in the treatment and prevention of back problems is nothing new. Depending on how the sector is defined, solutions from the use of [crude mechanical braces](https://www.youtube.com/watch?v=x2-MCPa_3rU) to correct posture, to the more common and modern elastic solutions that can be purchased over the counter today, can all be included. But as the solutions become electronic, more familiar wearable technology products enter the landscape. Perhaps the most famous of these are activity/posture trackers such as the [Lumo Lift](http://www.lumobodytech.com/lumo-lift/) or [Up-Right](http://www.uprightpose.com/). These use commodity electronics, like accelerometers or other motion sensors, that give real-time feedback, in a solution currently coined as *“*[*trainables*](https://vimeo.com/134395318)*.”* With minimal regulation required, and often significant lasting impact for the users after just a few hours or days of use, these devices provide a solution with lead times much more typical of the consumer electronics sector.

When one moves into the rehabilitative space, a new set of solutions emerge. [Valedo](http://www.valedotherapy.com/) is a medical device used to provide live feedback during back rehabilitation exercises. With direct medical implications, the level of regulation here is higher than for the posture devices. This kind of device is enabled by improved power consumption in transmission technology, as well as a broad network of mobile phone and tablets that acts as ubiquitous, high-performance, wireless-enabled user interfaces for these sensor-based devices.

A third category is in the monitoring and characterization of back motion. [Bainisha](http://bainisha.com/) provides skin-patch-based solutions for measuring motion with high accuracy. Bainisha’s platform illustrates many of the properties that make wearable technology so attractive in the long term. Thin, flexible, transparent, and near-invisible, the platform sets new standards in both form factor and sensor data quality.

**Different Products; Different Challenges**

These illustrate three very differing product strategies in the same disease vertical. While the sensors (IMUs and stretch sensors) remain very similar in each product, the time to market, required investment, margins, regulatory process and target markets differ for each. Consumer products have lead times of 3-6 months, whereas medical devices can take 8-10 years to go from idea to product. Solutions for the broad healthcare space span that whole gap, so product developers need to understand the lead times and investment models in order to achieve sustainable success.

This large diversity of problems and potential solutions leads to an incredibly diverse player ecosystem. While they deliberately steer clear of press and analysts alike, the key players here are the medical device manufacturers. They have been moving to more practical (e.g. thin, conformal, portable, automated) solutions for many years, and control the medical device market. Their standard for successful products can turn around vast revenues, such as Medtronic’s MCT device, the [SEEQ](http://www.medtronicdiagnostics.com/us/cardiac-monitors/seeq-mct-system/index.htm), which is expected to make $ US 1 billion in revenue in one year. The device, developed at Corventis as the NUVANT pre-acquisition, is used to detect and analyze cardiac arrhythmias. They have the expertise, and will make successful wearable technology solutions as a logical extension of their current business.

**Everybody Wants a Slice**

But the strategies to enter this space as a new market are more varied and interesting. [Apple](http://abcnews.go.com/Nightline/video/inside-apples-top-secret-health-lab-apple-watch-29804218) collected over two years of medical and fitness data prior to the launch of its watch, and continue to study many areas relevant to healthcare. Google’s life sciences activities have seen them develop contact lenses, partnering with pharmaceutical companies. The division has grown under GoogleX, and will soon be spun out under new holding company, Alphabet. Qualcomm launched their [Tricorder XPrize](http://tricorder.xprize.org/), which has seen entries from over 39 countries, and will conclude in March 2016. Novartis is actively working with companies developing new sensors and digital health platforms, investing heavily in companies including Proteus Digital Health. GSK is assessing potential opportunity, with its Innovation Platform Technology & Science (iPTS) division in the UK working to use wearable technology to support clinical trials. Even manufacturing giants like Flextronics and Jabil have weighed in, via acquisitions and active development programs.

Therefore, while the pie is large, everyone wants a slice. Add regulatory processes that are both challenging and evolving, lead times that require significant investment, a seemingly inevitable ‘technology push’ overlooking the ‘clinical pull’ and the complex funding structures ― and this area is quite far from an easy win. However, the space is large enough for there to be multiple winners. With healthcare expenditure at 10% of global GDP, this will only rise as the population expands and ages. The global healthcare system requires constant and significant investment to stay ahead, and wearable technology is a crucial part of the solution.

**1**. Прочитайте та перекладіть текст.

**What exactly is the Internet?**

The best way to think of the Internet, or Net as it is often called, is as a vast global network of networks connecting computers across the world. These networks range from government departments and industrial and educational communication systems down to the personal online service providers such as CompuServe, Delphi, etc.

At present, more than 33 million people use the Internet and over three million com­puters worldwide are linked in. They use the Net for transferring data, playing games, socializing with other computer users, and sending e-mail (electronic mail).

**What is cyberspace?**

Cyberspace is the term we give to this entire electronic domain. Whenever you are using one of the online services such as e-mail or the World Wide Web, you are in cyberspace.

Despite the confusing techno-jargon that surrounds it, the Internet is simple: comput­ers talk to one another through a network that uses phone lines, cable, and fibre-optic lines.

**How did it begin?**

The Net was dreamt up in the late 1960s by the US Defense Department's Advanced Research Projects Agency which decided that, in the event of a nuclear attack, it needed a means by which messages could be sent and received even if phone lines were inoperative. In 1969, there was a net­work of just four mainframe computers. By 1972, the number had risen to 40. About this time the idea of the electronic mailbox was born, as users looked for a way of talking to each other electronically. By 1984 when the resources of the network were made avail­able to academics, the Internet began to develop into the form we know it today.

The Internet can be divided into five broad areas.

**Electronic Mail**

E-mail is much faster than traditional or snail mail because once the message is typed out, it arrives in the electronic mailbox of the recipient within minutes or seconds. Anything that can be digitized - pictures, sound, video - can be sent, retrieved, and printed at the other end. This is efficient, convenient, and saves trees!

**Information sites**

This is perhaps the fastest growing area of the Internet as more and more people put their own information pages on line. One thing that computers do very well is process vast amounts of information very fast, so, by specifying a key word or phrase, the computer can then search around the Net until it finds some matches. These information sites are usually stored on big computers that exist all over the world. The beauty of the Net is that you can access all of them from your home, using your own PC.

**The World Wide Web**

The World Wide Web, usually referred to as WWW or 3W, is a vast network of infor­mation databases that feature text, visuals, sound, and even video clips. On the WWW you can do such things as go on a tour of a museum or art exhibition, see the latest images from outer space, go shopping, and get travel information on hotels and holidays. You can even view a hotel's facilities before deciding to book!

**Usenet**

Usenet is a collection of newsgroups covering any topic. Newsgroups allow users to participate in dialogues and conversations by subscribing free of charge. Each newsgroup consists of messages and information posted by other users. There are more than 10,000 newsgroups and they are popular with universities and businesses.

**Telnet**

Telnet programs allow you to use your personal computer to access a powerful mainframe computer. If you are an academic, or just have a lot of number-crunching to do it can be very useful and cost-effective.

**transfer – передача**

**entire -** цілий

**avail­able –** дійсний, годний

**snail mail –** повільна пошта

**digitized –** відцифрований

**2**. Дайте відповідь на запитання:

1. What Net is?
2. How many people use Internet at present?
3. What is the Net used for?
4. What was the beginning of the Net?
5. What five broad areas can the Internet be divided into?
6. What information sites do you know?

**3.** Знайдіть у тексті відповідники:

передача даних, спілкування з іншими користувачами комп’ютерів, відправка електронної пошти, широкі сфери, обробляти велику кількість інформації, охоплювати будь-яку тему, брати участь у розмовах.

**4.** Утворіть пасивний стан за зразком і складіть речення з отриманими словосполученнями

Ex.: everything (do to) – everything can be done. Everything can be done by means of the I-net.

1. Pictures & sound (to digitize) –
2. The letter (to send) –
3. The documents (to print) –
4. Information (to search) –
5. The Internet (to divide into) –
6. Information (to store) –

**5**. Заповніть пропуски, використовуючи наведені слова:

*Network, posted, cyberspace, popular with, efficient*

1. E-mail is \_\_\_ , convenient, and saves trees!

2. Whenever you are using e-mail or the WWW, you are in \_\_\_.

3. Comput­ers talk to one another through a \_\_\_ that uses phone lines, cable, and fibre-optic lines.

4. Each newsgroup consists of messages and information \_\_\_ by other users.

5. A lot of newsgroups are \_\_\_ universities and businesses.

**6.** Закінчіть речення

1. On the WWW you can …

2. Newsgroups allow users …

3. Telnet programs allow …

**7.** Перекладіть речення англійською мовою:

1. Сьогодні Інтернет стає все більш популярним.

2. Інтернет має багато функцій, серед яких: передача даних, спілкування з іншими користувачами комп’ютерів, гра в різноманітні ігри, відправка електронної пошти тощо.

3. Але багато психологів стурбовані впливом кібепростору на людську психіку, особливу підліткову.

4. Дуже часто люди нехтують своїми щоденними справами заради комп’ютеру та віртуальної реальності.

5. Отже, Інтернет є корисним у нашому житті, але не слід приділяти йому більшу частину свого життя.

**ІІІ. Підбиття підсумків заняття.**

1. Узагальнення та систематизація вивченого.
2. Оголошення завдання для самостійної роботи.
3. Оголошення оцінок за роботу на занятті та їх обґрунтування.

**ПРАКТИЧНЕ ЗАНЯТТЯ № 22**

**I. Організаційна частина.**

1. Повідомлення теми, мети заняття.

**Дидактична мета:**

* оволодіння лексичним мінімумом з теми «Додатки у сфері медицини»;
* оволодіння навичками вживання лексичних одиниць;
* формування умінь здійснювати різні види читання текстів;
* удосконалення навичок перекладу.

**Виховна мета:**

* формування звичок організації професійної діяльності;
* формування позитивної мотивації до вивчення англійської мови;
* розвиток навичок логічного мислення;
* розвиток аналітичних навичок.

2. Актуалізація опорних знань і контроль вихідного рівня знань студентів.

3. Мотивація навчальної діяльності.

**II. Зміст основної частини заняття (перелік практичних завдань):**

1. Вивчення нового матеріалу.

**Applications and technologies**

**Keywords**

• **streaming protocol** - a set of rules to ensure that data will be supported in real time

• **network protocol** - a set of rules that set out how to establish communication between two or more computers over the network

• **routing** - the process of selecting paths in a network along which data can be sent between computers (through the router)

• **router** - a network device that groups computers in the network and establishes an area inside it

• **Internet** - a global network connecting millions of computers

• **peering** - the arrangement of traffic exchange between the Internet service providers (ISPs).

• **Internet provider** - a company that sells bandwidth and access to the Internet

• **bandwidth** - the amount of data that can be transferred through a specific path in the network usually expressed in kb/s [kilo bits per second]

• **circuit switching network** - a network in which computers establish a constant bandwidth connection before they start to share any data

• **broadcast** – the action of sending data by one computer in the network to all the others that are available inside the network

Summary

The text, divided into several parts, familiarises the reader with the problem of receiving video data transferred through a network (especially the Internet). The author outlines the methods of transferring data by means of phone lines, radio waves and television wires. He explains why the transfer of data is not problematic in those cases, while in computer networks it poses a real problem. After giving a brief account of the basis of the global network, the author describes the transfer of video data through the Internet. The article gives detailed descriptions of methods of transferring that type of data and lists reasons why receiving them can be a problem.

Pre-reading exercises

1. What do you know about the history of TV and radio?

2. Do you know the origins of the Internet?

3. Which kind of media do you find important and valuable?

4. Can you explain how connections are made between ‘users’ of radio, TV and the Internet?

As noted in earlier chapters and as any end user would be quick to point out, viewing streaming video over the Internet is hardly a seamless experience. Streaming video suffers from hiccups, delays, drop-outs, skips, and connection loss. In this section, we explain how the Internet moves data and how this affects video playback. It’s sometimes hard to understand why the Internet has trouble moving audio and video when radio, television, and telephones do it fairly well and have existed for almost 100 years. So first let’s look at the mechanisms of these traditional media.

Radio

Radio works simply because a single tower broadcasts the same signal to many receivers. Everyone listens to the same thing at the same time. All the stations are available at any time; you simply have to tune into a different frequency signal. The main barriers to radio transmission are distance; physical barriers such as hills, buildings, and tunnels that block the signal; and interference between two strong signals near each other on the dial. In terms of communication, radio is a one-way broadcast transmission.

Television

Television works much like radio, except that television broadcasting is organized into national networks. The same program is delivered to television receivers around the country by broadcasting the originating signal to branch offices, which broadcasts it out from towers, out through cable companies, or to people with satellite dishes. In any case, the same signal is sent to everyone at the same time - a one-way broadcast. All the channels are available at any time; there is no noticeable delay caused by changing channels. The main barriers to television reception are bent or frayed cables, badly aimed antennas or dishes, physical barriers as in radio, and interference of what.

Telephone

Telephone calls use many of the same wires used by the Internet. The telephone central office maintains devices called switches (automated versions of the classic telephone switchboard) that are used to connect the call to the next location. Telephone calls create a two-way circuit all the way from caller to receiver. The message “All circuits are busy” - usually heard only during disasters or radio call-in concert ticket giveaways - means the switch does not have any more slots in which to carry this call. The main barriers to telephone transmission are found at the beginning of the call— if there are not enough circuits to place the call. While a call is in progress, the entire route between the caller and recipient is reserved for their use only, even if there is silence and no one is talking. Telephones use what is called a circuit-switched connection.

Internet Basics

The path from a website to a web browser is different than these other systems. Conceptually, it is similar to the telephone conversation: It’s a two-way conversation in which the browser asks for a document and the server sends it. Unlike the telephone call, however, there is no reserved circuit. Data, in the form of requests and responses, are organized into chunks called packets and sent between the requesting web browser and the web server. In between the requester and the server is a series of routers. These machines route traffic between different smaller networks. Each time a packet crosses the boundary from one ISP to another, or from one kind of network to another, it goes through a router. The packets “hop” from router to router like a bucket brigade. This type of data transmission is called packet switching, instead of circuit switching. Internet packet switching has some attributes that make it reliable and unreliable at the same time.

The Internet is an extremely heterogeneous network, consisting of several different kinds of networks and ways of connecting networks to the Internet, as described in the next few sections.

The Internet Backbone

The Internet backbone (as much as a large, shapeless and ever-shifting cloud of networks can have a backbone!) consists of long-haul connections tha carry large volumes of Internet traffic (packets) across and between continents.

Public Exchange Points

Public exchange points exist at various points on continents and are the major nerve centers where many regional private networks, Internet providers, corporations, schools, and government divisions—large and small—converge to exchange traffic destined for other points on the Internet. You can compare these centers to major public airports, where international and domestic flights arrive 24 hours a day and trade passengers from different airlines.

Peering

The process of connecting a network to the Internet at one of these exchange points is called peering, and connecting to the backbone this way makes one a Tier-1 Internet provider. ISPs that rent their connection from a Tier-1 provider are called Tier-2 providers, and so on. The policies, prices, and agreements that cover how data is treated on these connections are as numerous as there are companies involved. This is the first source of variability for our packet switching.

Private Peering

Peering is simply two networks connecting to each other with routers. Public peering occurs at large exchange points, but any two networks that find a lot of traffic flowing between them can choose to create a direct private link between the networks (called private peering). This reduces the cost of access through a public exchange point or other provider for all the bandwidth that travels between these two networks. It also decreases the number of intermediate connections between the networks. For instance, when several schools in the same organization link together, their inter-campus network traffic does not have to go out to the Internet at large, and is often more reliable as a result. In this scenario, though, each school has its own connection to the Internet.

What if one of the school’s Internet connections went down? Would it be fair to send its traffic through the private peering connection and use another school’s Internet connection? The way these kinds of questions are answered and the internal policies in this regard are another contributing factor to the variability of Internet packet switching.

Internet Complexity

As everything “goes digital,” the distinction between cable TV wires, telephone wires, radio waves, and satellite transmission blurs. However, there are many ways to send data over these media. Internet data transmission can be complicated, leading to an effective communication.

Exercises

Pre-reading questions

1. What do you know about the history of TV and radio?

• The first use of radio took place Franklin Institute in Philadelphia in February 1893. It was the demonstration of wireless telegraph. Transmission of voice was the invention of the beginning of XX century. Development of TV was divided into two paths: the mechanical and electrical and purely electrical. The first idea of construction the TV (electromechanical) was abandoned about 1925. Demonstration of first color television display was given on August 16, 1944.

2. Do you know the origins of the Internet?

• The first idea of global network of computers was created by J.C.R. Licklider. He moved to the Defense Advanced Research Projects Agency (DARPA) to develop it. The first connection of two computers (by the phone line) took place in 1965. The first form of the Internet, called ARPANET, was brought online in 1969. In those time, the first ideas of reliability of connections (nowadays included in many protocols) was implemented into networks.

3. Which kind of media do you find important and valuable?

• I find the Internet the most important and valuable kind of media. Any information that can be found in other media (tv or radio) can also be found in the Internet.

4. Can you explain how connections are made between ‘users’ of radio, TV and the Internet?

• The radio waves are divided into frequency which enables the receivers to distinguish the channels. The same way of transferring data in the wireless TV is used to receive from broadcasting stations. When using cable connected TV receiver no division of data stream is needed as one channel is received through the cable in time. In the Internet every media is shared so protocols (describing the way the data is transferred) need to provide effective way to avoid collisions of the packets.

Comprehension questions

**1. Can you point out the differences between TV, radio and the Internet in terms of communication?**

• only broadcast communication (TV, Radio)

• each of nodes can be both sender and recipient ( the Internet)

• information can be reviewed any time (the Internet)

**2. Can you explain the process of establishing connections by telephone and on the Internet?**

• Telephone calls use many of the same wires used by the Internet. The telephone central office maintains devices called switches (automated versions of the classic t Telephone calls create a two-way circuit all the way from caller to receiver.

The message “All circuits are busy”—usually heard only during disasters or radio call-in concert ticket giveaways—means the switch does not have any more slots in which to carry this call. The main barriers to telephone transmission are found at the beginning of the call— if there are not enough circuits to place the call. While a call is in progress, the entire route between the caller and recipientis reserved for their use only, even if there is silence and no one is talking. Telephones use what is called a circuit-switched connection.

**3. What is the idea of “packet communication”?**

• The path from a website to a web browser is different than these other systems. Conceptually, it is similar to the telephone conversation: It’s a two way conversation in which the browser asks for a document and the server sends it. Unlike the telephone call, however, there is no reserved circuit. Data, in the form of requests and responses, are organized into chunks called packets and sent between the requesting web browser and the web server. In between the requester and the server are a series of routers. These machines route traffic between different smaller networks. Each time a packet crosses the boundary from one ISP (Internet Service Provider) to another or from one kind of network to another, it goes through a router. The packets “hop” from router to router like a bucket brigade. This type of data transmission is called packet switching, instead of circuit switching. Internet packet switching has some attributes that make it reliable and unreliable at the same time.

**4. Explain, in general terms, how routing works.**

• Routing is the process of selecting paths in a network along which to send data or physical traffic, usually directs forwarding on the basis of routing tables which maintain a record of the routes to various network destinations. Thus constructing routing tables, which are held in the routers’ memory, becomes very important for efficient routing.

**5. Give 5 reasons for packet delays.**

• a router is too busy and can’t keep up with traffic

• a particular link between sender and receiver becomes saturated

• a link goes down, causing traffic to be rerouted to a different link

• one or more routers in between can’t think fast enough

• a firewall looks at all the packets for viruses

• delay is added due to the use of older technology, such as modems

• other downloads on a pipe cause it to delay

• packets are lost, resulting in resends, and other packets get bunched up behindelephone switchboard) that are used to connect the call to the next location.

**ІІІ. Підбиття підсумків заняття.**

1. Узагальнення та систематизація вивченого.

1. Оголошення завдання для самостійної роботи.

Оголошення оцінок за роботу на занятті та їх обґрунтування

**ПРАКТИЧНЕ ЗАНЯТТЯ № 23**

**I. Організаційна частина.**

1. Повідомлення теми, мети заняття.

**Дидактична мета:**

* оволодіння лексичним мінімумом з теми «Шкідливі ПЗ. Архітектура вірусу»;
* оволодіння навичками вживання лексичних одиниць;
* формування умінь здійснювати різні види читання текстів;
* удосконалення навичок перекладу.

**Виховна мета:**

* формування звичок організації професійної діяльності;
* формування позитивної мотивації до вивчення англійської мови;
* розвиток навичок логічного мислення;
* розвиток аналітичних навичок.

2. Актуалізація опорних знань і контроль вихідного рівня знань студентів.

3. Мотивація навчальної діяльності.

**II. Зміст основної частини заняття (перелік практичних завдань):**

1. Вивчення нового матеріалу.

**CYBER WARFARE: REALITY OR BOX OFFICE HIT?**

**TASKS**

1. Read each passage and give it a heading.

2. Comprehension questions

a) Using the information in the text about the first DDoS attack and your own knowledge, try to explain how DDoS works?

b) Can you name the large-scale attacks and who they were directed against?

3. Make a list of **five phrases** from the text.

4. Write a summary of the article. Use phrases like:

***This article is about…***

***It starts with…***

***The following sections describe…***

***The article gives information about…***

***It concludes with*** …

The threat of cyber warfare has been brought forth again by the media; not only in news outlets but also in the entertainment industry. But is this threat real or imagined?

1. What Is Cyber Warfare?

To properly assess the risk, we first need a working definition of what cyber war is and how it might manifest. There is much disagreement about the term and its actual definition, and varying degrees in the types of cyber attacks that might be perpetrated. I think cyber warfare has some critical characteristics. First, warfare is considered the process of military struggle between two nations or groups of nations. Warfare generally includes attacks against critical communications channels, and against the military and civilian population resulting in loss of life. Next, the cyber aspect can be considered to refer to the realm of electronic communication. So I think we can summarize the definition of cyber war as follows: cyber war (Cyber warfare): the process of military struggle between two nations or groups of nations conducted via various forms of electronic communications, or the Internet, resulting in the disruption of communications and/or loss of life.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Okay, we have a definition of cyber war, but what are other forms of cyber threats that would not fit into the definition of cyber warfare? Here’s a list of some online threats that I don’t feel fall into the warfare category:

Cyber vandalism: This is primarily the “script kiddies” that consider defacing a website to be “hacking.” I think of this as electronic graffiti. This is low-level harassment.

Civil disobedience or hacktivism: Hacktivism or Electronic Civil Disobedience (ECD) generally takes some form of Denial of Service (DoS) attack against the website of some target, usually political in nature. Those who consider themselves hactivists claim that hacktivism is the fusion of hacking and activism; politics and technology. More specifically, hacktivism is described as hacking for a political cause. Furthermore, hacktivists claim that Electronic Civil Disobedience (ECD) is a legitimate form of nonviolent, direct action utilized to bring pressure on institutions engaged in unethical or criminal actions. Within the electronic environment, ECD aims to disrupt the causing serious damage.

Cyber crime: Cyber crime can take many different forms; theft of intellectual property, extortion based on the threat of DDOS attacks, fraud based on identity theft, espionage, and so on.

While each of these types of activities is criminal in nature and might constitute an aspect of cyber warfare actions, they do not constitute cyber war by themselves. These actions, while criminal in nature, are generally not going to cost lives or affect military operations.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The threat comes primarily from nation states with the will, motive, and technology to launch attacks against the United States. In fact, nations that do not possess a powerful military are probably more likely to choose this form of attack because of its much lower cost of implementation (think “asymmetric warfare”). The most obvious avenues of attack would be against our nation’s critical infrastructure, so the government formed a body to analyze any threats against our infrastructure. This body, originally known as the President’s Critical Infrastructure Protection Board (PCCIB), is now known as the National Infrastructure Advisory Council (NIAC) and operates within the U.S. Department of Homeland Security. This council provides the President with advice on the security of the critical infrastructure sectors and their information systems. Over time, the sectors identified as belonging to the critical infrastructure have changed.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Just as our understanding of this critical infrastructure has changed and matured over time, so has the threat. These threats have existed for some time. Back in May 1998, all seven members of the L0pht (Brian Oblivion, Kingpin, Mudge, Space Rogue, Stefan Von Neumann, John Tan, and Weld Pond) famously testified before the Congress of the United States that they could shut down the entire Internet in 30 minutes.

Shortly after this testimony, the first distributed denial-of-service (DDoS) attacks appeared. The first well-documented DDoS attack appears to have occurred in August 1999, when a DDoS tool called Trinoo (described below) was deployed in at least 227 systems, of which at least 114 were on Internet2, to flood a single University of Minnesota computer. This system was knocked off the air for more than two days.

In the following months, Yahoo!, Amazon, Buy.com, CNN, and eBay were all hit with similar attacks. These commerce sites suffered large financial losses during the downtime because of these attacks. Today, incredibly large and complex botnets exist that can be used to launch a variety of attacks against multiple targets.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The current focus of these botnets appears to be primarily SPAM and DDoS attacks, but they could easily be used in cyber warfare activities. Other attacks of historic significance include the following:

Solar Sunrise: Solar Sunrise is the name given to a series of attacks against the Pentagon and MIT in February 1998. The Department of Defense called these attacks “the most organized and systematic attack to date.” The DoD actually declared the U.S. to be in a state of “cyber war.” These attacks appeared to be originating from Russian-owned IP address space, so the attack was considered to be “state-sponsored.”

Moonlight Maze: Moonlight Maze refers to an incident in which U.S. officials accidentally discovered a pattern of probing of computer systems at the Pentagon, NASA, Energy Department, private universities, and research labs that began in March 1998 and went on for nearly two years. It seems that these hackers had been able to access tens of thousands of files (including maps of military installations, troop configurations, and military hardware designs). The Defense Department traced the attacks back to a mainframe computer in the former Soviet Union.

Titan Rain: Titan Rain is the name given to a well-organized Chinese military hacking effort against the U.S. military. The hackers, believed to have been based in the Chinese province of Guangdong, are thought to have stolen U.S. military secrets, including aviation specifications and flight-planning software. These attacks apparently started in 2003 and lasted until 2005.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Much of the news related to cyber warfare tends to be a bit “sensational”. For example: Russia accused of unleashing cyber war to disable Estonia, Estonia hit by “Moscow cyber war”, Cyber war: Russia vs. Estonia.

All this sounds very dramatic and serious, but let’s look at the details. On April 27, officials in Estonia relocated the “Bronze Soldier,” a Soviet-era war memorial commemorating an unknown Russian who died fighting the Nazis. This led to political furor among ethnic Russians and to the blockading of the Estonian Embassy in Moscow. The event also marked the beginning of a large and sustained distributed denial-of -service attack on several Estonian national Web sites, including those of government that have no affiliation with any government agency. It seems there was no cyber war after all. But wait, that’s not all: America prepares for “cyber war” with China!

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Is Cyber war really that imminent? Are we about to fall under an attack of bits and bytes? A report in the UK branch of ZDNet proclaimed Cyber warfare “a reality in 12 months.” Unfortunately, that report was back in January 2004. The article is a good source of information about the types of vulnerable systems that may be attacked, but their predicted timeline is way off. .

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

There should be little doubt that future wars will inevitably include cyber warfare tactics. It is increasingly apparent that other nations are gearing up to take advantage of the ever-increasing complexity and inter-connected nature of various national infrastructures. Current efforts at security computer systems and networks will likely prove to be insufficient to prevent such future attacks. The U.S. military has been developing cyber warfare strategies for some time.

It appears that even Al Qaeda has been developing cyber war capabilities. With our enemies working toward this goal, we obviously cannot overlook the possibilities. The scenario in the movie Live Free or Die Hard might seem farfetched, but the potential exists for some of the attacks portrayed in that movie (although it won’t be nearly as easy as it seemed on the big screen). I’m hoping that somewhere in either our government or military cyberdefense forces we have our own John McClane?

**Botnet** a collection of software robots, or bots linked and cooperating with each other

**Hacktivism** combination of words: “hack(er)” and “activism”

**ІІІ. Підбиття підсумків заняття.**

1. Узагальнення та систематизація вивченого.

1. Оголошення завдання для самостійної роботи.
2. Оголошення оцінок за роботу на занятті та їх обґрунтування

**ПРАКТИЧНЕ ЗАНЯТТЯ № 24**

**I. Організаційна частина.**

1. Повідомлення теми, мети заняття.

**Дидактична мета:**

* оволодіння лексичним мінімумом з теми «Передача повідомлення. Компютерна симуляція»;
* оволодіння навичками вживання лексичних одиниць;
* формування умінь здійснювати різні види читання текстів;
* удосконалення навичок перекладу.

**Виховна мета:**

* формування звичок організації професійної діяльності;
* формування позитивної мотивації до вивчення англійської мови;
* розвиток навичок логічного мислення;
* розвиток аналітичних навичок.

2. Актуалізація опорних знань і контроль вихідного рівня знань студентів.

3. Мотивація навчальної діяльності.

**II. Зміст основної частини заняття (перелік практичних завдань):**

1. Вивчення нового матеріалу.

**COMPUTER SIMULATION**

**Keywords**

• **mathematical model** - an abstract model that uses mathematical language to describe a system.

• **stochastic process** - a process with an indeterminate or random element as opposed to a deterministic process that has no random element.

• **discrete** - not supporting or requiring the notion of continuity; discrete objects are countable sets such as integers.

• **Computer Generated Imagery (CGI)** - an application of the field of computer graphics (or, more specifically, 3D computer graphics) to special effects in films, television programs, commercials and simulation.

• **differential equation** - a mathematical equation for an unknown function of one or several variables that relates the values of the function itself and of its derivatives.

• **gamut** - a complete range or extent.

• **Monte Carlo method** - a computational algorithm which relies on repeated random sampling to compute its results.

***Computer Simulation***

A computer simulation (also referred to as a computer model or a computational model) is a computer program, or network of computers, that attempts to simulate an abstract model of a particular system. Computer simulations have become a useful part of the mathematical modelling of many natural systems in physics (computational physics), chemistry and biology; human systems in economics, psychology, and social science, and in the process of engineering new technology, so as to gain insight into the operation of those systems or to observe their behaviour.

Computer simulations vary from computer programs that run a few minutes, to network- -based groups of computers running for hours or ongoing simulations that run for days. The scale of events being simulated by computer simulations has far exceeded anything possible (or perhaps even imaginable) using the traditional paper-and-pencil mathematical modelling: over 10 years ago. A desert-battle simulation, of one force invading another, involved the modelling of 66,239 tanks, trucks and other vehicles on simulated terrain around Kuwait, using multiple supercomputers in the DoD High Performance Computer Modernization Program. Another simulation ran a 1-billion- -atom model, where previously, a 2.64-million-atom model of a ribosome, in 2005, had been considered a massive computer simulation. And the Blue Brain project at EPFL (Switzerland) began in May 2005 to create the first computer simulation of the entire human brain, right down to the molecular level.

*Simulation versus modelling*

Traditionally, the formal modelling, or modelling, of systems has been via a mathematical model, which attempts to find analytical solutions to problems, which enables the prediction of the behaviour of the system from a set of parameters and initial conditions.

While computer simulations might use some algorithms from purely mathematical models, computers can combine simulations with the reality of actual events, such as generating input responses to simulate test subjects who are no longer present. Although the missing test subjects (i.e. the users of equipment or systems) are being modelled/simulated, the whole process can be conducted with the actual equipment or system they use, revealing performance limits or defects in long-term use by the simulated users.

Note that the term computer simulation is broader than computer modelling, which implies that all aspects are being modelled in the computer representation. However, computer simulation also includes generating inputs from simulated users to run actual computer software or equipment, with only part of the system being modelled: an example would be flight simulators which can run machines as well as actual flight software.

Computer simulations are used in many fields, including science, technology, entertainment, and business planning and scheduling

*History*

Computer simulation was developed hand-in-hand with the rapid growth of the computer, following its first large-scale deployment during the Manhattan Project in World War II to model the process of nuclear detonation. It was a simulation of 12 hard spheres using a Monte Carlo algorithm. Computer simulation is often used as an adjunct to, or substitution for, modelling systems for which simple closed form analytic solutions are not possible. There are many different types of computer simulation; the common feature they all share is the attempt to generate a sample of representative scenarios for a model in which a complete enumeration of all possible states of the model would be prohibitive or impossible. Computer models were initially used as a supplement for other arguments, but their use later became rather widespread.

*Data preparation*

The data input/output for the simulation can be either through formatted text files or a pre- and post processor.

*Types of computer simulation*

Computer models can be classified according to several criteria including: • stochastic or deterministic (and as a special case of deterministic, chaotic)

• steady-state or dynamic

• continuous or discrete (and as an important special case of discrete, discrete event or DE models)

• local or distributed.

For example, steady-state models use equations defining the relationships between elements of the modelled system and attempt to find a state in which the system is in equilibrium. Such models are often used in simulating physical systems as a simpler modelling case before dynamic simulation is attempted. Dynamic simulations model changes in a system in response to (usually changing) input signals. Stochastic models use random number generators to model chance or random events; they are also called Monte Carlo simulations.

A discrete event simulation (DES) manages events in time. Most computer, logic-test and fault-tree simulations are of this type. In this type of simulation, the simulator maintains a queue of events sorted by the simulated time in which they should occur. The simulator reads the queue and triggers new events as each event is processed. It is not important to execute the simulation in real time. It’s often more important to be able to access the data produced by the simulation, to discover logic defects in the design or the sequence of events. A continuous dynamic simulation performs numerical solutions of differential-algebraic equations or differential equations (either partial or ordinary). Periodically, the simulation program solves all the equations, and uses the numbers to change the state and output of the simulation.

Applications include flight simulators, simulation games, chemical process modelling, and simulations of electrical circuits. Originally, these kinds of simulations were actually implemented on analogue computers, where the differential equations could be represented directly by various electrical components such as op-amps.

By the late 1980s, however, most “analogue” simulations were run on conventional digital computers that emulate the behaviour of an analogue computer. A special type of discrete simulation which does not rely on a model with an underlying equation, but can nonetheless be represented formally, is agent-based simulation. In agent-based simulation, the individual entities (such as molecules, cells, trees or consumers) in the model are represented directly (rather than by their density or concentration) and possess an internal state and set of behaviours or rules which determine how the agent’s state is updated from one time-step to the next. Distributed models run on a network of interconnected computers, possibly through the Internet. Simulations dispersed across multiple host computers like this are often referred to as “distributed simulations”. There are several standards for distributed simulation, including Aggregate Level Simulation Protocol (ALSP), Distributed Interactive Simulation (DIS), the High Level Architecture (HLA) and the Test and Training Enabling Architecture (TENA).

*CGI computer simulation*

Formerly, the output data from a computer simulation was sometimes presented in a table, or a matrix, showing how data was affected by numerous changes in the simulation parameters. The use of the matrix format was related to the traditional use of the matrix concept in mathematical models; however, psychologists and others noted that humans could quickly perceive trends by looking at graphs or even moving-images or motion-pictures generated from the data, as displayed by computer -generated-imagery (CGI) animation. Although observers couldn’t necessarily read out numbers, or spout maths formulas, from observing a moving weather chart, they might be able to predict events (and “see that rain was headed their way”), much faster than scanning tables of rain-cloud coordinates. Such intense graphical displays, which transcended the world of numbers and formulae, sometimes also led to output that lacked a coordinate grid or omitted timestamps, as if straying too far from numeric data displays. Today, weather forecasting models tend to balance the view of moving rain/snow clouds against a map that uses numeric coordinates and numeric timestamps of events.

Similarly, CGI computer simulations of CAT scans can simulate how a tumour might shrink or change, during an extended period of medical treatment, presenting the passage of time as a spinning view of the visible human head, as the tumour changes.

Other applications of CGI computer simulations are being developed to graphically display large amounts of data in motion, as changes occur during a simulation run.

*Computer simulation in science*

The following are generic examples of types of computer simulations in science, which are derived from an underlying mathematical description: A numerical simulation of differential equations which cannot be solved analytically. Falling into this category are:

• theories which involve continuous systems such as phenomena in physical cosmology • fluid dynamics (e.g. climate models, roadway noise models, roadway air dispersion models)

• continuum mechanics and chemical kinetics

A stochastic simulation, typically used for discrete systems where events occur probabilistically, and which cannot be described directly with differential equations (this is a discrete simulation in the above sense). Phenomena in this category include:

• genetic drift

• biochemical or gene regulatory networks with small numbers of molecules (See also: Monte Carlo method).

Specific examples of computer simulations follow:

• statistical simulations based upon an agglomeration of a large number of input profiles, such as the forecasting of equilibrium temperature of receiving waters, allowing the gamut of meteorological data to be input for a specific locale. This variability in the agents cannot be neglected, such as population dynamics of salmon and trout (most purely mathematical models assume all trout behave identically)

• time stepped dynamic model; in hydrology there are several such hydrology transport models such as the SWMM and DSSAM Models developed by the U.S. Environmental Protection Agency for river water quality forecasting

• computer simulations have also been used to formally model theories of human

cognition and performance, e.g. ACT-R

• computer simulation using molecular modelling for drug discovery

• computational fluid dynamics simulations are used to simulate the behaviour of flowing air, water and other fluids. There are one-, two- and three- dimensional models used. A one dimensional model might simulate the effects of water hammer in a pipe. A two-dimensional model might be used to simulate the drag forces on the cross-section of an aeroplane wing. A three-dimensional simulation might estimate the heating and cooling requirements of a large building.

Understanding of statistical thermodynamic molecular theory is fundamental to the appreciation of molecular solutions. Development of the Potential Distribution Theorem (PDT) allows one to simplify this complex subject to down-to-earth presentations of molecular theory.

Notable, and sometimes controversial, computer simulations used in science include:

• Donella Meadows’ World3 used in the Limits to Growth

• James Lovelock’s Daisyworld

• Thomas Ray’s Tierra.

*Simulation environments for physics and engineering*

Graphical environments to design simulations have been developed. Special care was taken to handle “events” (situations in which the simulation equations are not valid and have to be changed). The open project Open Source Physics was started in order to develop reusable libraries for simulations in Java, together with Easy Java Simulations, a complete graphical environment that generates code based on these libraries.

*Pitfalls in computer simulation*

Although sometimes ignored in computer simulations, it is very important to perform sensitivity analysis to ensure that the accuracy of the results is properly understood. For example, the probabilistic risk analysis of factors determining the success of an oilfield exploration program involves combining samples from a variety of statistical distributions using the Monte Carlo method. If, for instance, one of the key parameters (i.e. the net ratio of oil-bearing strata) is known to only one significant figure, then the result of the simulation might not be more precise than one significant figure, although it might (misleadingly) be presented as having four significant figures.

*Computer simulation in practical contexts*

Computer simulations are used in a wide variety of practical contexts, such as:

• analysis of air pollutant dispersion using atmospheric dispersion modelling

• design of complex systems such as aircraft and logistics systems

• design of noise barriers to effect roadway noise mitigation

• flight simulators to train pilots

• weather forecasting

• behaviour of structures (such as buildings and industrial parts) under stress and other conditions

• design of industrial processes, such as chemical processing plants

• strategic management and organizational studies

• reservoir simulation for the petroleum engineering to model the subsurface reservoir

• Process Engineering Simulation tools

• robot simulators for the design of robots and robot control algorithms

The reliability and the trust people put in computer simulations depends on the validity of the simulation model, therefore verification and validation are of crucial importance in the development of computer simulations. Another important aspect of computer simulations is that of reproducibility of the results, meaning that a simulation model should not provide a different answer for each execution. Although this might seem obvious, this is a special point of attention in stochastic simulations, where random numbers should actually be semi-random numbers. An exception to reproducibility are “human-in-the-loop” simulations, such as flight simulations and computer games. Here a human is part of the simulation and thus influences the outcome in a way that is hard if not impossible to reproduce exactly.

Computer graphics can be used to display the results of a computer simulation. Animations can be used to experience a simulation in real-time e.g. in training simulations. In some cases animations may also be useful in faster than real-time or even slower than real-time modes. For example, faster than real-time animations can be useful in visualizing the build-up of queues in the simulation of humans evacuating a building. Furthermore, simulation results are often aggregated into static images using various ways of scientific visualization.

In debugging, simulating a program execution under test (rather than executing natively) can detect far more errors than the hardware itself can detect and, at the same time, log useful debugging information such as instruction trace, memory alterations and instruction counts. This technique can also detect buffer overflow and similar “hard to detect” errors as well as produce performance information and tuning data.

**EXERCISES**

Exersise 1. Read and translate the article. Make a list of 10 words/phrases from the text.

Exersise 2. Answer the questions

1. How can we solve problems in cases where physical models are too complex or expensive to build?

2. Name some problems which can be solved using computer simulation?

Exersise 3.Explain the differences between discrete/continuous and stochastic/deterministic simulation, giving examples.

Exercise 4. Complete the Summary of the article

**The article presents a general view** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. **It explains what** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **and the differences** **between** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. **It provides a brief overview of** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **and divides computer simulation into** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. **It sets out the advantages of** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**and describes the impact of** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. **The final part of the article** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**ІІІ. Підбиття підсумків заняття.**

1. Узагальнення та систематизація вивченого.

2. Оголошення завдання для самостійної роботи.

1. Оголошення оцінок за роботу на занятті та їх обґрунтування

**ПРАКТИЧНЕ ЗАНЯТТЯ № 25**

**I. Організаційна частина.**

1. Повідомлення теми, мети заняття.

**Дидактична мета:**

* оволодіння лексичним мінімумом з теми «Компютерне моделювання»;
* оволодіння навичками вживання лексичних одиниць;
* формування умінь здійснювати різні види читання текстів;
* удосконалення навичок перекладу.

**Виховна мета:**

* формування звичок організації професійної діяльності;
* формування позитивної мотивації до вивчення англійської мови;
* розвиток навичок логічного мислення;
* розвиток аналітичних навичок.

2. Актуалізація опорних знань і контроль вихідного рівня знань студентів.

3. Мотивація навчальної діяльності.

**II. Зміст основної частини заняття (перелік практичних завдань):**

1. Вивчення нового матеріалу.

##### 1. Знайдіть у тексті відповіді на запитання:

##### What are the main differences between «Code Red III» and «Code Red II»?

##### What firstly reduced the potential for damage from the worm?

##### What virus affects computers without a person’s help?

##### How is the Internet worm, which affects some Web sites running Microsoft software, designed?

##### What have White House technicians done, dodging the worm's strike?

##### What users aren’t affected with Code Red?

##### What systems are more vulnerable?

##### FBI: "Code Red" damage will be minimal

##### WASHINGTON (AP) — When the «Code Red» Internet virus enters «attack mode» in August, it will cause far less damage than originally feared because of concerted efforts to make Web server operators aware of it, the FBI said. At its peak, Code Red affected hundreds of thousands of Web servers, and some experts predicted it would have catastrophic effects on the Internet. But so many Web server operators downloaded a program to protect them from the worm that its potential harm has been limited.

##### «Because of the rapid response from the public, industry and infrastructure providers to mitigate the potential for damage from this worm, the threat posed by the upcoming attack is significantly reduced,» FBI officials said in a statement.

##### The Internet worm, which affects some Web sites running Microsoft software, is designed to spread until the 19th of each month. Then it tries to clog the White House Web site by launching a denial-of-service attack.

##### But White House technicians changed the site's numerical Internet address when the worm first attacked, dodging the worm's strike.

##### The more destructive «Code Red II» worm, which affected a handful of companies in recent weeks, does not make the same type of attack against the White House or any other site — though the worm can leave computers vulnerable to hackers.

##### Unlike a virus, which needs a person to help it spread, a worm infects other computers on its own.

##### FBI officials also reiterated that there is no «Code Red III» worm, despite some news reports quoting Asian officials. The FBI said the reports stemmed from a confusion in names.

##### Even though Code Red's threat has abated, experts have said several thousand computers are still infected.

##### Web site administrators running Microsoft Windows NT and 2000 operating systems, along with the Internet Information Services software, should download a patch from Microsoft's Web site. Users running Windows 95, 98 or Me are not affected.

##### efforts – зусилля

##### predict - прогнозувати

##### spread – розповсюджуватись

##### 2. Знайдіть у словнику переклад слова “WORM”. Яке відношення воно має до комп’ютерів?

##### 3. Перекладіть речення:

##### Цей вірус вплинув на більшість серверів.

##### Спеціалісти прогнозують, що наслідки для Інтернету будуть катастрофічні.

##### Потенціальна загроза цього вірусу буде обмежена.

##### Деякі операційні системи особливо чутливі до дії «Code Red III».

##### 4. Виберіть правильний варіант перекладу:

##### 1. Unlike a virus, which needs a person to help it spread, a worm infects other computers on its own.

##### Не так як вірус, якому необхідна допомога людини для розповсюдження, “хробак” вражає комп’ютери сам по собі (самостійно)

##### Несхожий на вірус, якому необхідна людина, щоб допомогти розповсюдитись, “хробак” вражає комп’ютери самостійно.

##### Як і вірус, якому необхідна людина, щоб допомогти розповсюдитись, “хробак” вражає комп’ютери самостійно.

##### Як і вірус, якому непотрібна людина для розповсюдження, “хробак” вражає комп’ютери самостійно.

##### 2.But so many Web server operators downloaded a program to protect them from the worm that its potential harm has been limited.

##### Але так багато операторів серверів завантажили програму для захисту від “хробака”, що його потенційна загроза була обмежена.

##### Але так багато серверів написали спецільну програму щоб захиститись від “хробака”, що його потенційна загроза була зменшена.

##### Але так багато серверів знищили програму щоб захиститись від “хробака”, що їх потенційна шкода була зменшена.

##### 3.Even though Code Red's threat has abated, experts have said several thousand computers are still infected.

##### Навіть хоча шкода від Code Red зменшилась, експерти говорять, що кілька тисяч комп’ютерів ще інфіковані.

##### Навіть хоча загроза Code Red зменшилась, експерти стверджують, що кілька тисяч комп’ютерів ще інфіковані

##### Навіть хоча шкода від Code Red зменшилась, експерти впевнені, що кілька сотен комп’ютерів ще інфіковані.

##### 1. Прочитайте текст. Підкресліть слова, які можна виділити як ключові.

##### Web bugs spying on net users

##### Web bugs are crawling over the internet, secretly collecting information about surfing habits, says a new report.

##### Internet tracking firm Cyveillance found that the use of web bugs, has risen by almost 500% over the past three years. A web page was nearly five times more likely to contain a web bug today than in 1998, said the report.

##### «As public awareness levels begin to rise, the fact the websites are collecting information from visitors without permission is likely to generate more controversy,» said the report.

##### Hidden within webpages

##### Web bugs are hidden graphics embedded in web pages primed to collect information about visitors to the site.

##### Often only a pixel in size, they can gather information such as the user's IP address or the type of browser used to retrieve the bug.

##### The web bugs can dig out details about your computer, and work best together with cookies - files that log what you do on a website - and can interrogate them to find out more about you.

##### Violation of privacy?

##### «The proliferation of web bugs combined with the explosive growth of the internet and vast online partner networks multiplies the risk to the average company of association with privacy concerns,» said the report authors, Brian H.Murray and James J.Cowart.

##### “The collection of visitor information through web bugs...could be considered a violation of privacy policies, exposing a company to unwanted repercussions in terms of corporate and brand image,” said the report author, Brian H Murray.

##### spy – займатися шпигунством

##### habits – звички

##### permission – дозвіл

##### generate – породжувати

##### retrieve - возстановлювати

##### 2. Дайте відповідь на запитання

##### What Web bugs are?

##### Where are they embedded?

##### What is their size?

##### What files log what you do on a website?

##### What can be considered as a violation of privacy policies?

##### 3.Виберіть правильний варіант перекладу:

##### 1.Web bugs are crawling over the internet, secretly collecting information about surfing habits, says a new report.

##### Веб баги повзають по інтернету, секретно збираючи інформацію про звички серфінгістів, як говорить нова доповідь.

##### Веб баги повзають по інтернету, секретно збираючи інформацію про звички серфінгістів, як говорить нова доповідь.

##### Веб баги повзають по інтернету, секретно збираючи інформацію про звички серфінгістів, як говорить нова доповідь

##### 2.A web page was nearly five times more likely to contain a web bug today than in 1998.

##### Веб-сторінка містить в 5 разів більше багів сьогодні, ніж у 1988 році.

##### Веб-сторінка містить близько п’яти багів сьогодні, ніж у 1988 році.

##### Веб-сторінка біля п’яти разів виробляла схожі баги сьогодні, ніж у 1988 році.

##### На сьогодні ймовірність того, що Веб-сторінка містить баги, зросла в 5 разів порівняно з 1988 роком.

##### 4. Знайдіть антоніми у тексті

##### Fallen, unlikely, yesterday, with, alone, hide.

##### 5. Перекладіть віршик:

##### When the copy of your floppy's getting sloppy on the disk, And the microcode instructions cause unnecessary risk, Then you have to flash your memory and you'll want to ram your rom. Quickly turn off the computer and be sure to tell your mom!

**ІІІ. Підбиття підсумків заняття.**

1. Узагальнення та систематизація вивченого.

2. Оголошення завдання для самостійної роботи.

1. Оголошення оцінок за роботу на занятті та їх обґрунтування

**ПРАКТИЧНЕ ЗАНЯТТЯ № 26**

**I. Організаційна частина.**

1. Повідомлення теми, мети заняття.

**Дидактична мета:**

* оволодіння лексичним мінімумом з теми «Функціональний стиль науково-технічної літератури»;
* оволодіння навичками вживання лексичних одиниць;
* формування умінь здійснювати різні види читання текстів;
* удосконалення навичок перекладу.

**Виховна мета:**

* формування звичок організації професійної діяльності;
* формування позитивної мотивації до вивчення англійської мови;
* розвиток навичок логічного мислення;
* розвиток аналітичних навичок.

2. Актуалізація опорних знань і контроль вихідного рівня знань студентів.

3. Мотивація навчальної діяльності.

**II. Зміст основної частини заняття (перелік практичних завдань):**

1. Вивчення нового матеріалу.

##### 1. Прочитайте два тексти, присвячених одній проблеми. З’ясуйте, що у них спільного і чим вони відрізняються один від одного.

##### World News Briefs

##### Internet Fraud Admitted

##### BOSTON. - A 23-year-old i. college student who staged a major Internet fraud, pleaded guilty to manipulating the stock of Emulex Corp.

##### • Mark Simeon Jakob. the son of working-class Yugoslav immigrants, sent a false press release to an Internet business news service, claiming that the company was under investigation by the Securities and Exchange Commission. As Jakob had expected, the news ... sent the stock price of Emulex plum­meting by 62 per cent. The student had been facing $97,000 in losses, in­curred by selling Emulex stock short, instead made a $241,000 profit. The fraud cost investors $110 million.

##### Jakob faces 46 months in prison and could be ordered to pay $110 million or more in fines. As part of his guilty plea, he yesterday handed FBI agents $54,000 in cash.

##### • Computers really don't use that much juice

##### LOS ANGELES. - As the California electrical crisis worsened the past few weeks, experts began to ask consumers to turn off their computers when not in use, even if they were only leaving them to go to lunch. Now, according to the San Francisco Chronicle, an ex­pert at the Lawrence Berkeley National Laboratory says the concept that home computers guzzle electricity is an urban legend. Researchers say that the use of home computers accounts for only about three percent of domestic electrical use.

##### false – фальшивий

##### fraud – обман

##### domestic – внутрішній

##### worsened – погіршив

##### 2. Дайте відповідь на запитання:

##### What are the articles about?

##### What is called an urban legend?

##### Who suffered because of the student?

##### What is the student’s punishment?

##### 3. Напишіть власну статтю до газети, присвячену проблемам комп’ютеру сьогодні.

##### 4. Перекладіть вірш:

##### If your cursor finds a menu item followed by a dash, And the double-clicking icon puts your window in the trash, And your data is corrupted 'cause the index doesn't hash, then your situation's hopeless, and your system's gonna crash!

1. Прочитайте та перекладіть текст.

Electronic correspondence

The Internet is a worldwide computer network that allows people around the world to communicate, find and share information, and offer commercial services on line. A wide range of resources is available on the Internet, including electronic mail, discussion groups, chat environments, the World Wide Web (WWW) etc.

E-mail is nowadays the most popular and the simplest appendix to the global computer network which embraces over 100 countries and millions of users. The Internet began in the USA in 1969 as a military experiment.

Information sent over the Internet takes the shortest path available from one computer to another. Most of the people, who have access to the Internet, use the network only for sending and receiving e-mail messages. The Internet provides us with a reliable alternative to the expensive and unreliable telecommunication systems. However some problems remain. The most important is security. When you send your message to somebody, this message can travel through many different network and computers "in the clear", without any form of encoding.

E-mail address consists of several figures separated one from another with points. Every figure has a certain name - domain. The right domain usually means a country: .us (USA), .ua (Ukr), .ru (Rus) or a company: .com; an educational establishment: .edu; dealing with network: .net etc. For example: ksu@ukrpack.net, Kristian.Steiner@isb.hh.se, bill@microsoft.com.

services – послуги

discussion - дискусійний

to share – ділити

appendix – додаток

to embrace - охоплювати

2. Заповніть пропуски у реченнях поданими словами:

*e-mail address, domain, the Internet, network, appendix, military.*

\_\_\_\_ allows people around the world to communicate, find and share information, and offer commercial services on line.

E-mail is nowadays the most popular and the simplest \_\_\_\_\_to the global computer network.

The Internet began in the USA in 1969 as a \_\_\_\_\_ experiment.

Most people use the \_\_\_\_ only for sending and receiving e-mail messages.

\_\_\_\_\_ consists of several figures separated one from another with points.

Every figure has a certain name - \_\_\_\_.

3. Перекладіть слова та словосполучення українською мовою.

Worldwide computer network, correspondence, security, to communicate, to share, to consist, mail, global, access, messages, reliable.

4. Чи погоджуєтесь ви з твердженнями? Поставте “true” або “false”.

1. The Internet helps us to study, to work, to communicate.
2. Nowadays a lot of people have access to the Internet.
3. The Internet was invented as a military experiment.
4. The global computer network embraces some hundreds of users.
5. Only few people use the network for sending and receiving e-mail messages.
6. To send an e-mail message to somebody is secure today.

5. Дайте відповіді на запитання:

# What does the Internet allow people?

What resources are available on the Internet?

Why do most of the people use the Internet?

What does ‘www’ stand for?

What problems can be there with the sending of a message?

What does the E – mail address consist of?

What domain is?

6. Напишіть, що позначають подані домени:

.us —

.ua —

.ru —

.uk —

.com —

.net —

.edu –

.pl –

.fr —

**ІІІ. Підбиття підсумків заняття.**

1. Узагальнення та систематизація вивченого.

2. Оголошення завдання для самостійної роботи.

1. Оголошення оцінок за роботу на занятті та їх обґрунтування

**ПРАКТИЧНЕ ЗАНЯТТЯ № 27**

**I. Організаційна частина.**

1. Повідомлення теми, мети заняття.

**Дидактична мета:**

* оволодіння лексичним мінімумом з теми «Синтаксичні конструкції та звороти»;
* оволодіння навичками вживання лексичних одиниць;
* формування умінь здійснювати різні види читання текстів;
* удосконалення навичок перекладу.

**Виховна мета:**

* формування звичок організації професійної діяльності;
* формування позитивної мотивації до вивчення англійської мови;
* розвиток навичок логічного мислення;
* розвиток аналітичних навичок.

2. Актуалізація опорних знань і контроль вихідного рівня знань студентів.

3. Мотивація навчальної діяльності.

**II. Зміст основної частини заняття (перелік практичних завдань):**

1. Вивчення нового матеріалу.

Прочитайте текст. Розташуйте у логічній послідовності абзаци тесту та дайте назву кожному з них

**Electronic Mail**

**1** Internet users often find that the expanded capability to communicate with colleagues around the world leads to important new sources of information, collaboration, and professional development.

**2** Besides basic correspondence between two network users, e-mail presents additional opportunities for communication. Through various methods for distributing e-mail messages to lists of "subscribers," e-mail supports electronic discussions on a wide range of topics. These discussions bring together like-minded individuals who use such forums for discussing common problems, sharing solutions, and arguing issues.

**3** Electronic mail, or e-mail, is a fast, easy, and inexpensive way to communicate with other Internet users around the world. In addition, it is possible for Internet users to exchange e-mail with users of other independent networks such as CompuServe, Applelink, the WELL, and others.

**4** Another type of electronic communication that is growing in popularity is the electronic journal, or "e-journal." Although some e-journals require certain types of software and hardware to display each issue, most e-journals are distributed to a list of subscribers as an e-mail text message, either complete as one issue, or retrievable at the article level by mailing a command to a software program that automatically sends the appropriate file. The very definition of a "journal" is undergoing change in the electronic environment, as e-journal publishers experiment with different publication models (e.g., sending articles out individually as soon as they are ready rather than waiting until a group of articles are gathered for an "issue").

**expanded** - розширений

**capability** - можливість

**collaboration** - співробітництво

**opportunities** - можливості

**solution** – рішення

**2.** Заповніть пропуски у реченнях поданими словами:

*Supports, display, forums, communication, solutions, electronic journal.*

E-mail presents additional opportunities for \_\_\_\_.

E-mail \_\_\_\_\_ electronic discussions on a wide range of topics.

Like-minded individuals use \_\_\_\_ for discussing common problems, sharing \_\_\_, and arguing issues.

Some e-journals require certain types of software and hardware to \_\_\_\_each issue.

Another type of electronic communication that is growing in popularity is the \_\_\_\_ \_\_\_\_.

**3.** Перекладіть слова та словосполучення:

sources of information, subscribers, independent networks, require, mailing a command, appropriate file, publication models

**4.** Виберіть вірний варіант перекладу:

Besides basic correspondence between two network users, e-mail presents additional opportunities for communication.

а) Окрім основної переписки між двома користувачами мережі, електронна пошта надає додаткові можливості для спілкування.

b) Окрім базисної кореспонденції двох користувачів мережі, електронна пошта представляє додаткові можливості комунікації.

The very definition of a "journal" is undergoing change in the electronic environment

а) Саме поняття “журналу” піддається змінам в електронному середовищі.

b) Власне визначення “журналу” змінюється зараз в електронному середовищі.

с) Навіть визначення “журнал” змінилось в електронному оточенні.

**5.** Перекладіть англійською мовою:

Електронна пошта – це швидкий, легкий та недорогий спосіб спілкування з людьми у всьому світі. Власне спілкування робить нас людьми, а інтернет надає нам додаткові можливості для цього. Електронна пошта дозволяє переписуватись, брати участь у форумах, та підписуватись на розсилки та електронні журнали. Цей засіб спілкування має бути доступний кожному на сьогодні. Я користуюсь електронною поштою досить часто і вона допомагає мені у роботі та навчанні.

6. Прочитайте текст. Які поради є найважливішими на вашу думку?

**Electronic Communications**

(Email, LISTSERV groups, Mailing lists, and Usenet) Keep paragraphs and messages short and to the point. Focus on one subject per message and always include a pertinent subject title for the message, that way the user can locate the message quickly. Don't use the academic networks for commercial or proprietary work. Include your signature at the bottom of Email messages. Your signature footer should include your name, position, affiliation and Internet and/or BITNET addresses and should not exceed more than 4 lines. Optional information could include your address and phone number. Capitalize words only to highlight an important point or to distinguish a title or heading. \*Asterisks\* surrounding a word also can be used to make a stronger point. Capitalizing whole words that are not titles is generally termed as SHOUTING! Limit line length and avoid control characters. Follow chain of command procedures for corresponding with superiors. For example, don't send a complaint via Email directly to the "top" just because you can. Be professional and careful what you say about others. Email is easily forwarded. Cite all quotes, references and sources and respect copyright and license agreements. It is considered extremely rude to forward personal email to mailing lists or Usenet without the original author's permission. Be careful when using sarcasm and humor. Without face to face communications your joke may be viewed as criticism. Acronyms can be used to abbreviate when possible, however messages that are filled with acronyms can be confusing and annoying to the reader. Examples: IMHO= in my humble/honest opinion; FYI = for your information; BTW = by the way; Flame = antagonistic criticism; :-) = happy face for humor

**pertinent** – відповідний

**signature** – підпис

**cite** – цитувати

**quotes** – цитати

**2.** Дайте відповідь на запитання:

What kind of information should be included into e-mail?

What can help to express shouting?

What acronyms are?

What asterisks indicate at?

**3**. Напишіть власний електронний лист:

до ділового партнера;

до друга.

4. Використайте таку інформацію:

* Learn the **Smileys and Jargon** The following faces are the most common

(Tilt your head to the right in order to see it)

|  |  |
| --- | --- |
| :-)   :^) - Happy :-)) - Very happy 8-] - In love :-/ - Skeptical / undecided :-ozzzZZ - Bored %-) - Confused :-( - Very unhappy | :'-(   :,-( - Crying :-e - Disappointed :-II   :-|| - Angry :-o - Surprised ;-)   '-) - Winking :-> - Sarcastic >:-) - Devilish |

**ІІІ. Підбиття підсумків заняття.**

1. Узагальнення та систематизація вивченого.

2. Оголошення завдання для самостійної роботи.

3. Оголошення оцінок за роботу на занятті та їх обґрунтування

**ПРАКТИЧНЕ ЗАНЯТТЯ № 28**

**I. Організаційна частина.**

1. Повідомлення теми, мети заняття.

**Дидактична мета:**

* оволодіння лексичним мінімумом з теми «Переклад заголовків наукових статей та термінів»;
* оволодіння навичками вживання лексичних одиниць;
* формування умінь здійснювати різні види читання текстів;
* удосконалення навичок перекладу.

**Виховна мета:**

* формування звичок організації професійної діяльності;
* формування позитивної мотивації до вивчення англійської мови;
* розвиток навичок логічного мислення;
* розвиток аналітичних навичок.

2. Актуалізація опорних знань і контроль вихідного рівня знань студентів.

3. Мотивація навчальної діяльності.

**II. Зміст основної частини заняття (перелік практичних завдань):**

1. Вивчення нового матеріалу.

**1. Прочитайте та запам’ятайте правила:**

**The Ten Commandments For Computer Ethics**

*from the Computer Ethics Institute*1. Thou shalt not use a computer to harm other people.  
2. Thou shalt not interfere with other people's computer work.  
3. Thou shalt not snoop around in other people's files.  
4. Thou shalt not use a computer to steal.  
5. Thou shalt not use a computer to bear false witness.  
6. Thou shalt not use or copy software for which you have not paid.  
7. Thou shalt not use other people's computer resources without authorization.  
8. Thou shalt not appropriate other people's intellectual output.  
9. Thou shalt think about the social consequences of the program you write.  
10. Thou shalt use a computer in ways that show consideration and respect.

**thou = you**

**shalt =** should not

**harm** – спричиняти шкоду

**interfere** – заважати

**steal** – красти

**social consequences** – соціальні наслідки

**2.** Головна думка тексту:

You should use computer in you interests;

You should not use computer to harm people and society;

You should not use computer in you interests;

You should use computer in somebody’s else interests.

Most people use computer to steal.

**3.** Дайте відповідь на запитання:

What computer ethics is?

What is the difference between usual human ethics and computer ethics?

What are the main rules of computer ethics?

Do you always follow this rules?

How should person or society punish those who don’t follow the rules?

What do you know about the rules’ violation?

What scandals about computer ethics do you know? What do think about them?

**4.** Знайдіть синоніми у тексті до поданих слів:

Bother, injure, produce, proof, result, regard

**5.** Перекладіть речення англійською мовою.

Інтернет стає дедалі популярним. Ця світова комп’ютерна мережа дає людям можливість спілкуватися та швидко знаходити необхідну інформацію. Інтернет є надійною заміною коштовним та інколи ненадійним телекомунікаційним системам. В Інтернеті доступне широке коло ресурсів. Нажаль, не всі студенти на сьогодні мають доступ до Інтернету.

У вас є доступ до Інтернету?

Це домен якої країни?

Вкажіть, будь ласка, вашу електронну адресу.

Чи часто ви користуєтесь електронною поштою?

**1**. Прочитайте подані визначення.

**Basic Internet Terms.**

**FTP**: File Transfer Protocol - Internet protocol (and program) used to transfer files between hosts.

**HTML**: Hypertext Markup Language - a language (or format) used for creating hypertext documents on the World Wide Web.

**HTTP**: Hypertext Transfer Protocol - an information retrieval mechanism for HTML documents.

**Hypertext**: A text link to other documents containing more information on the same or a related topic. To retrieve the related document, or move to the related link, click on the hypertext.

**Protocol**: A formal description of messages to be exchanged and rules to be followed for two or more systems to exchange information.

**Telnet**: The virtual terminal protocol in the Internet suite of protocols. This allows users of one host to log into a remote host and interact as a regular terminal user of that host using command line interface.

**URL**: A URL is a Uniform Resource Locator. Basically, it's a file or site address. Think of it as a networked extension of the standard filename concept: not only can you point to a file in a directory, but that file and that directory can exist on any machine on the network, can be served via any of several different methods, and might not even be something as simple as a file. URLs can also point to queries, documents stored deep within databases, the results of a finger or archie command, or search.

**Usenet**: Usenet is a world-wide distributed discussion system. It consists of a set of "newsgroups" with names that are classified hierarchically by subject. "Articles" or "messages" are "posted" to these newsgroups by people on computers with the appropriate software. These articles are then broadcast to other interconnected computer systems.

**transfer** – передача

**retrieval** – пошук

**related** - споріднений

**transmission** – передача, син. до transfer

**suite** – блок

**log** - регіструвати

**remote** – віддалений

**query** – запит

**appropriate** – відповідний

**2.** Дайте відповіді на запитання.

What hypertext is?

What hyperlink is?

What is the usual colour for hyperlinks?

What is the main function of Usenet?

What kinds of the Internet Protocols do you know?

**3**. Перекладіть словосполучення:

Related topic, hypertext documents, retrieval mechanism, terminal protocol, remote host, standard filename, appropriate software, interconnected computer systems, suite of protocols, command line interface.

**4**. Заповніть пропуски у реченнях поданими словами:

*Operating System, Internet, databases, hosts, newsgroups, hypertext links, log into, related.*

This Internet protocol is used to transfer files between \_\_\_\_.

Telnet allows users of one host to \_\_\_\_\_ a remote host .

Documents can be stored deep within \_\_\_\_\_ .

URL's make the \_\_\_\_\_ go around.

The articles from \_\_\_\_\_ the are broadcast to other interconnected computer systems via a wide variety of networks.

\_\_\_\_\_ are identified as different coloured text with an underline.

To retrieve the \_\_\_\_\_ document you should click on the hypergraphic.

\_\_\_\_\_\_ is also known as OS.

**5**. Знайдіть відповідники до акронімів та термінів

|  |  |
| --- | --- |
| 1. ZIP | A graphic image link to other documents containing more information on the same or a related topic. |
| 1. RTM | The extension given to a file using the most popular compression tool. |
| 1. Hypergraphic | The format used to create Web pages. |
| 1. Operating System | A loose linkage of Internet sites which provide data and other services from around the world. World Wide Web. |
| 1. HTML | Write-Once-Read-Many |
| 1. WWW | Read the manual [or message] |
| 1. Cybernetics: | the study of technology related to the transfer of information (computers, digital electronics, telecommunications) |
| 1. Information technology | the study of the way information is moved and controlled by the brain or by machinery |
| 1. WORM | The primary software a computer system that provides high level functions with which to build software applications. |

**6. Jokes**: ☺

On-line - Programmer trying to deal rationally on phone with management at 9pm

Off-Line - Uncharitable remarks programmer makes to wife or husband upon being phoned at 9pm to come in because system just crashed.

Windows - Will Install Needless Data On Whole System

Zeen. A electronic magazine.

**ІІІ. Підбиття підсумків заняття.**

1. Узагальнення та систематизація вивченого.

2. Оголошення завдання для самостійної роботи.

3. Оголошення оцінок за роботу на занятті та їх обґрунтування

**ПРАКТИЧНЕ ЗАНЯТТЯ № 29**

**I. Організаційна частина.**

1. Повідомлення теми, мети заняття.

**Дидактична мета:**

* оволодіння лексичним мінімумом з теми «Адекватність у перекладі. Переклад фразеологізмів»;
* оволодіння навичками вживання лексичних одиниць;
* формування умінь здійснювати різні види читання текстів;
* удосконалення навичок перекладу.

**Виховна мета:**

* формування звичок організації професійної діяльності;
* формування позитивної мотивації до вивчення англійської мови;
* розвиток навичок логічного мислення;
* розвиток аналітичних навичок.

2. Актуалізація опорних знань і контроль вихідного рівня знань студентів.

3. Мотивація навчальної діяльності.

**II. Зміст основної частини заняття (перелік практичних завдань):**

1. Вивчення нового матеріалу.

***Machine translation in practice***

Let us suppose that you are a native English speaker engaged as a professional German-English translator in the Language Centre for a multinational manufacturing company. One of the products this company supplies is computer products. In this organization the Language Centre is principally responsible for the translation of documents created within the company into a variety of European and Oriental languages. The Language Centre is also charged with exercising control over the content and presentation of company documentation in general. To this end, it attempts to specify standards for the final appearance of documents in distributed form, including style, terminology, and content in general. The overall policy is enshrined in the form of a corporate Document Design and Content Guide which the Centre periodically updates and revises.

The material for which MT is to be used consists of technical documentation such as User and Repair manuals for software and hardware products manufactured or sourced by the company. Some classes of highly routine internal business correspondence are also submitted for MT. Legal and marketing material, and much external business correspondence, is normally translated by hand, although some translators in the organization prefer to use MT here as well.

All material for translation is available in electronic form on a computer network which supports the company’s documentation system. Although most documents will be printed out at some point as standard paper User Manuals and so forth, the system also supports the preparation of multi-media hypertext documents. These are documents which exist primarily in electronic form with a sophisticated cross-reference system; they contain both text and pictures (and perhaps speech and other sounds). These documents are usually distributed to their final users as CD-ROMs, although they can be distributed in other electronic forms, including electronic mail. Printed versions of these documents can also be made.

Everyone in the language department has a workstation — an individual computer. These are linked together by the network. The documentation system which runs on this network allows users to create and modify documents by typing in text; in other words, it provides very sophisticated word processing facilities. It also provides sophisticated means for storing and retrieving electronic documents, and for passing them around the network inside the company or via external networks to external organizations. As is usual with current computer systems, everything is done with the help of a friendly interface based on windows, icons and menus, selections being made with a mouse.

The MT system which you use is called ETRANS and forms part of the overall documentation system. (ETRANS is just a name we have invented for a prototypical MT system). Parts of an electronic document on the system can be sent to the MT system in the same way that they can be sent to a printer or to another device or facility on the network. ETRANS is simultaneously available from any workstation and, for each person using it, behaves as if it is his or her own personal MT system.

Earlier this morning, one of the technical authors had completed (two days after the deadline) a User Manual for a printer the company is about to launch. The text is in German. Although this author works in a building 50 kilometres away, the network ensures that the document is fully accessible from your workstation. What follows is a fragment of the text which you are viewing in a window on the workstation screen and which you are going to translate:

|  |
| --- |
| **German Source Text**  Druckdichte Einstellung  Die gedruckte Seite sollte von exzellenter Qualität sein. Es gibt aber eine Reihe von Umweltfaktoren, wie hohe Temperatur und Feuchtigkeit, die Variationen in der Druckdichte verursachen können.  Falls die Testseite zu hell oder zu dunkel aussieht, verstellen Sie die Druckdichte am Einstellknopf an der linken Seite des Druckers (Figur 2-25).  Einstellung der Druckdichte:   * Drehen Sie den Knopf ein oder zwei Positionen in Richtung des dunklen Indikators. * Schalten Sie den Drucker für einen Moment aus und dann wieder ein, so dass die Testseite gedruckt wird. * Wiederholen Sie die beiden vorherigen Schritte solange, bis Sie grau auf dem Blatthintergrund sehen, ähnlich wie bei leicht unsauberen Kopien eines Photokopierers. * Drehen Sie den Knopf eine Position zur¨uck.   Jetzt können Sie den Drucker an den Computer anschliessen. Falls Sie den Drucker an einen Macintosh Computer anschliessen, fahren Sie mit den Instruktionen im Kapitel 3 fort. Falls Sie einen anderen Computer benutzen, fahren Sie fort mit Kapitel 4. |

As with all the technical documents submitted to ETRANS, all the sentences are relatively short and rather plain. Indeed, it was written in accordance with the Language Centre document specification and with MT very much in mind. There are no obvious idioms or complicated linguistic constructions. Many or all of the technical terms relating to printers (e.g. Druckdichte ‘print density’) are in regular use in the company and are stored and defined in paper or electronic dictionaries available to the company’s technical authors and translators.

To start up ETRANS, you click on the icon bearing an ETRANS logo, and this pops up a menu giving various translation options. ETRANS handles six languages: English, German, French, Italian, Spanish and Japanese. The printer document needs to be translated into English, so you select English as the target language option. Another menu shows the source language to be used. In this case, there is no need to select German because ETRANS has already had a very quick look at your printer document and decided, that it is probably German text. If ETRANS had guessed wrongly — as it sometimes does — then you could select the correct source language from the menu yourself.

By clicking on an additional menu of ETRANS options, you start it translating in batch or full-text mode; that is, the whole text will be translated automatically without any intervention on your part. The translation starts appearing in a separate screen window more or less immediately. However, since the full source text is quite long, it will take some time to translate it in its entirety. Rather than sit around, you decide to continue with the revision of another translation in another window. You will look at the output as soon as it has finished translating the first chapter.

|  |
| --- |
| **MT Output**  Print density adjustment  The printed page should be from excellent quality. There is however a series of environmental factors, how high temperature and humidity, can cause the variations in the print density.  If the test page looks too light or too darkly, adjust the print density at the tuner at the left page of the printer (figure 2-25).  Adjustment of the print density:   * Turn the button an or two positions in direction of the dark indicator. * Switch off the printer for a moment and then again a, so that the test page is printed. * Repeat the two previous steps as long as, until you see Gray on the background of the page, similarly like at easily unclean copies of a photocopier. * Turn back the button a position.   Now you can connect the printer to the computer. If you connect the printer to a Macintosh computers, continue with the instructions in the chapter 3. If you use an other computer, continue with chapters 4. |

The quality of this raw output is pretty much as you expect from ETRANS. Most sentences are more or less intelligible even if you don’t go back to the German source. (Sometimes some sentences may be completely unintelligible.) The translation is relatively accurate in the sense that it is not misleading — it doesn’t lead you to think that the source text says one thing when it really says something quite the opposite. However, the translation is very far from being a good specimen of English. For one thing, ETRANS clearly had difficulties with choosing the correct translation of the German word ein which has three possible English equivalents: a/an, on and one.

(1) a) Turn the button *an* or two positions in direction of the dark indicator.

b) Switch off the printer for a moment and then again a , so that the test page is printed.

Apart from these details, it has also made quite a mess of a whole phrase:

(2)….. similarly like at easily unclean copies of a photocopier.

In order to post-edit such phrases it will be necessary to refer back to the German source text.

During post-editing, the source text and target text can be displayed on alternate lines, which permits easy editing of the target text. This can be seen in the window at the top left of the screen. Below this are windows and icons for on-line dictionaries and termbanks, the source text alone, and the edited target text, etc. The window on the right shows the source text as it was originally printed.

After post-editing the remaining text, you have almost completed the entire translation process. Since it is not uncommon for translators to miss some small translation errors introduced by the MT system, you observe company policy by sending your post-edited electronic text to a colleague to have it double-checked. The result will be something like that.

The only thing left to be done is to update the term dictionary, by adding any technical terms that have appeared in the document with their translation terms which other translators should in future translate in the same way, and report any new errors the MT system has committed (with a view to the system being improved in the future).

|  |
| --- |
| **Post-edited translation**  Adjusting the print density  The printed page should be of excellent quality. There is, however, a number of environmental factors, such as high temperature and humidity, that can cause variations in the print density.  If the test page looks too light or too dark, adjust the print density using the dial on the left side of the printer (see Figure 2-25).  How to adjust the print density:   * Turn the button one or two positions in the direction of the dark indicator. * Switch the printer off for a moment and then back on again, so that the test page is printed. * Repeat the two previous steps until you see gray on the background of the page, similar to what you see with slightly dirty copies from a photocopier. * Turn the button back one position.   Now you can connect the printer to the computer. If you are connecting the printer to a Macintosh computer proceed to Chapter 3 for instructions. If you are using any other computer turn to Chapter 4. |

Having finished revising the translation, the result can be checked. One of the windows contains a preview of how the revised target text will look when it is printed. The other contains the revised translation, which can be edited for further corrections.

**ІІІ. Підбиття підсумків заняття.**

1. Узагальнення та систематизація вивченого.

2. Оголошення завдання для самостійної роботи.

3. Оголошення оцінок за роботу на занятті та їх обґрунтування

**ПРАКТИЧНЕ ЗАНЯТТЯ № 30**

**I. Організаційна частина.**

1. Повідомлення теми, мети заняття.

**Дидактична мета:**

* оволодіння лексичним мінімумом з теми «Формальний підмет. Порядок слів у реченні.»;
* оволодіння навичками вживання лексичних одиниць;
* формування умінь здійснювати різні види читання текстів;
* удосконалення навичок перекладу.

**Виховна мета:**

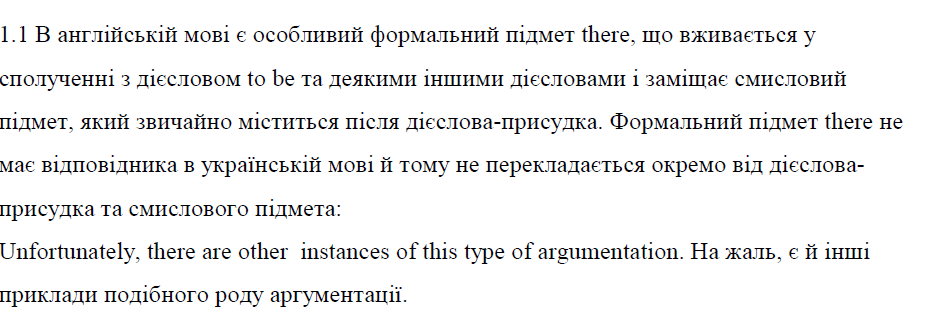
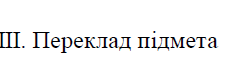
* формування звичок організації професійної діяльності;
* формування позитивної мотивації до вивчення англійської мови;
* розвиток навичок логічного мислення;
* розвиток аналітичних навичок.

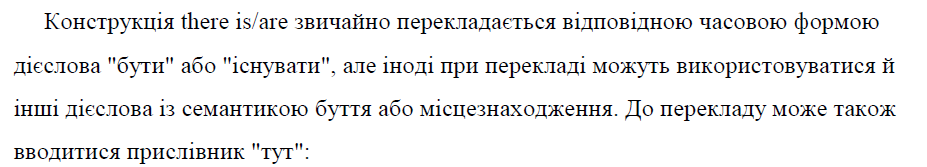
2. Актуалізація опорних знань і контроль вихідного рівня знань студентів.

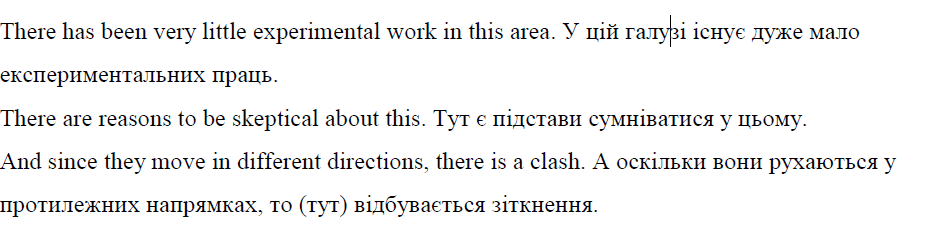
3. Мотивація навчальної діяльності.

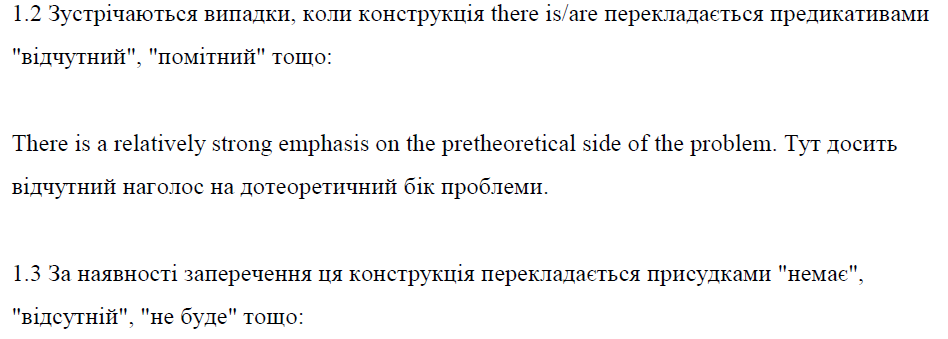
**II. Зміст основної частини заняття (перелік практичних завдань):**

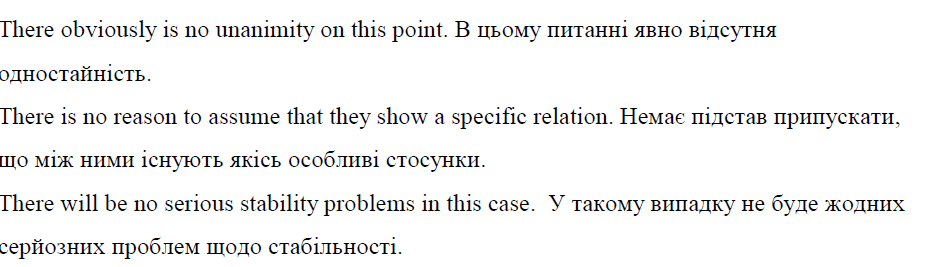
1. Вивчення нового матеріалу.

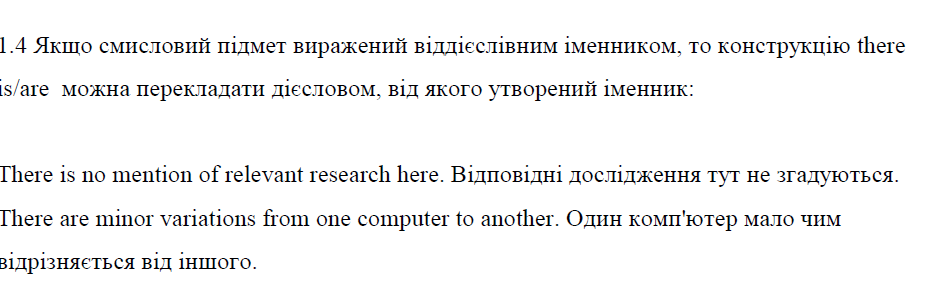


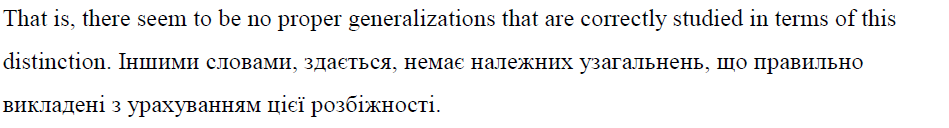


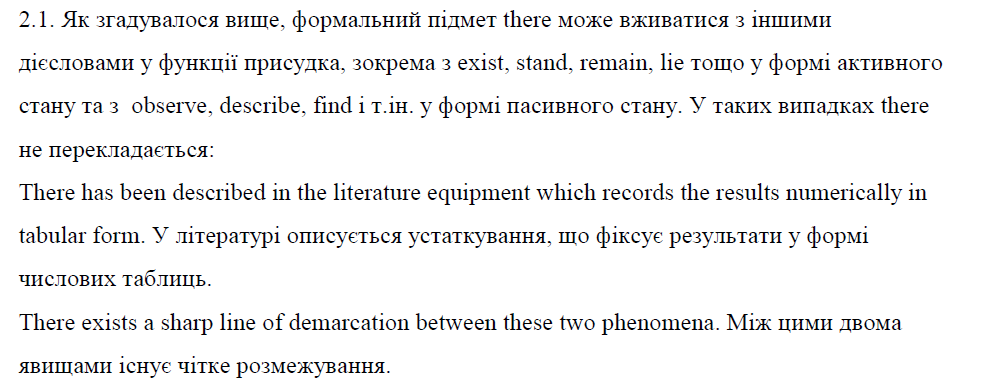


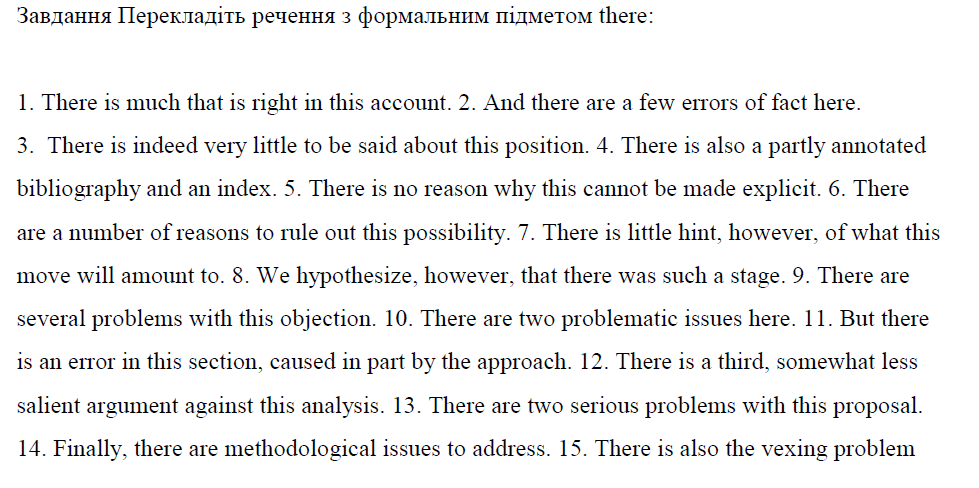


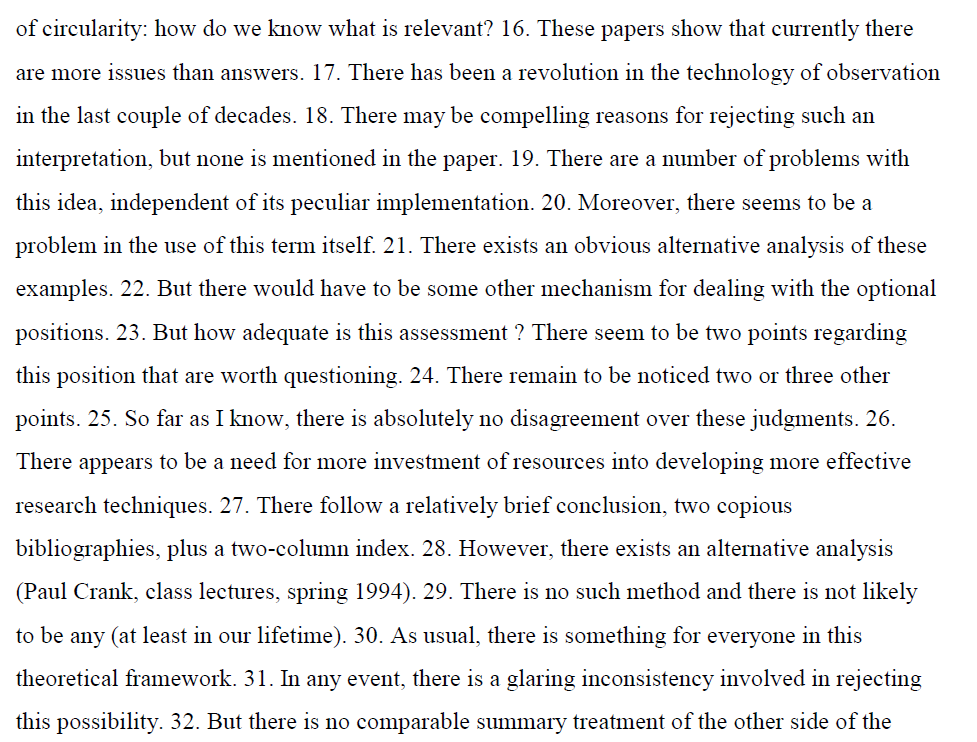


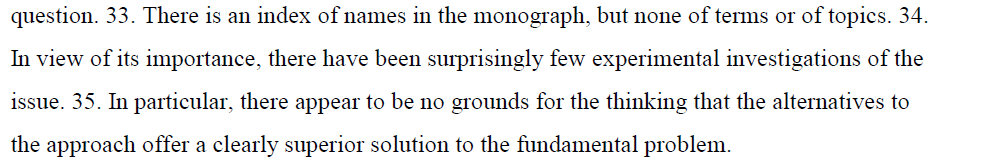




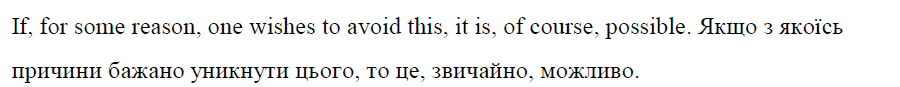


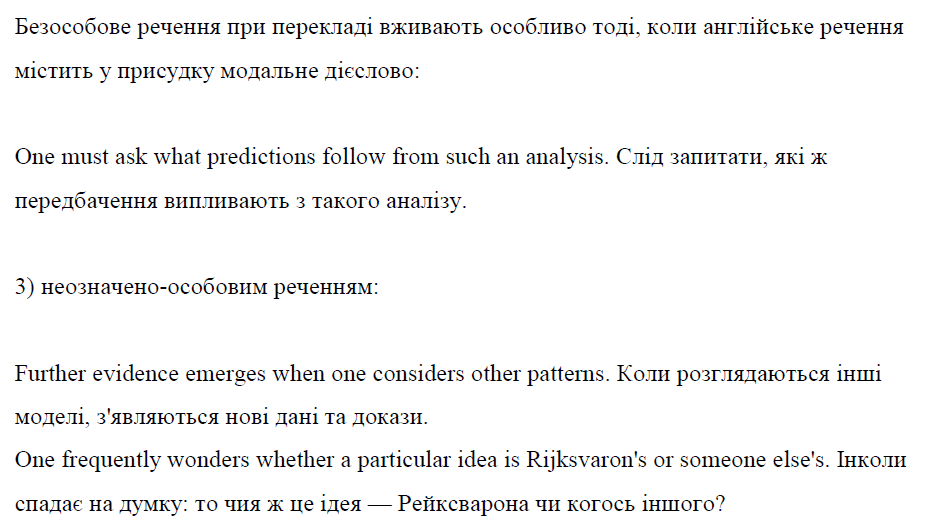


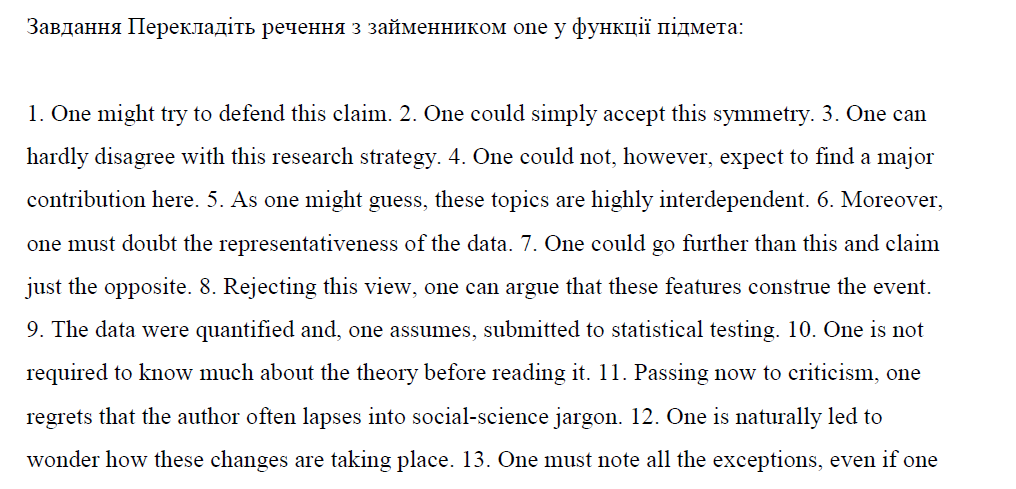








**ІІІ. Підбиття підсумків заняття.**

1. Узагальнення та систематизація вивченого.

2. Оголошення завдання для самостійної роботи. **ЗАВДАННЯ ДЛЯ САМОСТІЙНОЇ РОБОТИ**

**Самостійна робота 1.**

Тема: **Етимологічний аналіз словникового запасу англійської мови**

План

1. Definition of terms native, borrowing, translation loan, semantic loan.
2. Words of native origin and their characteristics.
3. Ukrainian - English lexical correlations

Література

1. Антрушина Г.Б., Афанасьева О.В., Морозова Н.Н. Лексикология английского языка: Учебник для пед. вузов. – 3-е изд-е. - – М.: Дрофа, 2001. – 288 с.
2. Бабич Г.Н. Лексикология английского языка. – Екатеринбург: Уральское изд-во. – 2005. – 176 с.
3. Ніколенко А.Г. Лексикологія англійської мови – теорія і практика. – Вінниця: Нова Книга. – 2007. – 528 с.

Etymologically the vocabulary of the English language is far from being homogeneous. It consists of two layers - the native stock of words and the borrowed stock of words. Numerically the borrowed stock of words is considerably larger than the native stock of words. In fact native words comprise only 30 % of the total number of words in the English vocabulary but the native words form the bulk of the most frequent words actually used in speech and writing. Besides the native words have a wider range of lexical and grammatical valence, they are highly polysemantic and productive in forming word clusters and set expressions.

Borrowed words (or loan words or borrowings) are words taken over from another language and modified according to the patterns of the receiving language. In many cases a borrowed word especially one borrowed long ago is practically indistinguishable from a native word without a thorough etymological analysis (*street, school, face*). The number of borrowings in the vocabulary of a language and the role played by them is determined by the historical development of the nation speaking the language. The most effective way of borrowing is direct borrowing from another language as the result of contacts with the people of another country or with their literature. But a word may also be borrowed indirectly not from the source language but through another language. When analysing borrowed words one must distinguish between the two terms - "source of borrowing" and "origin of borrowing". The first term is applied to the language from which the word was immediately borrowed, the second - to the language to which the word may be ultimately traced e.g. table - source of borrowing - French, origin of borrowing - Latin elephant - source of borrowing - French, origin-Egypt convene - source of borrowing - French, origin-Latin. The closer the two interacting languages are in structure the easier it is for words of one language to penetrate into the other.

There are different ways of classifying the borrowed stock of words. First of all the borrowed stock of words may be classified according to the nature of the borrowing itself as borrowings proper, translation loans and semantic loans.

Translation loans are words or expressions formed from the elements existing in the English language according to the patterns of the source language (the moment of truth - sp. el momento de la verdad).

A semantic loan is the borrowing of a meaning for a word already existing in the English language (e.g. the compound word *shock brigade* which existed in the English language with the meaning "аварійна бригада" acquired a new meaning "ударная бригада" which it borrowed from the Russian language.

Latin Loans are classified into the subgroups.

1. Early Latin Loans. Those are the words which came into English through the language of Anglo-Saxon tribes. The tribes had been in contact with Roman civilisation and had adopted several Latin words denoting objects belonging to that civilisation long before the invasion of Angles, Saxons and Jutes into Britain *(cup, kitchen, mill, port, wine).*
2. Later Latin Borrowings. To this group belong the words which penetrated the English vocabulary in the sixth and seventh centuries, when the people of England were converted to Christianity *(priest, bishop, nun, candle).*
3. The third period of Latin includes words which came into English due to two historical events: the Norman conquest in 1066 and the Renaissance or the Revival of Learning. Some words came into English through French but some were taken directly from Latin *(major, minor, intelligent, permanent).*
4. The Latest Stratum of Latin Words. The words of this period are mainly abstract and scientific words *(nylon, molecular, vaccine, phenomenon, vacuum).*

Norman-French Borrowings may be subdivided into subgroups:

1. Early loans - 12th - 15th century
2. Later loans - beginning from the 16th century.

The Early French borrowings are simple short words, naturalised in accordance with the English language system *(state, power, war, pen, river)* Later French borrowings can be identified by their peculiarities of form and pronunciation *(regime, police, ballet, scene, bourgeois*

**Ukrainian - English lexical correlations**

Lexical correlations are defined as lexical units from different languages which are phonetically and semantically related. The number of Ukrainian-English lexical correlations is about 6870.

The history of the Slavonic-German ties resulted in the following correlations: beat - бити, call - голос, day - день, widow - вдова, young -юний.

Semantically Ukrainian - English lexical correlations are various. They may denote everyday objects and commonly used things; *brutal* -брутальний, *cap* - капелюх, *cold* - холодний, *ground -* грунт, *kettle* - котел, *kitchen* - кухня, *lily* - лілія, *money -* монета (назва походить від латин. *Moneta* ''богиня домашнього добробуту), *quart* - кварта, *sister -* сeстра, *wolf*- вовк etc. Some Ukrainian - English lexical correlations have common Indo-European background: *garden -* город, *murder* - мордувати, *soot* - сажа.

Beside Ukrainian - English lexical correlations the Ukrainian language contains borrowings from modern English period e.g. брифінг, короткий інструктаж - *briefing;* диск-жокей, ведучий програми - *disk-jockey;* ескапізм, ухилення від соціальних проблем - *escapism;* істеблішмент, організація суспільно-державних установ країни - *establishment;* хіт парад, конкурс популярних пісень - *hit parade;* кітч, халтура - *kitch;* мас-медіа, засоби масової інформації - *mass media;* серіал, багатосерійна телепередача - *serial.*

Assimilation is the process of changing the adopted word. The process of assimilation of borrowings includes changes in sound form morphological structure, grammar characteristics, meaning and usage.

Phonetic assimilation comprises changes in sound form and stress. Sounds that were alien to the English language were fitted into its scheme of sounds, e.g. In the recent French borrowings *communique, cafe* the long [e] and [e] are rendered with the help of [ei]. The accent is usually transferred to the first syllable in the words from foreign sources.

The degree of phonetic adaptation depends on the period of borrowing: the earlier the period is the more completed is this adaptation. While such words as *"table", "plate"* borrowed from French in the 8th - 11th centuries can be considered fully assimilated, later Parisian borrowings (15th c.) such as *regime, valise, cafe"* are still pronounced in a French manner.

Grammatical adaption is usually a less lasting process, because in order to function adequately in the recipient language a borrowing must completely change its paradigm. Though there are some well-known exceptions as plural forms of the English Renaissance borrowings - *datum* pl. *data, criterion -* pl. *criteria* and others.

The process of semantic assimilation has many forms: narrowing of meanings (usually polysemantic words are borrowed in one of he meanings); specialisation or generalisation of meanings, acquiring new meanings in the recipient language, shifting a primary meaning to the position of a secondary meaning.

Completely assimilated borrowings are the words, which have undergone all types of assimilation. Such words are frequency used and are stylistically neutral, they may occur as dominant words in a synonymic group. They take an active part in word-formation.

Partially assimilated borrowings are the words which lack one of the types of assimilation. They are subdivided into the groups: 1) Borrowings not assimilated semantically (e.g. *shah, rajah).* Such words usually denote objects and notions peculiar to the country from which they came.

2) Loan words not assimilated grammatically, e.g. nouns borrowed from Latin or Greek which keep their original plural forms *{datum* - *data, phenomenon* - *phenomena).*

3) Loan words not completely assimilated phonetically. These words contain peculiarities in stress, combinations of sounds that are not standard for English *(machine, camouflage, tobacco).*

4) Loan words not completely assimilated graphically (e.g. *ballet, cafe, cliche).*

Barbarisms are words from other languages used by the English people in conversation or in writing but not assimilated in any way, and for which there are corresponding English equivalents e.g. *ciao* Italian - *good-bye* English,

The borrowed stock of the English vocabulary contains not only words but a great number of suffixes and prefixes. When these first appeared in the English language they were parts of words and only later began a life of their own as word-building elements of the English language *(-age, -ance, -ess, -merit)* This brought about the creation of hybrid words like *shortage, hindrance, lovable* and many others in which a borrowed suffix is joined to a native root. A reverse process is also possible.

Inmany cases one and the same word was borrowed twice either from the same language or from different languages. This accounts for the existence of the so called etymological doublets like *canal* - *channel* (Latin -French), *skirt - shirt* (Sc. - English), *balsam - balm* (Greek - French).

International words. There exist many words that were borrowed by several languages. Such words are mostly of Latin and Greek origin and convey notions which are significant in the field of communication in different countries. Here belong names of sciences *(philosophy, physics, chemistry, linguistics),* terms of art *(music, theatre, drama, artist, comedy),* political terms *(politics, policy, progress).* The English language became a source for international sports terms *(football, hockey, cricket, rugby, tennis)*

**Самостійна робота 2.**

Тема: **Асиміляція запозичень**

План

1. Types of assimilation.
2. Degrees of assimilation.
3. Assimilated and non-assimilated words.

Література

1. Антрушина Г.Б., Афанасьева О.В., Морозова Н.Н. Лексикология английского языка: Учебник для пед. вузов. – 3-е изд-е. - – М.: Дрофа, 2001. – 288 с.
2. Бабич Г.Н. Лексикология английского языка. – Екатеринбург: Уральское изд-во. – 2005. – 176 с.

Completely assimilated words are found in all the layers of older borrowings: the first layer of Latin borrowings (cheese, street, wall, and wing); Scandinavian borrowings (fellow, gate, to call, to die, to take, to want, happy, ill, low, wrong); early French borrowings (table, chair, finish, matter, dress, large, easy, common, to allow, to carry, to cry, to consider).

The number of completely assimilated words is many times greater than the number of partly assimilated ones. They follow all morphological, phonetical and orthographic standards.

II. The partly (partially) assimilated words can be subdivided into groups: a). Borrowed words not assimilated phonetically: e.g. machine, cartoon, police (borrowed from French) keep the accent on the final syllable; bourgeois, contain sounds or combinations of sounds that are not standard for the English language and do not occur in native words ([wa:],the nasalazed [a]); b).

Borrowed words not completely assimilated graphically. This group is fairly large and variegated. These are, for instance, words borrowed from French in which the final consonants are not pronounced: e.g. ballet, buffet, corps. French digraphs (ch, qu, ou, ete) may be retained in spelling: bouquet, brioche. c).

Borrowed words not assimilated grammatically, for example, nouns borrowed from Latin and Greek which keep their original forms: crisis-crises, formula-formulae, phenomenon-phenomena. d).

Borrowed words not assimilated semantically because they de-note objects and notions peculiar to the country from which they come: sombrero, shah, sheik, rickchaw, sherbet, etc. III. The so-called barbarisms are words from other languages used by English people in conversation or in writing but not assimilated in any way, and for which there are corresponding English equivalents, e.g.: Italian 'ciao' ('good-bye'), the French 'affiche' for 'placard', 'carte blanche' ('freedom of action'), 'faux pas' ('false step').

**Самостійна робота 3.**

Тема: **Словотворення в сучасній англійській мові**

План

1. The morphological structure of a word. The morpheme. The principles of morphemic analysis. Types of morphemes. Structural types of words: simple, derived, compound words.
2. Productivity. Productive and non-productive ways of word-formation.
3. Affixation. General characteristics of suffixes and prefixes. Classification of prefixes according to:

a) their correlation with independent words;

b) meaning

c) origin.

Classification of suffixes according to:

a) the part of speech formed;

b) the criterion of sense;

c) stylistic reference;

d) origin.

4) Productive and non-productive affixes, dead andliving affixes.

Література

1. Антрушина Г.Б., Афанасьева О.В., Морозова Н.Н. Лексикология английского языка: Учебник для пед. вузов. – 3-е изд-е. - – М.: Дрофа, 2001. – 288 с.
2. Бабич Г.Н. Лексикология английского языка. – Екатеринбург: Уральское изд-во. – 2005. – 176 с.
3. Ніколенко А.Г. Лексикологія англійської мови – теорія і практика. – Вінниця: Нова Книга. – 2007. – 528 с.

The word is not the smallest unit of the language. It consists of morphemes. The morpheme may be defined as the smallest meaningful unit which has a sound form and meaning and which occurs in speech only as a part of a word.

Word formation is the creation of new words from elements already existing in the language. Every language has its own structural patterns of word formation.

Morphemes are subdivided into root - morphemes and affixational morphemes.

The root morpheme is the lexical center of the word. It is the semantic nucleus of a word with which no grammatical properties of the word are connected, Affixational morphemes include inflections and derivational affixes.

Inflection is an affixal morpheme which carries only grammatical meaning thus relevant only for the formation of word-forms *(books, opened, strong-er).*

Derivational morpheme is an affixal morpheme which modifies the lexical meaning of the root and forms a new word. In many cases it adds the part-of-speech meaning to the root *(manage-ment, en-courage, fruit-ful)*

Morphemes which may occur in isolation and function as independent words are called free morphemes *(pay, sum, form).*

Morphemes which are not found in isolation are called bound morphemes *(-er, un-, -less)*

Morphemic analysis.

The segmentation of words is generally carried out according to the method of Immediate and Ultimate Constituents. This method is based upon the binary principle, i.e. each stage of procedure involves two components the word immediately breaks into. At each stage these two components are referred to as the Immediate Constituents (IC). Each IC at the next stage of analysis is in turn broken into smaller meaningful elements. The analysis is completed when we arrive at constituents incapable of further division, i.e. morphemes. These are referred to as Ultimate Constituents (UC). The analysis of word-structure on the morphemic level must naturally proceed to the stage of UC-s.

Allomorphs are the phonemic variants of the given morpheme e.g. *il-, im-, ir-*, are the allomorphs of the prefix **in**- *(illiterate, important, irregular, inconstant).*

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**Самостійна робота 4.**

Тема: **Фразеологія**

План

1. Free Word-Groups, Versus Set-Phrases. Phraseological Units, Idioms,

Word-Equivalents.

1. Criteria of Stability and Lack of Motivation (Idiomaticity)
2. Classification.

Література

1. Антрушина Г.Б., Афанасьева О.В., Морозова Н.Н. Лексикология английского языка: Учебник для пед. вузов. – 3-е изд-е. - – М.: Дрофа, 2001. – 288 с.
2. Бабич Г.Н. Лексикология английского языка. – Екатеринбург: Уральское изд-во. – 2005. – 176 с.
3. Ніколенко А.Г. Лексикологія англійської мови – теорія і практика. – Вінниця: Нова Книга. – 2007. – 528 с.

The term itself p h r a s e o l o g i c a l u n i t s to denote a specific group of phrases was introduced by Soviet linguists and is generally accepted in our country.

Attempts have been made to approach the problem of phraseology in different ways. Up till now, however, there is a certain divergence of opinion as to the essential feature of phraseological units as distinguished from other word-groups and the nature of phrases that can be properly termed p h r a s e o l o g i c a l u n i t s .

The complexity of the problem may be largely accounted for by the fact that the border-line between free or variable word-groups and phraseological units is not clearly defined. The so-called free word-groups are only relatively free as collocability of their member-words is fundamentally delimited by their lexical and grammatical valency which makes at least some of them very close to set-phrases.

Phraseological units are comparatively stable and semantically inseparable. Between the extremes of complete motivation and variability of member-words on the one hand and lack of motivation combined with complete stability of the lexical components and grammatical structure on the other hand there are innumerable border-line ca’ses.

However, the existing terms,1 e.g. set-phrases, idioms, wordequivalents, reflect to a certain extent the main debatable issues of phraseology which centre on the divergent views concerning the nature and essential features of phraseological units as distinguished from the so-called free word-groups. The term s e t - p h r a s e implies that the basic criterion of differentiation is stability of the lexical components and grammatical structure of word-groups. The term i d i o m s generally implies that the essential feature of the linguistic units under consideration is idiomaticity or lack cf motivation. This term habitually used by English and American linguists is very often treated as synonymous with the term p h r a s e o l o g i c a l u n i t universally accepted in our country.

The term w o r d - e q u i v a l e n t stresses not only the semantic but also the functional inseparability of certain word-groups and their aptness to function in speech as single words. Phraseological units are habitually defined as non-motivated word-groups that cannot be freely made up in speech but are reproduced as ready-made units. This definition proceeds from the assumption that the essential features of phraseological units are stability of the lexical components and lack of motivation.1 It is consequently assumed that unlike components of free word-groups which may vary according to the needs of communication, member-words of phraseological units are always reproduced as single unchangeable collocations.

Thus, for example, the constituent red in the free word-group *red flower* may, if necessary, be substituted for by any other adjective denoting colour (blue, white, etc.), without essentially changing the denotational meaning of the word-group under discussion (a flower of a certain colour). In the phraseological unit *red tape* (bureaucratic “methods) no such substitution is possible, as a change of the adjective would involve a complete change in the meaning of the whole group. A blue (black,

white, etc.) tape would mean ‘a tape of a certain colour’. It follows that the phraseological unit red tape is semantically non-motivated, i.e. its meaning cannot be deduced from the meaning of its components and that it exists as a ready-made linguistic unit which does not allow of any variability of its lexical components.

Taking into account mainly the degree of idiomaticity phraseological units may be classified into three big groups: p h r a s e o l o g i c a l f u s i o n s , p h r a s e o l o g i c a l u n i t i e s and p h r a s e o l o g i c a l c ol l o c a t i o n s .

P h r a s e o l o g i c a l f u s i o n s are completely non-motivated word-groups, such as red tape — ‘bureaucratic methods’; heavy father — ’serious or solemn part in a theatrical play’; kick the bucket — ‘die’; and the like. The meaning of the components has no connections whatsoever, at least synchronically, with the meaning of the whole group. Idiomaticity is, as a rule, combined with complete stability of the lexical components and the grammatical structure of the fusion.

P h r a s e o l o g i c a l u n i t i e s are partially non-motivated as their meaning can usually be perceived through the metaphoric meaning of the whole phraseological unit. For example, to show one’s teeth, to wash one’s dirty linen in public if interpreted as semantically motivated through the combined lexical meaning of the component words would naturally lead one to understand these in their literal meaning. The metaphoric meaning of the whole unit, however, readily suggests ‘take a threatening tone’ or ’show an intention to injure’ for show one’s teeth and ‘discuss or make public one’s quarrels’ for wash one’s dirty linen in public. Phraseological unities are as a rule marked by a comparatively high degree of stability of the lexical components.

P h r a s e o l o g i c a l c o l l o c a t i o n s are motivated but they are made up of words possessing specific lexical valency which accounts for a certain degree of stability in such word-groups. In phraseological collocations variability of member-words is strictly limited. For instance, bear a grudge may be changed into bear malice, but not into bear a fancy or liking. We can say take a liking (fancy) but not take hatred (disgust). These habitual collocations tend to become kind of clichés where the meaning of member-words is to some extent dominated by the meaning of the whole group. Due to this phraseological collocations are felt as possessing a certain degree of semantic inseparability.

**Самостійна робота 5.**

Тема: **Фразеологізми та ідіоматичні вирази.**

План

1. Criterion of Function
2. Phraseological Units and Idioms Proper
3. Criterion of Context

Література

1. Антрушина Г.Б., Афанасьева О.В., Морозова Н.Н. Лексикология английского языка: Учебник для пед. вузов. – 3-е изд-е. - – М.: Дрофа, 2001. – 288 с.
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Another angle from which the problem of phraseology is viewed is the so-called functional approach. This approach assumes that phraseological units may be defined as specify word-groups functioning as word-equivalents.1 The fundamental features of phraseological units thus understood are their semantic and grammatical inseparability which are regarded as distinguishing features of isolated words.

It will be recalled that when we compare a free word-group, e.g, heavy weight, and a phraseological unit, e.g. heavy father, we observe that in the case of the free wordgroup each of the member-words has its own denotational meaning. So the lexical meaning of the word-group can be adequately described as the combined lexical meaning of its constituents. In the case of the phraseological unit, however, the denotational meaning belongs to the word-group as a single semantically inseparable unit. The individual member-words do not seem to possess any lexical meaning outside the meaning of the group. The meanings of the member-words heavy and father taken in isolation are in no way connected with the meaning of the phrase heavy father — ’serious or solemn part in a theatrical play’.

The same is true of the stylistic reference and emotive charge of phraseological units. In free word-groups each of the components preserves as a rule its own stylistic reference. This can be readily observed in the stylistic effect produced by free word-groups made up of words of widely different stylistic value, e.g. to commence to scrub, valiant chap and the like.

A certain humorous effect is attained because one of the memberwords (commence, valiant) is felt as belonging to the bookish stylistic layer, whereas the other (scrub, chap) is felt as stylistically neutral or colloquial. When we say, however, that kick the bucket is highly colloquial or heavy father is a professional term, we do not refer to the stylistic value of the component words of these phraseological units kick, bucket, heavy or father, but the stylistic value of the word-group as a single whole. Taken in isolation the words are stylistically neutral. It follows that phraseological units are characterised by a single stylistic reference irrespective of the number and nature of their component words. Semantic inseparability of phraseological units is viewed as one of the aspects of idiomaticity 3 which enables us to regard them as semantically equivalent to single words.

The term g r a m m a t i c a l i n s e p a r a b i l i t y implies that the grammatical meaning or, to be more exact, the part-of-speech meaning of phraseological units is felt as belonging to the word-group as a whole irrespective of the part-of-speech meaning of the component words. Comparing the free word-group, e.g. a long day, and the phraseological unit, e.g. in the long run, we observe that in the free word-group the noun day and the adjective long preserve the part-of-speech meaning proper to these words taken in isolation. The whole group is viewed as composed of two independent units (adjective and noun). In the phraseological unit in the long run the part-of-speech meaning belongs to the group as a single whole. In the long run is grammatically equivalent to single adverbs, e.g. finally, ultimately, firstly, etc.

As can be inferred from the above discussion, the functional approach does not discard idiomaticity as the main feature distinguishing phraseological units from free word-groups, but seeks to establish formal criteria of idiomaticity by analysing the syntactic function of phraseological units in speech.

An attempt is also made to distinguish phraseological units as wordequivalents

from i d i o m s proper, i.e. idiomatic units such as that’s where the shoe pinches, the cat is out of the bag, what will Mrs Grundy say?, etc. Unlike phraseological units, proverbs, sayings and quotations do not always function as word-equivalents. They exist as readymade expressions with a specialised meaning of their own which cannot be inferred from the meaning of their components taken singly. Due to this the linguists who rely mainly on the criterion of idiomaticity classify proverbs and sayings as phraseological units.

The proponents of the functional criterion argue that proverbs and sayings lie outside the province of phraseology. It is pointed out, firstly, that the lack of motivation in such linguistic units is of an essentially different nature. Idioms are mostly based on metaphors which makes the transferred meaning of the whole expression more or less transparent. If we analyse such idioms, as, e.g., to carry coals to Newcastle, to fall between two stools, or fine feathers make fine birds, we observe that though their meaning cannot be inferred from the literal meaning of the member-words making up these expressions, they are still metaphorically motivated as the literal meaning of the whole expression readily suggests its meaning as an idiom, i.e. ‘to do something that is absurdly superfluous’, ‘fail through taking an intermediate course’ and ‘to be well dressed to give one an impressive appearance’ respectively.1 The meaning of the phraseological units, e.g. red tape, heavy father, in the long run, etc., cannot be deduced either from the meaning of the component words or from the metaphorical meaning of the word-group as a whole.

**Самостійна робота 6.**

Тема: **Словоскладання. Складні слова**

План

1. Word-composition. Classification of compound words:

a) from the functional point of view;

b) from the point of view of the way the components of the compound are linked together;

c) from the point of view of different ways of composition.

1. Coordinative and subordinative compound words and their types.

Література

1. Антрушина Г.Б., Афанасьева О.В., Морозова Н.Н. Лексикология английского языка: Учебник для пед. вузов. – 3-е изд-е. - – М.: Дрофа, 2001. – 288 с.
2. Бабич Г.Н. Лексикология английского языка. – Екатеринбург: Уральское изд-во. – 2005. – 176 с.
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Monomorphic are root-words consisting of only one root-morpheme i.e. simple words *(dry, grow, boss, sell).*

Polymorphic are words consisting of at least one root-morpheme and a number of derivational affixes, i.e. derivatives, compounds *(customer, payee, body-building, shipping).*

Derived words are those composed of one root-morpheme and one more derivational morphemes *(consignment, outgoing, publicity).*

Derived words are those composed of one root-morpheme and one or more. Compound words contain at least two root-morphemes *(warehouse, camera-man),*

Productivity is the ability to form new words after existing patterns which are readily understood by the speakers of a language. Synchronilly the most important and the most productive ways of word-formation are affixation, conversion, word-composition and abbreviation (contraction). In the course of time the productivity of this or that way of word-formation may change. Sound interchange or gradation *(blood* - *to bleed, to abide -abode, to strike* - *stroke)* was a productive way of word building in old English and is important for a diachronic study of the English language. It has lost its productivity in Modern English and no new word can be coined by means of sound gradation. Affixation on the contrary was productive in Old English and is still one of the most productive ways of word building in Modern English.

Affixation is the formation of new words with the help of derivational affixes. Suffixation is more productive than prefixation. In Modern English suffixation is characteristic of noun and adjective formation, while prefixation is typical of verb formation *(incoming, trainee, principal, promotion).*

Affixes are usually divided into living and dead affixes. Living affixes are easily separated from the stem (care-ful). Dead affixes have become fully merged with the stem and can be singled out by a diachronic analysis of the development of the word (admit - L.- ad + mittere). Living affixes are in their turn divided into productive and non-productive affixes. In many cases the choice of the affixes is a means of differentiating meaning:

*uninterested - disinterested distrust - mistrust*

Word-composition is another type of word-building which is highly productive. That is when new words are produced by combining two or more stems.

Stem is that part of a word which remains unchanged throughout its paradigm and to which grammatical inflexions and affixes are added. The bulk of compound words is motivated and the semantic relations between the two components are transparent.

Compound proper words are formed by joining together stems of words already available in the language. Compound proper is a word, the two Immediate Constituents of which are stems of notional words, e.g. *ice-cold* (*N + A*), *ill-luck(A+N).*

Derivational compound is a word formed by a simultaneous process of composition and derivation. Derivational compound is formed by composing a new stem that does not exist outside this pattern and to which suffix is added. Derivational compound is a word consisting of two Immediate Constituents, only one of which is a compound stem of notional words, the other being a derivational affix, e.g. *blue* - *eyed - (A+N)* + *ed.* In coordinative compounds neither of the components dominates the other, both are structurally and semantically independent and constitute two structural and semantic centres, e.g. *breath-taking, self-discipline, word-formation*

**Самостійна робота 7.**

Тема: **Процес словотворення на сучасному етапі**

План

1. Conversion, its definition. The word-building means in conversion. Different view-points on conversion. Typical semantic relations within a converted pair (verbs converted from nouns, nouns converted from verbs).
2. Shortening. Lexical abbreviations. Acronyms. Clipping. Types of clipping: apocope, aphaeresis, syncope.
3. Non-productive means of word formation. Blending. Back-formation. Onomatopoeia. Sentence - condensation. Sound and stress interchange.

Література

1. Антрушина Г.Б., Афанасьева О.В., Морозова Н.Н. Лексикология английского языка: Учебник для пед. вузов. – 3-е изд-е. - – М.: Дрофа, 2001. – 288 с.
2. Бабич Г.Н. Лексикология английского языка. – Екатеринбург: Уральское изд-во. – 2005. – 176 с.
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**Working Definitions of Principal Concepts**

Conversion is a highly productive way of coining new words in Modern English. Conversion is sometimes referred to as an affixless way of word-building, a process of making a new word from some existing root word by changing the category of a part of speech without changing the morphemic shape of the original root-word. The transposition of word from one part of speech into another brings about changes of the paradigm.

Conversion is not only highly productive but also a particularly English way of word-building. It is explained by the analytical structure of Modern English and by the simplicity of paradigms of English parts of speech. A great number of one-syllable words is another factor that facilitates conversion.

**Typical semantic relations within a converted pair**

I. Verbs converted from noun (denominal verbs) denote:

1. action characteristic of the object *ape (n) - to ape (v)*

*butcher (n) - to butcher (v)*

1. instrumental use of the object *screw (n)* - *to screw (v) whip (n) - to whip*
2. acquisition or addition of the object *fish (n) - to fish (v)*

II. Nouns converted from verbs (deverbal nouns) denote:

1. instance of the action *to jump (v) -jump (n)*

2. agent of the action

*to help (v) - help (n)*

3. place of action *to drive (v) - drive (n)*

4.object or result of the action

*to peel (v) - peel (n)*

The shortening of words involves the shortening of both words and word-groups. Distinction should he made between shortening of a word in written speech (graphical abbreviation) and in the sphere of oral intercourse (lexical abbreviation). Lexical abbreviations may be used both in written and in oral speech. Lexical abbreviation is the process of forming a word out of the initial elements (letters, morphemes) of a word combination by a simultaneous operation of shortening and compounding.

Clipping consists in cutting off two or more syllables of a word. Words that have been shortened at the end are called apocope *(doc-doctor, mit-mitten, vet-veterinary).* Words that have been shortened at the beginning are called aphaeresis *(phone-telephone).* Words in which some syllables or sounds have been omitted from the middle are called syncope *(ma'm - madam, specs - spectacles).* Sometimes a combination of these types is observed *(tec-detective, frig-refrigerator).*

Blendings (blends, fusions or portmanteau words) may be defined as formation that combine two words that include the letters or sounds they have in common as a connecting element (slimnastics < slim+gymnastics; mimsy < miserable+flimsy; galumph < gallop+triumph; neutopia < new+utopia). The process of formation is also called telescoping. The analysis into immediate constituents is helpful in so far as it permits the definition of a blend as a word with the first constituent represented by a stem whose final part may be missing, and the second constituent by a stem of which the initial part is missing. The second constituent when used in a series of similar blends may turn into a suffix. A new suffix *-on;* is, for instance, well under way in such terms as *nylon, rayon, salon,* formed from the final element of *cotton.* This process seems to be very active in present-day English word-formation numerous new words have been coined recently: *Reaganomics, Irangate, blacksploitation, workaholic, foodoholic, scanorama etc.*

Back formation is a semi - productive type of word-building. It is mostly active in compound verbs, and is combined with word-composition. The basis of this type of word-building are compound words and word-combinations having verbal nouns, gerunds, participles or other derivative nouns as their second component (*rush-development, finger-printing, well-wisher*). These compounds and word-combinations are wrongly considered to be formed from compound verbs which are nonexistent in reality. This gives a rise to such verbs as: *to rush-develop, to finger-print, to well-wish.*

Onomatopoeia (sound-imitation, echoism) is the naming of an action or thing by a more or less exact reproduction of a natural sound associated with it *(babble, crow, twitter).* Semantically, according to the source of sound onomatopoeic words fall into a few very definite groups. Many verbs denote sounds produced by human beings in the process of communication or in expressing their feelings *(babble, chatter, giggle, grumble, murmur, mutter, titter, whisper).* There are sounds produced by animals, birds and insects *(buzz, cackle, croak, crow, hiss, howl, moo, mew, roar).* Besides the verbs imitating the sound of water *(bubble, splash),* there are others imitating the noise of metallic things *(clink, tinkle)* or forceful motion *(clash, crash, whack, whip, whisk).*

Sentence - condensation is the formation of new words by substantivising the whole locutions *(forget-me-not, merry-go-round).*

Sound and stress interchange (distinctive stress, the shift of stress). The essence of it is that to form a new word the stress of the word is shifted to a new syllable. It mostly occurs in nouns and verbs. Some phonetic changes may accompany the shift of the stress *(export* - *to export, increase - to increase, break* - *breach, long -length).*

**Самостійна робота 8.**

Тема: **Семасіологія як наука**

План

1. Referential Approach to Meaning
2. Meaning in the Referential Approach
3. Functional Approach to Meaning
4. Relation Between the Two Approaches

Література

1. Антрушина Г.Б., Афанасьева О.В., Морозова Н.Н. Лексикология английского языка: Учебник для пед. вузов. – 3-е изд-е. - – М.: Дрофа, 2001. – 288 с.
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The branch of lexicology that is devoted to the study of meaning is known as S e m a s i o l o g y. It should be pointed out that just as lexicology is beginning to absorb a major part of the efforts of linguistic scientists 3 semasiology is coming to the fore as the central problem of linguistic investigation of all levels of language structure. It is suggested that semasiology has for its subject – matter not only the study of lexicon, but also of morphology, syntax and sentential semantics. Words, however, play such a crucial part in the structure of language that when we speak of semasiology without any qualification, we usually refer to the study of word-meaning proper, although it is in fact very common to explore the semantics of other elements, such as suffixes, prefixes, etc.

Meaning is one of the most controversial terms in the theory of language. At first sight the understanding of this term seems to present no difficulty at all — it is freely used in teaching, interpreting and translation.

The scientific definition of meaning however just as the definition of some other basic linguistic terms, such as w o r d . s e n t e n c e , etc., has been the issue of interminable discussions. Since there is no universally accepted definition of meaning we shall confine ourselves to a brief survey of the problem as it is viewed in modern linguistics both in our country and elsewhere.

In recent years a new and entirely different approach to meaning known as the functional approach has begun to take shape in linguistics and especially in structural linguistics. The functional approach maintains that the meaning of a linguistic unit may be studied only through its relation to other linguistic-units and not through its relation to either concept or referent. In a very simplified form this view may be illustrated by the following: we know, for instance, that the meaning of the two words move and movement is different because they function in speech differently.

Comparing the contexts in which we find these words we cannot fail to observe that they occupy different positions in relation to other words. (To) move, e.g., can be followed by a noun (move the chair), preceded by a pronoun (we move), etc. The position occupied by the word movement is different: it may be followed by a preposition (movement of smth), preceded by an adjective (slow movement), and so on. As the distribution of the two words is different, we are entitled to the conclusion that not only do they belong to different classes of words, but that their meanings are

different too.

The same is true of the different meanings of one and the same word. Analysing the function of a word in linguistic contexts and comparing these contexts, we conclude that; meanings are different (or the same) and this fact can be proved by an objective investigation of linguistic data. For example we can observe the difference of the meanings of the word take if we examine its functions in different linguistic contexts, take the tram (the taxi, the cab,, etc.) as opposed to to take to somebody. It follows that in the functional approach (1) semantic investigation is confined to the analysis of the difference or sameness of meaning; (2) meaning is understood essentially as the function of the use of linguistic units. As a matter of fact, this line of semantic investigation is the primary concern, implied or expressed, of all structural linguists.

**Самостійна робота 9.**

Тема: **Полісемія**

План

1. Semantic Structure of Polysemantic Words
2. Diachronic Approach.
3. Synchronic Approach.
4. Historical Changeability of Semantic Structure.
5. Polysemy and Arbitrariness of Semantic Structure

Література

1. Антрушина Г.Б., Афанасьева О.В., Морозова Н.Н. Лексикология английского языка: Учебник для пед. вузов. – 3-е изд-е. - – М.: Дрофа, 2001. – 288 с.
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When analysing the wordmeaning we observe, however, that words as a rule are not units of a single meaning. Monosemantic words, i.e. words having only one meaning are comparatively few in number, these are mainly scientific terms, such –as hydrogen, molecule and the like. The bulk of English words are p o l y s e m a n t i c , that is to say possess more than one meaning. The actual number of meanings of the commonly used words ranges from five to about a hundred. In fact, the commoner the word the more meanings it has.

The word table, e.g., has at least nine meanings in Modern English: 1. a piece of furniture; 2. the persons seated at a table; 3. *sing.* the food put on a table, meals; 4. a thin flat piece of stone, metal, wood, etc.; 5. *pl.* slabs of stone; 6. words cut into them or written on them (the ten tables); 2 7. an orderly arrangement of facts, figures, etc.; 8. part of a machine-tool on which the work is put to be operated on; 9. a level area, a plateau. Each of the individual meanings can be described in terms of the types of meanings discussed above. We may, e.g., analyse the eighth meaning of the word table into the part-of-speech meaning — that of the noun (which presupposes the grammatical meanings of number and case) combined with the lexical meaning made up of two components The denotational semantic component which can be interpreted as the dictionary definition (part of a machine-tool on which the work is put) and the connotational component which can be identified as a specific stylistic reference of this particular meaning of the word table (technical terminology). Cf. the Russian *планшайба, стол станка.*

In polysemantic words, however, we are faced not with the problem of analysis of individual meanings, but primarily with the problem of the interrelation and interdependence of the various meanings in the semantic structure of one and the same word.

If polysemy is viewed diachronically, it is understood as the growth and development of or, in general, as a change in the semantic structure of the word. Polysemy in diachronic terms implies that a word may retain its previous meaning or meanings and at the same time acquire one or several new ones. Then the problem of the interrelation and interdependence of individual meanings of a polysemantic word may be roughly formulated as follows: did the word always possess all its meanings or did some of them appear earlier than the others? are the new meanings dependent on the meanings already existing? and if so what is the nature of this dependence? can we observe any changes in the arrangement of the meanings? and so on. In the course of a diachronic semantic analysis of the polysemantic word table we find that of all the meanings it has in Modern English, the primary meaning is ‘a flat slab of stone or wood’, which is proper to the word in the Old English period (*OE*. tabule from *L.* tabula); all other meanings are secondary as they are derived from the primary meaning of the word and appeared later than the primary meaning.

The terms s e c o n d a r y and d e r i v e d meaning are to a certain extent synonymous. When we describe the meaning of the word as “secondary” we imply that it could not have appeared before the primary meaning was in existence. When we refer to the meaning as “derived” we imply not only that, but also that it is dependent on the primary meaning and somehow subordinate to it. In the case of the word table, e.g., we may say that the meaning ‘the food put on the table’ is a secondary meaning as it is derived from the meaning ‘a piece of furniture (on which meals are laid out)’. It follows that the main source of polysemy is a change in the semantic structure of the word.

Polysemy may also arise from homonymy. When two words become identical in sound-form, the meanings of the two words are felt as making up one semantic structure. Thus, the human ear and the ear of corn are from the diachronic point of view two homonyms. One is etymologically related to *L.* auris, the other to *L.* acus, aceris. Synchronically, however, they are perceived as two meanings of one and the same word. The ear of corn is felt to be a metaphor of the usual type (cf. the eye of the needle, the foot of the mountain) and consequently as one of the derived or, synchronically, minor meanings of the polysemantic word ear.1 Cases of this type are comparatively rare and, as a rule, illustrative of the vagueness of the border-line between polysemy and homonymy.

Semantic changes result as a rule in new meanings being added to the ones already existing in the semantic structure of the word. Some of the old meanings may become obsolete or even disappear, but the bulk of English words tend to an increase in number of meanings. Synchronically we understand polysemy as the coexistence of various meanings of the same word at a certain historical period of the development of the English language. In this case the problem of the interrelation and interdependence of individual meanings making up the semantic structure of the word must be investigated along different lines.

In connection with the polysemantic word table discussed above we are mainly concerned with the following problems: are all the nine meanings equally representative of the semantic structure of this word? Is the order in which the meanings are enumerated (or recorded) in dictionaries purely arbitrary or does it reflect the comparative value of individual meanings, the place they occupy in the semantic structure of the word table?

**Самостійна робота 10.**

Тема: **Контекст. Типи контексту**

План

1. Lexical Context
2. Grammatical Context
3. Extra-Linguistic Context (Context of Situation)
4. Common Contextual Associations. Thematic Groups.

Література

1. Антрушина Г.Б., Афанасьева О.В., Морозова Н.Н. Лексикология английского языка: Учебник для пед. вузов. – 3-е изд-е. - – М.: Дрофа, 2001. – 288 с.
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The meaning or meanings of polysemantic words observed only in certain contexts may be viewed as determined either by linguistic (or verbal) contexts or extra-linguistic (non-verbal) contexts.

The two more or less universally recognised main types of linguistic contexts which serve to determine individual meanings of words are the lexical context and the grammatical context. These types are differentiated depending on whether the lexical or the grammatical aspect is predominant in determining the meaning.

In lexical contexts of primary importance are the groups of lexical items combined with the polysemantic word under consideration. This can be illustrated by analyzing different lexical contexts in which polysemantic words are used. The adjective heavy, e.g., in isolation is understood as meaning ‘of great weight, weighty’ (heavy load, heavy table, etc.). When combined with the lexical group of words denoting natural phenomena such as wind, storm, snow, etc., it means ’striking, falling with force, abundant’ as can be seen from the contexts, e.g. heavy rain, wind, snow, storm, etc. In combination with the words industry, arms, artillery and the like, heavy has the meaning ‘the larger kind of something’ as in heavy industry, heavy artillery, etc.

The verb take in isolation has primarily the meaning ‘lay hold of with the hands, grasp, seize’, etc. When combined with the lexical group of words denoting some means of transportation (e.g. to take the tram, the bus, the train, etc.) it acquires the meaning synonymous with the meaning of the verb go.

It can be easily observed that the main factor in bringing out this or that individual meaning of the words is the lexical meaning of the words with which heavy and take are combined. This can be also proved by the fact that when we want to describe the individual meaning of a polysemantic word, we find it sufficient to use this word in combination with some members of a certain lexical group. To describe the meanings of the word handsome, for example, it is sufficient to combine it with the following words — a) man, person, b) size, reward, sum. The meanings ‘good-looking’ and ‘considerable, ample’ are adequately illustrated by the contexts.

The meanings determined by lexical contexts are sometimes referred to as lexically (or phraseologically) bound meanings which implies that such meanings are to be found only in certain lexical contexts.

In grammatical contexts it is the grammatical (mainly the syntactic) structure of the context that serves to determine various individual meanings of a polysemantic word. One of the meanings of the verb make, e.g. ‘to force, to enduce’, is found only in the grammatical context possessing the structure to make somebody do something or in other terms this particular meaning occurs only if the verb make is followed by a noun and the infinitive of some other verb (to make smb. laugh, go, work, etc.). Another meaning of this verb ‘to become’, ‘to turn out to be’ is observed in the contexts of a different structure, i.e. make followed by an adjective and a noun (to make a good wife, a good teacher, etc.).

Such meanings are sometimes described as grammatically (or structurally) bound meanings. Cases of the type she will make a good teacher may be referred to as syntactically bound meanings, because the syntactic function of the verb make in this particular context (a link verb, part of the predicate) is indicative of its meaning ‘to become, to turn out to be’. A different syntactic function of the verb, e.g. that of the predicate (to make machines, tables, etc.) excludes the possibility of the meaning ‘to become, turn out to be’.

In a number of contexts, however, we find that both the lexical and the grammatical aspects should be taken into consideration. The grammatical structure of the context although indicative of the difference between the meaning of the word in this structure and the meaning of the same word in a different grammatical structure may be insufficient to indicate in w h i с h of its individual meanings the word in question is used. If we compare the contexts of different grammatical structures, e.g. to take+nown and to take to+noun, we can safely assume that they represent different meanings of the verb to take, but it is only when we specify the lexical context, i.e. the lexical group with which the verb is combined in the structure to take + noun (to take coffee, tea; books, pencils; the bus, the tram) that we can say that the context determines the meaning.

Dealing with verbal contexts we consider only linguistic factors: lexical groups of words, syntactic structure of the context and so on. There are cases, however, when the meaning of the word is ultimately determined not by these linguistic factors, but by the actual speech situation in which this word is used. The meanings of the noun ring, e.g. in to give somebody a ring, or of the verb get in I've got it are determined not only by the grammatical or lexical context, but much more so by the actual speech situation.

The noun *ring* in such context may possess the meaning ‘a circlet of precious metal’ or ‘a call on the telephone’; the meaning of the verb to get in this linguistic context may be interpreted as ‘possess’ or ‘understand’ depending on the actual situation in which these words are used. It should be pointed out however that such cases, though possible, are not actually very numerous. The linguistic context is by far a more potent factor in determining word-meaning.

**Самостійна робота № 11**

***Text referencing***

**Computer-assisted translation**, **computer-aided translation**, or **CAT** is a form of [translation](http://en.wikipedia.org/wiki/Translation) wherein a human translator translates texts using [computer](http://en.wikipedia.org/wiki/Computer) [software](http://en.wikipedia.org/wiki/Computer_software) designed to support and facilitate the [translation process](http://en.wikipedia.org/wiki/Translation_process).

Computer-assisted translation is sometimes called machine-assisted, or machine-aided, translation.

**Computer-assisted translation and machine translation**

Some advanced computer-assisted translation solutions include controlled [machine translation](http://en.wikipedia.org/wiki/Machine_translation) (MT). Integration of MT into computer-assisted translation has been implemented in various ways by various parties. Although this type of technology is neither widely known nor available to individual translators, carefully-customized user dictionaries based on correct terminology significantly improve the accuracy of MT, and as a result, they improve the efficiency of translation process.

**Overview**

Computer-assisted translation is a broad and imprecise term covering a range of tools, from the fairly simple to the more complicated. These can include:

* Spell checkers, either built into [word processing](http://en.wikipedia.org/wiki/Word_processing) software, or add-on programs; grammar checkers, again either built into word processing software, or add-on programs;
* [terminology](http://en.wikipedia.org/wiki/Terminology) managers, allowing the translator to manage his own terminology bank in an electronic form. This can range from a simple table created in the translator's word processing software or spreadsheet, a database created in a program such as [FileMaker Pro](http://en.wikipedia.org/wiki/FileMaker) or, for more robust (and more expensive) solutions, specialized software packages such as LogiTerm, MultiTerm, Termex, etc.;
* Dictionaries on [CD-ROM](http://en.wikipedia.org/wiki/CD-ROM), either unilingual or bilingual;
* Terminology databases, either on CD-ROM or accessible through the Internet, (such as [The Open Terminology Forum](http://www.terminologie.com), [TERMIUM](http://en.wikipedia.org/w/index.php?title=TERMIUM&action=edit&redlink=1) or [*Grand dictionnaire terminologique*](http://en.wikipedia.org/wiki/Grand_dictionnaire_terminologique) from the [Office québécois de la langue française](http://en.wikipedia.org/wiki/Office_qu%C3%A9b%C3%A9cois_de_la_langue_fran%C3%A7aise))
* [Full-text search tools](http://en.wikipedia.org/wiki/Full-text_search) (or indexers), which allow the user to query already translated texts or reference documents of various kinds. In the translation industry one finds such indexers as Naturel, [ISYS Search Software](http://en.wikipedia.org/wiki/ISYS_Search_Software) and dtSearch.
* [Concordancers](http://en.wikipedia.org/wiki/Concordancer), which are programs that retrieve instances of a word or an expression and their respective context in a monolingual, bilingual or multiligual corpus, such as a bitext or a translation memory.
* [Bitexts](http://en.wikipedia.org/wiki/Bitext), a fairly recent development, the result of merging a source text and its translation, which can then be analyzed using a [full-text search tool](http://en.wikipedia.org/wiki/Full-text_search) or a [concordancer](http://en.wikipedia.org/wiki/Concordancer).
* [Project management software](http://en.wikipedia.org/wiki/Project_management_software) that allows linguists to structure complex translation projects, assign the various tasks to different people, and track the progress of each of these tasks.
* [Translation memory](http://en.wikipedia.org/wiki/Translation_memory) managers (TMM), tools consisting of a [database](http://en.wikipedia.org/wiki/Database) of text segments in a source language and their translations in one or more target languages.
* Systems that are nearly automatic as in machine translation, but allow user decisions for ambiguous cases. These are sometimes called human-aided machine translation.

**Translation memory software**

[Translation memory](http://en.wikipedia.org/wiki/Translation_memory) (TM) programs store previously translated source texts and their equivalent target texts in a database and retrieve related segments during the translation of new texts. Such programs split the source text into manageable units known as “segments”. A source-text sentence or sentence-like unit (headings, titles or elements in a list) may be considered a segment, or texts may be segmented into larger units such as paragraphs or small ones, such as clauses.

As the translator works through a document, the software displays each source segment in turn and provides a previous translation for re-use, if the program finds a matching source segment in its database. If it does not, the program allows the translator to enter a translation for the new segment.

After the translation for a segment is completed, the program stores the new translation and moves onto the next segment. In the dominant paradigm, the translation memory, in principle, is a simple database of fields containing the source language segment, the translation of the segment, and other information such as segment creation date, last access, translator name, and so on. Another translation memory approach does not involve the creation of a database, relying on aligned reference documents instead (e.g. Star Transit).

Some translation memory programs function as standalone environments, while others function as an add-on or macro to commercially available word-processing or other business software programs. Add-on programs allow source documents from other formats, such as desktop publishing files, spreadsheets, or HTML code, to be handled using the TM program.

**Language Search Engine Software**

New to the translation industry, Language Search Engine software is typically an Internet based system that works similarly to Internet search engines. Rather than searching the Internet, however, a language search engine searches a large repository of Translation Memories to find previously translated sentence fragments, phrases, whole sentences, even complete paragraphs that match source document segments. It leverages more from translation memories than traditional translation memory software.

Language search engines are designed to leverage modern search technology to conduct searches based on the source words in context to ensure that the search results match the meaning of the source segments. Like traditional TM tools, the value of a language search engine rests heavily on the Translation Memory repository it searches against.

**Terminology management software**

[Terminology](http://en.wikipedia.org/wiki/Terminology) management software provides the translator a means of automatically searching a given terminology database for terms appearing in a document, either by automatically displaying terms in the translation memory software interface window or through the use of hot keys to view the entry in the terminology database.

Some programs have other hotkey combinations allowing the translator to add new terminology pairs to the terminology database on the fly during translation. Some of the more advanced systems enable translators to check, either interactively or in [batch mode](http://en.wikipedia.org/wiki/Batch_processing), if the correct source/target term combination has been used within and across the translation memory segments in a given project.

**Alignment software**

Alignment programs take completed translations, divide both source and target texts into segments, and attempt to determine which segments belong together in order to build a [translation memory](http://en.wikipedia.org/wiki/Translation_memory) database with the content. Many alignment programs allow translators to manually realign mismatched segments. The resulting translation memory file can then be imported into a translation memory program for future translations.

**Самостійна робота № 12**

***Read the text. Find information about the typical grammar errors in translation***

The task of instructing a machine how to translate from one language it does not and will not understand into another language it does not and will not understand presents a real challenge for structural linguists, in that their thesis that language can be exhaustively described in non-referential terms undergoes here an expcrimentum crucis. If, in a translation program, some step has to be taken which directly or indirectly depends upon the machine's ability to understand the text on which it operates, then the machine will simply be unable to make this step, and the whole operation will come to a full stop. We can speak of four specific problems, of which the only obvious common feature is the decisive role which they play in machine translation.

Machine translation systems usually make errors on the following language levels: morphological, word-forming, lexical and semantic, phraseological, syntactical. The Chart below shows different types of errors and their analysis based on the journalistic texts.

Types of errors and their analysis

|  |  |  |
| --- | --- | --- |
| Error type | Example | Reasons |
| Morphological | 1. Faced with a corporate crisis, it's the PR team that the CEO will increasingly call in first.   MT: Стикаючись з корпоративною кризою, це - команда *PR,* яку *CEO* все більше і більше назве в першому.  Postediting**:** Стикаючись з корпоративною кризою, *генеральний директор* буде викликати спочатку *команду по роботі з громадськістю.*   1. To protect its corporate image, Nike responded with a *well-publicised* 'greening' of the company.   MT:Для захисту свого корпоративного іміджу, Nike відповів з *широкого розгласу* «озеленення» компанії.  Postediting**:** Для захисту свого корпоративного іміджу, Nike відповів з *добре розрекламованим* «озелененням» компанії. | СМП не ідентифікує морфему у процесі віртуального членування слова. При цьому комп'ютер або переносить слово в його оригінальному написанні в текст перекладу, або транслітерує. |
| Word-forming | 1. I still wonder *what happened to that happy-go-lucky semi-thug* who used to hang out with drug dealers on dimly-lit street corners.   MT:Я до сих пір цікаво, *що трапилося з цим безтурботний напів-бандит,* який використовував, щоб бовтатися з наркоторговцями на слабо освітлених вулицях.  Postediting**:** Мені досі цікаво, *що трапилося з тим безтурботним бандитом,* який, бувало, бовтався з наркоторговцями слабо освітленими вулицями.   1. …what we are now increasingly seeing is *highly paid project teams created for* particular assignment *for a specific period of time.*   MT:що ми зараз спостерігаємо все більш *високооплачуваних проектні групи створюються для* конкретного завдання *протягом певного періоду часу.*  Postediting**:** що ми зараз все більше спостерігаємо – це *високооплачувальні проектні групи, створенні для* конкретного завдання *на певний період часу* | СМП не ідентифікує, з яких саме морфем складається слово або не може підібрати потрібні морфеми для утворення слова, при цьому слово граматично не узгоджується з іншими словами у реченні (відмінювання іменників, рід прикметників тощо) |
| Semantic | 1. If we can admit that yes, *people can be mean*, grandma does have a drinking problem, divorce is painful, we allow children *to trust their gut*.   MT:Якщо ми можемо визнати, що так, *люди можуть сказати*, бабуся дійсно є проблеми з алкоголем, розлучення є болючим, ми дозволяємо дітям *довіряти свої кишки.*  Postediting**:** Якщо ми можемо визнати, що так, *люди можуть бути поганими*, бабуся дійсно має проблеми з алкоголем, розлучення є болючим, ми дозволяємо дітям *довіряти своїм внутрішнім інстинктам.*   1. By imposing *wildly different* rates of tax on otherwise homogeneous commodities like petrol, governments *distort prices* even further.   MT:Встановлюючи *дико різні* ставки податку на інше однорідні товари, такі як бензин, уряди *спотворюють ціни* ще більше.  Postediting**:** Встановлюючи *зовсім різні* податкові ставки на однорідні товари, такі як бензин, уряди *викривляють ціни* ще більше. | СМП не розрізняє значення слова. При даному виді помилки полісемічне слово має правильну граматичну форму, але не є еквівалентним у даному контексті. |
| Phraseological | 1. I don’t remember *people getting the third degree* because they decided to wear brown shoes instead of black.   MT:Я не пам'ятаю, щоб *люди отримували третю ступінь*, тому що вони вирішили носити коричневі туфлі замість чорних.  Postediting**:** Я не пам'ятаю, щоб *людям влаштовували суровий допит*, тому що вони вирішили носити коричневі туфлі замість чорних.   1. When Philip Morris *knocked 40c off a packet of Marlboro*, $47-and-a-half billion was instantly wiped off the market value of America's top twenty cigarette manufacturers. Lesser brands *went to the wall.*   MT:Коли Філіп Морріс *постукав 40с від пакета Marlboro*, $47 із половиною мільярдів миттєво стерли ринкову вартості першої двадцятки американських виробників сигарет. Малі бренди *підійшов до стіни*.  Postediting**:** Коли Філіп Морріс *знизив вартість пакету Мальборо на 40 центів,* $47 із половиною мільярдів миттєво стерли ринкову вартість першої двадцятки американських виробників сигарет. Менш відомі бренди *збанкрутіли*. | Помилка на фразеологічному рівні виникає, коли СМП не може підібрати відповідну фразеологічну єдність або через відсутність її еквіваленту у базі даних, або через неможливість правильно її відтворити, або обирає з бази даних одне з багатьох значень цього фразеологізму, яке не є еквівалентом у даному контексті (останнє в основному стосується фразових дієслів) |
| Syntactical | 1. But the budding entrepreneur is more likely to be an outsider, a troublemaker, a rebel who drops out of college to get a job, discovers *a flair for building companies* from nothing, gets bored quickly and moves on.   MT:Але починаючий підприємець, найімовірніше, буде аутсайдером, баламут, бунтівник, який кидає коледж, щоб отримати роботу, виявляє *схильність до будівельних компаній* з нічого, набридають швидко і йде далі.  Postediting**:** Але починаючий підприємець, найімовірніше, є аутсайдером, баламутом, бунтівником, який кидає коледж, щоб отримати роботу, виявляє *схильність до побудови компаній* з нічого, їм це швидко і вони йдуть далі. | Неадекватний переклад зумовлений відсутністю співвідносин різних рівнів тексту або різних граматичних категорій. |

**Самостійна робота № 13**

***Text referencing***

Different approaches can be taken to optimise MT efficiency:

* Human interaction either before (pre-editing), during, or after (post-editing) MT,
* Controlled Language (CL),
* MT combined with Translation Memory (TM) systems,
* Dictionary building and updating.

The importance of post-editing as well as dictionary building and updating are the aspects considered to optimise the back-end of the MT process. Pre-editing, which itself is an additional variable, and TM systems, which could further improve translation quality, will not be addressed in this lesson. Nevertheless, a very brief explanation of the four remaining possibilities will be outlined in this lesson to present a general overview.

*Pre-editing* is understood as the process of identifying problems and, where necessary, editing the source text (ST) before translating it so that any strings of text that an MT system will have problems with are highlighted and removed or modified in advance. The final aim is to achieve better human *readability* and clarity of the source language (SL) text, as well as better computational processing or *translatability*, especially by translation systems. Pre-editing may be used to ensure that a ST conforms to a given Controlled Language.

*A Controlled Language* (*CL*), by definition, is a subset of a natural language whose grammar and dictionaries have been restricted to reduce or eliminate ambiguity and complexity in texts written in that CL, whether they are processed by machine or read by humans only.

*Human-machine interaction* during the translation process is particularly important in those cases where the system suspends its processing to ask the user for clarification of an ambiguity in the ST or for a decision regarding a possible choice for the TT. This uncertainty is commonly associated with difficulties that occur at lexical or syntactic levels.

*Combining MT with TM systems* in environments where HT is also implemented. Recent studies are trying to join “the best of two worlds” as, it seems that, they are complementary: Integrating MT into TM means that there is a translation proposal for each sentence in the source document. With properly internationalised and structured documents, linguists will primarily perform minor to modest post-editing instead of translating from scratch. Many companies are successfully combining these two technologies for most of the translation projects.

**Post-editing of machine-translated texts** “Post-editing” as a step or set of steps in an overall translation process, is the term used for editing, modifying and/or correcting machine-translated texts. In general, MT PE is a type of translation service that is offered as an optional parallel process to HT. TM tools can further be added to either the HT or the MT process. The implementation of MT is increasing over time for certain types of translated documents, and for certain organisations. However, this term has occasionally been used in a different manner to describe the process of cleaning up scanned optical character recognition (OCR) texts or even for the practice of reviewing texts compiled through TM processes. Our use of the term “post-editing” in this lesson is limited only to the task of editing, modifying and/or correcting raw MT output.



MT is not equivalent to HT, but it adds a range of options that should not be underestimated. MT software can be particularly useful depending on the intended purpose(s) of the translation(s). *See Fig*. *MT for different purposes*

1. MT can sometimes be used to present rough translations for information only. This practice is known as “inbound translation”, MT for acquisition, indicative translation, MT for assimilation and translation to understand. In this case, grammatical errors or a neutral style are accepted, provided the message of the TT is readable and comprehensible. Within this translation approach, there are two different uses of MT systems:
2. MT without any PE: the translation obtained is known as content “gisting”, browsing or scanning;
3. On the other hand, MT can be followed by rapid post-editing (RPE) to correct the most serious errors so as to give reasonable comprehensibility and accuracy, but without any guarantee of quality. To save time and to convey faithfully the information content of the ST is the main objective of this type of PE, which does not consider modifications in style. The specificity of RPE is that it is usually focused on texts with a short life span. Therefore, the “perishability” of a document is the factor that determines how much information needs to be corrected. The post-editing of machine translation seeks to strike the right balance between time, quality, and available capacity. Applied to the right types of text, it offers a pragmatic approach to three main areas of concern: increased productivity, effective use of existing tools and reduced costs.
4. In other cases, MT systems can be used for translation for publication processes, known as “outbound translation”, translation for dissemination and translation to communicate, by creating a preliminary draft of a text. This draft can be edited further by minimal post-editing (MPE) or even by full post-editing (FPE) when high-quality translation is requested.
5. Minimal post-editing (MPE) also known as partial post-editing, is the term used in industries such as the automotive and heavy-machinery industries, and it is used for texts that have a long life span. Due to the nature of these texts, (mainly technical documents used for machine operation and servicing, and usually read in a non-linear fashion), cohesion is only important for those sections that need to be read and followed at a given moment. Since the reader needs to follow a set of instructions, it is possible to limit the number and types of PE changes to those that will make a procedural text the most comprehensible possible in the least amount of time.
6. Full post-editing (FPE) is the most complete of all levels of PE and it seems to be the most controversial as well. This is due to the fact that, in terms of quality, final MT output must be indistinguishable from HT. It is very common to read that FPE takes as long as, or longer than HT. This interesting and challenging claim will be of particular significance in our work.
7. Another possibility is the use of MT for outbound translation where automatic translations from specific sub-domains and/or text types offer an accuracy of 90% or 80%. In these specific cases, 10% or 20% of the documentation will be post-edited to achieve the expected 100% accuracy in the TT.

Although there are different types of PE serving different purposes, as already explained, the distinctions between these levels and the changes to be made are not entirely clear. The criteria for the actual PE task are not properly defined and PE guidelines are urgently needed. This lack of clarity is the reason why sometimes FPE is performed despite the fact that, at times, only rapid or minimal PE is required.

Post –editing skills are developed gradually; the level of comfort is greatly increased at the end of 100,000 words, the equivalent of a month of full-time post-editing”. A post-editor should be a near native of the SL and a native speaker of the TL, with knowledge of the subject area, related terminology, and text type, qualified in the IT sector with good word processing skills, able to use macros and to code dictionaries, a tolerant professional with a positive predisposition towards MT, confident in his/her translation ability and technical expertise.

**Самостійна робота № 14**

***Conceptions and Misconceptions about machine translation***

Read a paragraph from the book “Machine translation” by D.Arnold, L.Balkan and others and do the following tasks:

1. make notes (in your own words) about the misconception of MT with the authors’ arguments;
2. continue the authors’ list of true facts about MT.

Here is the list of some popular misconceptions about MT. We will discuss them in turn.

“MT is a waste of time because you will never make a machine that can translate Shakespeare”.

The criticism that MT systems cannot, and will never, produce translations of great literature of any great merit is probably correct, but quite beside the point. It certainly does not show that MT is impossible. First, translating literature requires special literary skill — it is not the kind of thing that the average professional translator normally attempts. So accepting the criticism does not show that automatic translation of non-literary texts is impossible. Second, literary translation is a small proportion of the translation that has to be done, so accepting the criticism does not mean that MT is useless. Finally, one may wonder who would ever *want* to translate Shakespeare by machine — it is a job that human translators find challenging and rewarding, and it is not a job that MT systems have been designed for. The criticism that MT systems cannot translate Shakespeare is a bit like criticism of industrial robots for not being able to dance Swan Lake.

“There was/is an MT system which translated *The spirit is willing, but the flesh is weak* into the Russian equivalent of *The vodka is good, but the steak is lousy*, and *hydraulic ram* into the French equivalent of *water goat*. MT is useless.”

The ‘spirit is willing’ story is amusing, and it really is a pity that it is not true. However, like most MT ‘howlers’ it is a fabrication. In fact, for the most part, they were in circulation long before any MT system could have produced them (variants of the ‘spirit is willing’ example can be found in the American press as early as 1956, but sadly, there does not seem to have been an MT system in America which could translate from English into Russian until much more recently — for sound strategic reasons, work in the USA had concentrated on the translation of Russian into English, not the other way round). Of course, there are real MT howlers. Two of the nicest are the translation of French *avocat* (‘advocate’, ‘lawyer’ or ‘barrister’) as *avocado*, and the translation of *Les soldats sont dans le caf´e* as *The soldiers are in the coffee*. However, they are not as easy to find as the reader might think, and they certainly do not show that MT is useless.

“Generally, the quality of translation you can get from an MT system is very low. This makes them useless in practice.”

Far from being useless, there are several MT systems in day-to-day use around the world. Examples include METEO (in daily since 1977 use at the Canadian Meteorological Center in Dorval, Montreal), SYSTRAN (in use at the CEC, and elsewhere), LOGOS, ALPS, ENGSPAN (and SPANAM), METAL, GLOBALINK. It is true that the number of organizations that use MT on a daily basis is relatively small, but those that do use it benefit considerably. For example, as of 1990, METEO was regularly translating around 45 000 words of weather bulletins every day, from English into French for transmission to press, radio, and television. In the 1980s, the diesel engine manufacturers Perkins Engines was saving around *£* 4 000 on each diesel engine manual translated (using a PC version of WEIDNER system). Moreover, overall translation time per manual was more than halved from around 26 weeks to 9-12 weeks — this time saving can be very significant commercially, because a product like an engine cannot easily be marketed without user manuals.

Of course, it is true that the quality of many MT systems is low, and probably no existing system can produce really perfect translations. However, this does not make MT useless. In fact, one can get perfect translations from one kind of system, but at the cost of radically restricting what an author can say, so one should perhaps think of such systems as (multilingual) text creation aids, rather than MT systems. The basic idea is similar to that of a phrase book, which provides the user with a collection of ‘canned’ phrases to use. This is fine, provided the canned text contains what the user wants to say. Fortunately, there are some situations where this is the case.

First, not every translation has to be perfect. Imagine you have in front of you a Chinese newspaper which you suspect may contain some information of crucial importance to you or your company. Even a very rough translation would help you. Apart from anything else, you would be able to work out which, if any, parts of the paper would be worth getting translated properly. Second, a human translator normally does not immediately produce a perfect translation. It is normal to divide the job of translating a document into two stages. The first stage is to produce a draft translation, i.e. a piece of running text in the target language, which has the most obvious translation problems solved (e.g. choice of terminology, etc.), but which is not necessarily perfect. This is then revised — either by the same translator, or in some large organizations by another translator — with a view to producing something that is up to standard for the job in hand. This might involve no more than checking, or it might involve quite radical revision aimed at producing something that

reads as though written originally in the target language. For the most part, the aim of MT is only to automate the first, draft translation process.

“MT threatens the jobs of translators.”

The quality of translation that is currently possible with MT is one reason why it is wrong to think of MT systems as dehumanizing monsters which will eliminate human translators, or enslave them. It will not eliminate them, simply because the volume of translation to be performed is so huge, and constantly growing, and because of the limitations of current and forseeable MT systems. While not an immediate prospect, it could, of course, turn out that MT enslaves human translators, by controlling the translation process, and forcing them to work on the problems it throws up, at its speed. There are no doubt examples of this happening to other professions.

However, there are not many such examples, and it is not likely to happen with MT. What is more likely is that the process of producing draft translations, along with the often tedious business of looking up unknown words in dictionaries, and ensuring terminological consistency, will become automated, leaving human translators free to spend time on increasing clarity and improving style, and to translate more important and interesting documents — editorials rather than weather reports, for example. This idea borne out in practice: the job satisfaction of the human translators in the Canadian Meteorological Centerimproved when METEO was installed, and their job became one of checking and trying to find ways to improve the system output, rather than translating the weather bulletins by hand (the concrete effect of this was a greatly reduced turnover in translation staff at the Center).

“The Japanese have developed a system that you can talk to on the phone. It translates what you say into Japanese, and translates the other speaker’s replies into English.”

The claim that the Japanese have a speech to speech translation system, of the kind described above, is pure science fiction. It is true that speech-to-speech translation is a topic of current research, and there are laboratory prototypes that can deal with a very restricted range of questions. But this research is mainly aimed at investigating how various technologies involved in speech and language processing can be integrated, and is limited to very restricted domains (hotel bookings, for example), and messages (offering little more than a phrase book in these domains). It will be several years before even this sort of system will be in any sort of real use. This is partly because of the limitations of speech systems, which are currently fine for recognizing isolated words, uttered by a single speaker, for which the system has been specially trained, in quiet conditions, but which do not go far beyond this. However, it is also because of the limitations of the MT system.

“There is an amazing South American Indian language with a structure of such logical perfection that it solves the problem of designing MT systems.”

The South American Indian language story is among the most irritating for MT researchers. First, the point about having a ‘perfectly logical structure’ is almost certainly completely false. Such perfection is mainly in the eye of the beholder — Diderot was convinced that the word order of French exactly reflected the order of thought, a suggestion that non-French speakers do not find very convincing. What people generally mean by this is that a language is very simple to describe. Now, as far as anyone can tell all human languages are pretty much as complicated as each other. It’s hard to be definite, since the idea of simplicity is difficult to pin down, but the general impression is that if a language has a very simple syntax, for example, it will compensate by having a more complicated morphology (word structure), or phonology (sound structure). However, even if one had a very neat logical language, it is hard to see that this would solve the MT problem, since one would still have to perform automatic translation into, and out of, this language.

“MT systems are machines, and buying an MT system should be very much like buying a car.”

There are really two parts to this misconception. The first relates to the sense in which MT systems are machines. They are, of course, but only in the sense that modern word processors are machines. It is more accurate to think of MT systems as *programs* that run on computers (which really are machines). Thus, when one talks about buying, modifying, or repairing an MT system, one is talking about buying, modifying or repairing a piece of *software*. It was not always so — the earliest MT systems were dedicated machines, and even very recently, there were some MT vendors who tried to sell their systems with specific hardware, but this is becoming a thing of the past. Recent systems can be installed on different types of computers.

The second part of the misconception is the idea that one would take an MT system and ‘drive it away’, as one would a car. In fact, this is unlikely to be possible, and a better analogy is with buying a house — what one buys may be immediately habitable, but there is a considerable amount of work involved in adapting it to one’s own special needs. In the case of a house this might involve changes to the decor and plumbing. In the case of an MT system this will involve additions to the dictionaries to deal with the vocabulary of the subject area and possibly the type of text to be translated. There will also be some work involved in integrating the system into the rest of one’s document processing environment. The importance of customization, and the fact that changes to the dictionary form a major part of the process is one reason why we have given a whole chapter to discussion of the dictionary. Against these misconceptions, we should place the genuine facts about MT. These are listed further in our article.

The correct conclusion is that MT, although imperfect, is not only a possibility, but an actuality. But it is important to see the product in a proper perspective, to be aware of its strong points and shortcomings.

Machine Translation started out with the hope and expectation that most of the work of translation could be handled by a system which contained all the information we find in a standard paper bilingual dictionary. Source language words would be replaced with their target language translational equivalents, as determined by the built-in dictionary, and where necessary the order of the words in the input sentences would be rearranged by special rules into something more characteristic of the target language. In effect, correct translations suitable for immediate use would be manufactured in two simple steps. This corresponds to the view that translation is nothing more than word substitution (determined by the dictionary) and reordering (determined by reordering rules).

Reason and experience show that ‘good’ MT cannot be produced by such delightfully simple means. As all translators know, word for word translation doesn’t produce a satisfying target language text, not even when some local reordering rules (e.g. for the position of the adjective with regard to the noun which it modifies) have been included in the system. Translating a text requires not only a good knowledge of the vocabulary of both source and target language, but also of their grammar — the system of rules which specifies which sentences are well-formed in a particular language and which are not. Additionally it requires some element of **real world knowledge** — knowledge of the nature of things out in the world and how they work together — and technical knowledge of the text’s subject area. Researchers certainly believe that much can be done to satisfy these requirements, but producing systems which actually do so is far from easy. Most effort in the past years or so has gone into increasing the subtlety, breadth and depth of the linguistic or grammatical knowledge available to systems. We shall take a more detailed look at these developments in due course.

In growing into some sort of maturity, the MT world has also come to realize that the ‘text in \_ translation out’ assumption — the assumption that MT is solely a matter of switching on the machine and watching a faultless translation come flying out — was rather too naive. A translation process starts with providing the MT system with *usable* input. It is quite common that texts which are submitted for translation need to be adapted (for example, typographically, or in terms of format) before the system can deal with them. And when a text can actually be submitted to an MT system, and the system produces a translation, the output is almost invariably deemed to be grammatically and translationally imperfect. Despite the increased complexity of MT systems they will never — within the forseeable future — be able to handle all types of text reliably and accurately. This normally means that the translation will have to be corrected (post-edited) and usually the person best equipped to do this is a translator.

This means that MT will only be profitable in environments that can exploit the strong points to the full. As a consequence, we see that the main impact of MT in the immediate future will be in large corporate environments where substantial amounts of translation are performed. The implication of this is that MT is not (yet) for the individual self-employed translator working from home, or the untrained lay-person who has the occasional letter to write in French. This is not a matter of cost: MT systems sell at anywhere between a few hundred pounds and over *£* 100 000. It is a matter of effective use. The aim of MT is to achieve faster, and thus cheaper, translation. The lay-person or self-employed translator would probably have to spend so much time on dictionary updating and/or postediting that MT would not be worthwhile. There is also the problem of getting input texts in machine readable form, otherwise the effort of typing will outweigh any gains of automation. The real gains come from integrating the MT system into the whole document processing environment and they are greatest when several users can share, for example, the effort of updating dictionaries, efficiencies of avoiding unnecessary retranslation, and the benefits of terminological consistency.

Some Facts about MT

* MT is useful. The METEO system has been in daily use since 1977. As of 1990, it was regularly translating around 45 000 words daily. In the 1980s, The diesel engine manufacturers Perkins Engines was saving around *£* 4 000 and up to 15 weeks

on each manual translated.

* While MTsystems sometimes produce howlers, there are many situations where the ability of MT systems to produce reliable, if less than perfect, translations at high speed is valuable.
* In some circumstances, MT systems can produce good quality output: less than 4% of METEO output requires any correction by human translators at all (and most of these are due to transmission errors in the original texts). Even where the quality is lower, it is often easier and cheaper to revise ‘draft quality’ MT output than to translate entirely by hand.
* MT does not threaten translators’ jobs. The need for translation is vast and unlikely to diminish, and the limitations of current MT systems are too great. However, MT systems can take over some of the boring, repetitive translation jobs and allow human translation to concentrate on more interesting tasks, where their

specialist skills are really needed.

* Speech-to-Speech MT is still a research topic. In general, there are many open research problems to be solved before MT systems will be come close to the abilities of human translators.
* Not only are there are many open research problems in MT, but building an MT system is an arduous and time consuming job, involving the construction of grammars and very large monolingual and bilingual dictionaries. There is no ‘magic solution’ to this.
* In practice, before an MT system becomes really useful, a user will typically have to invest a considerable amount of effort in customizing it.

**Самостійна робота № 15**

***Read the article by D.Arnold and find information about the basic translation problems.***

***Why translation us difficult for trsanslation***

Why is it difficult to get computers to translate? My answer to this will be in two parts. The firstst part consists of some general remarks about the nature of translation, and the abilities of computers. These will lay out the ground and provide a general but rather unsatisfactory answer to the question. The second part will look in more detail at the sorts of problem that create the difficulty, and provide a more detailed and revealing answer.

**Translation and Computers** Part of the reason why translation is difficult for computers is that translation is just difficuult: difficult even for humans. Translating is a many faceted skill that goes well beyond mere competence in two languages. Roughly speaking, the job of a translator is take a text in one language (the “source language”) and produce a text in another language (the “target language”) which is in some sense equivalent. Before we talk about why this is difficult, we should notice that translators are often asked to do rather more than this. In particular they are often expected to produce a text that is in some sense “good” in its own right – clear, unambiguous, interesting, persuasive, elegant, poetic, gripping, etc., according to the kind of text being translated. While this is understandable, it is clearly somewhat unfair, especially when one is thinking about trying to automate the process. It is one thing to ask a computer to produce a target text which is (in some sense) equivalent to the source text, it is quite another to ask the computer to make it interesting. So, in asking why translation is difficult for computers, we should be careful to restrict ourselves to the translation job proper: to be concrete, let us imagine that anything the computer produces will be post-edited for qualities other than 'equivalence' with the source text. All we want from the computer is some kind of 'draft quality' translation: something which is more or less faithful to the original, understandable in its own right, and which is a reasonable starting point for a polished translation.

Of course, this is still very difficult, even for a skilled human, because the appropriate notion of equivalence is difficult to pin down, and can vary greatly depending on the kind of text involved. For example, in translating texts for an on-line help system, the length of the source text (number of characters) may be important, since the translation may have to fit in the same area of screen as the source text. While one normally expects a translation to be roughly the same length as the original, one would not normally worry about counting characters. Let us try to ignore these complications also, and focus on cases of translation where the key point is just to convey the content of the source text.

Unfortunately, this is still a tall order, because languages do not always allow the same content to be expressed. There are many well-known cases where one language lacks a precise equivalent for a term in another. In English, one can be vague about the gender of a friend, without seeming evasive. This is harder in French, where one has a choice between terms for male ami and female amie. Conversely, it is hard in English to refer to a friend who is female without going too far (girlfriend ) or seeming to labour the point (female friend ). So let us be a little less ambitious, and ask for only approximately the same content.

Even so, translating is a difficult task. In particular, it is a creative task, for at least two reasons. First, translators are often expected to be able to coin translations of novel terms that appear in the source text. Second, translators are often required to act as cultural mediators, conveying to readers of the target language what may be obvious to readers of the source language. A very clear case of this occurs with the translation of religious texts (how should one translate “Man shall not live by bread alone” for readers for whom bread is an alien or exotic foodstuff?).

Computers are fundamentally just devices for following rules, mechanically and literally, albeit with considerable speed and precision. Rule following can produce to a kind of creativity, but not the kind of creativity required for these tasks. Coining a new piece of terminology is more a matter of inventing a rule than following a rule, and cultural mediation requires very sophisticated reasoning – one must not only be able to extract the meaning from a text, but also be able to think about what meaning a potential reader would extract. To avoid these problems, we should restrict ourselves to cases where readers of source and target text can be regarded as sharing the same culture and background knowledge (e.g. by being members of the same profession or scientific discipline), and where problems of novel terminology either do not arise or can be solved by a human in interaction with the computer.

The translation task we have now is one of taking a text written in one language and producing a text in another language with the same approximate content, where readers of the target text are expected to share the same knowledge and culture as the readers of the source text, where there are no problems due to new terminology, and where we expect a human translator to be involved in producing a polished result. For the most part, the aim of Machine Translation (MT) research over the last forty or so years has been to automate this process. Despite considerable progress, despite the fact that the aim has actually been achieved for some languages, and some restricted domains and text types, it still poses fundamental practical and theoretical problems.

At the root of these problems are four particular limitations of computers, namely, the inability of computers to: (i) perform vaguely specified tasks; (ii) learn things (as opposed to being told them); (iii) perform common sense reasoning; (iv) deal with some problems where there is a large number of potential solutions.

Precisely formulated rules are required because they must, ultimately, be interpreted in terms of the normal operations of computer hardware. Much of the difficculty of natural language processing in general, and MT in particular, arises from the difficulty of finding sufficiently precise formulations of intuitively very straightforward ideas like 'in English, the subject usually comes before the verb' (the really problematic word here is usually, of course). Moreover, regrettably, a precise formulation is not enough. There are problems for which rules can be formulated precisely, but for which solutions still cannot always be computed (any task that involves examining every member of an infinite set, for example).

Learning also poses fundamental problems from a computational perspective. There are several reasons for this, one of which is to do with the fact that it involves classification, which involves the notion of similarity, which is a vague notion, another being the fact that it involves genuine creativity (rule inventing, not rule following). There are learning algorithms for some tasks, but there is no general reliable procedure for learning the kinds of knowledge required for MT. In this area, what a computer needs to know, it must be told, in the form of explicit rules, written by humans.

The third problem is that computers cannot perform 'common sense' reasoning. There are several reasons for this, but perhaps the most serious is the fact that common sense reasoning involves literally millions of facts about the world (water is wet, men don't get pregnant, most people have two feet …). The task of coding up the vast amount of knowledge required is daunting. In practice, most of what we understand by common sense reasoning is far beyond the reach of modern computers.

The fourth fundamental dfficulty for computers arises even for precisely specified problems which do not involve learning. It is the problem of combinatorial explosion. Suppose there are a number of slots each of which can be filled in one of two ways (say, by a zero or a 1), and that we have to consider every way of filling the slots (the worst case). The number of possibilities very quickly becomes very big. There are two ways of filling one slot, four ways of filling two, and in general 2n ways of filling n slots. Every time we add a slot, we double the number of possibilities, and hence the amount of time required. Suppose that it takes 1 millisecond to consider one solution: ten slots involves 210 = 1024 possibilities, requiring just over a second. With 20 slots, the number of possibilities rises to 1; 048; 576, requiring over two hours. With 30 slots, the time goes up to 12 days, with 40 it goes up to over 34 years. Dealing with 41 slots would take over 64 years, which is too long for most humans to wait. Improvements to computer hardware are insignificant in the face of this sort of problem: buying a computer which is twice as fast as your present one allows you to deal with exactly one more slot in any given time.

The bad news, from an MT perspective, is that each of these limitations is relevant. Thus, a general, though not very revealing answer to the question we started with would be: Because it involves problems that resist an algorithmic solution (including common sense reasoning), learning, and combinatorially explosive tasks". In order to give a more systematic and revealing answer, we need to look at the various tasks involved in MT.

A number of different architectures have been proposed for MT systems. The easiest starting point is a so-called 'transfer' approach. Here translation involves three main tasks: *analysis*, where the source text is analyzed to produce to an abstract representation; *transfer*, where this representation is mapped to a similar representation of the target language text; *synthesis*, or generation, where the target representation is mapped to a target text.

**The Analysis Problem** The task of an analysis component is to take a source language text (e.g. a sentence), and produce an abstract representation | the idea being that it will be easier to translate from this representation than from an unstructured string of source language words. There will be different views on what sort of representation this should be (e.g. how abstract it should be), but it clearly must represent the content of the source text, since this is what the source text and its translation have in common.

The problem is to infer the content from the source text. There are two major diffiulties:

1. The source text will often contain sentences that are ill-formed, at least from the view point of the rules in an analysis component. Analysis components must be able to cope with this by being robust.
2. The source text will often be ambiguous, so it may be difficult to work out what content is intended: the form of the input under – determines its content.

The problem of ambiguity is that no matter how superficial the representations we decide to use for an MT system, it will generally be the case that one string of words can correspond to several different representations.

The examples in (1) involve *lexical* *ambiguity*.

(1) a. They are trying to design a better *pen*. (Writing implement or animal enclosure?)

b. Our Jimmy has grown another *foot*. (Limb, or unit of measurement?)

c. The *post* has arrived. (Delivery of mail, or piece of wood?)

The examples in (2) involve *structural* *ambiguity* – the indeterminacy of meaning is not due to any of the words, but to the different structures that can be assigned.

(2) a. Concern has been expressed about conditions in the factory near the river that was polluted last week.

b. The minister stated that the proposal was rejected yesterday.

c. Some young girls and boys have arrived.

d. Sam has joined a student film society.

Is it the river, or the factory that was polluted? What occurred yesterday, the rejection, or the minister's statement? Is this a film society for students, or a society for student films (cf. adult film society)? Are the boys young, or is it just the girls? The *alternative* *interpretations* (2) might be represented as (3).

(3) a. the [ factory near [ the river ] that was polluted last week ].

b. the [ factory near [ the river that was polluted last week ]].

A very obvious and dramatic case of underspecification of content arises with pronouns, and other so-called *anaphoric expressions*. In an example like (4), one cannot tell who advocated violence: it might be the police, the women, or some other group that the speaker has mentioned earlier (or even a group that is being indicated in some other way).

(4) The police refused to let the women demonstrate because they advocated violence.

Turning to the problem of 'ill-formed' input, it is an unfortunate fact that ordinary written language, even the kind that has been carefully edited and prepared (like the contents of this book) abounds in errors of spelling, repeated words, transposed words, missing words, and what will appear to an analysis component to be errors of grammar. Solutions (at least partial solutions) to these problems are not hard to find. For example, if we fail to produce an analysis for a whole phrase or sentence, we may nevertheless have successfully analyzed parts of it, so we might try to hypothesis a missing word, or transpose a pair of words, and try to re-analyze, using the partial analyses that have been established. In a case like (5), we might just relax the requirement that a third person singular subject requires a particular verb form. Of course, such tricks are a long way from the exibility of human reader, which is based on an overall understanding of the text.

(5) The problems are interesting, but the solution (*sic*) leave something to be desired.

However, two points should be kept in mind. First, inserting words, trying permutations of words and so on are all potentially combinatorially explosive. Second, notice how dealing with ill-formed interacts with the problem of ambiguity. The obvious way to deal with a case such as (5) above, is to disregard the rules that enforce subject-verb agreement. But doing this generally will lead to increased ambiguity.

**The Transfer Problem** The task of a transfer component is to take the sort of abstract representation produced by the source language analysis component (call this a 'source Interface Structure' or 'source IS'), and produce something that can be input to the synthesis component of the target language (call this a 'target IS'). Obviously, the closer the two ISes, the easier this will be. The 'problem of transfer' is that they cannot be the same, because languages do not associate form and content in the same ways.

(1) a. I miss London.

b. Londres manques a moi.

A case of languages using radically different structures for roughly the same content can be seen in (2). Dutch (2 a) involves a construction with an 'impersonal' pronoun, Spanish (2b) uses a reflexive (cf 'Apples sell themselves here'), and English uses a passive construction. If the corresponding IS representations are as superficial as those above, some very complex transfer rules will be required.

(2) a. Men verkoopt hier appels.

One sells here apples

b. Se venden manzanas aqui.

self sell apples here

c. Apples are sold here.

The need for very complex rules can also arise when two languages have corresponding constructions (i.e. content is packaged similarly), but the constructions are subject to different grammatical restrictions. One example of this involves adjectives like difficult and easy and their translations in German. In (3a) the subject, Sam, is understood as one of the objects of the verb convince: compare It is easy to convince Sam. The German (3b) is structurally parallel, and expresses the same content.

(3) a. Sam is easy to convince.

b. Sam ist leicht zu uberzeugen.

Unfortunately, there are differences between this construction in English and German. One difference is that while in English the understood position can be any kind of object, in German it must be a direct object. Thus, a straightforward translation of (4a) produces the ungrammatical (4b). Instead, one must produce something like (4c), with a very different structure.

(4) a. Sam is easy to work with.

b. \*Sam ist leicht mit zu arbeiten.

c. Es ist leicht mit Sam zu arbeiten.

It is easy with Sam to work.

It is important to notice that even apparently small differences between languages can give rise to problems. In English, the idea of being hungry is expressed with an adjective, in German a noun is used, as in (5).

(5) a. I am hungry.

b. Ich habe Hunger

I have hunger

**The Synthesis Problem** The two aspects of the synthesis problem are actually instances of the last problem discussed in the previous section. There are typically many ways in which the same content can be expressed. In short: meaning under-determines form.

The first aspect of the problem that sometimes only one of the ways of expressing the content is correct. There seems to be no principled reason why one says *What time is it?* in English, rather than *How late is it?* or *What is the hour?* On the face of it, these would be equally good ways of expressing the same content. It is just that only one is idiomatic English. The solution to this problem may look simple – just keep a list of the contents that must be realized by these semi-fixed expressions, and stop rules applying to produce the correct, but unidiomatic alternatives. But this solution is not foolproof, precisely for the reasons discussed at the end of the previous section: there are many ways in which the content that one would like to realize as *What time is it?* Could turn up in an IS representation, so it will be hard to list them all.

The second aspect of the synthesis problem is in some ways the converse of the first. It occurs when there is no obvious way of selecting the right way to express the content. To take a very simple example, the content of (1) might be represented as (2):

(1) Sam saw a black cat.

(2) Seeing, by (Sam), of, cat, black, before now.

i.e. there is a seeing event, where Sam did the seeing, and the seen thing was a black cat, and the event occurred before now. This content can be expressed in English in many other ways:

(3) a. Sam saw a cat. It was black.

b. Sam saw something black. It was a cat.

c. Sam saw a cat which was black.

d. A black cat was seen by Sam.

f. Something happened in the past. Sam saw a cat.

g. There was a black cat. Sam saw it.

The problem is how to select among these alternatives. In part, this is just another combinatorial problem: there are just too many alternatives to consider. But a more serious is the problem that it is hard to know in general what one way of saying something better than another. The only reliable test is to read what has been produced, and see if it is clear, and would be clear to a potential reader. But this is certainly asking too much of a computer. We would be asking not only that it understand sentences, but also that it should be able to consider whether someone else would be able to understand them. Of course, one approach to this problem is to choose the output that is most similar to the source text. This is, in fact, one of the ideas behind a transfer-based approach.

**Самостійна робота № 16**

***Quality of machine translation***

*Read the extracts from article by R.Fiederer and Sh.O’Brien* [13] *and be ready to answer the questions:*

1. *What is CL (controlled language)?*
2. *What is NTI? What role does it play in the MT evaluation?*
3. *What are the most obvious tests of MT output quality? Explaine in your own words.*
4. *Translation sentences from English into Ukrainian and from Ukrainian into English with the help of available MT. Analyze the quality of the transaltion interms of clarity, accuracy and style. State the NTIs discocered in the target sentences.*

As the interest in, and demand for, MT increases, it is reasonable to assume that translators who work in technical domains will be increasingly required to interact with MT and, yet, research into the topic within Translation Studies is still quite limited. Published research on the topic of MT itself is plentiful but appears at the moment to be focused more on computational and empirical research, such as statistical methods in MT and automatic evaluation of output. It is important for translators to both keep abreast of developments in this area and to actively contribute to it so that the translation community can engage with technological demands and provide well-informed feedback to system developers, end users and translation customers.

If MT is used for “gisting” purposes, then often no post-editing is required unless, of course, the user would like to see a more polished version of the output. However, when MT is used for publication purposes, then some level of post-editing is normally required. Another method for improving MT output is to apply Controlled Language (CL) rules to the source text in order to reduce ambiguities and complexity. CL rules generally make the source text input more suitable for MT by reducing sentence length, eliminating problematic features such as gerunds, long noun phrases, ambiguous anaphoric referents and so on. Such features are often termed “Translatability Indicators” or, more precisely, “Negative Translatability Indicators” (NTIs for short). It has been shown by several researchers that the use of CL rules can have a positive impact on MT output. The influence of CL on the quality of MT output is an important topic in this paper and will be discussed further in the Data Analysis section.

In a previous study by one of the authors of this paper using an English software user manual translated into German by the IBM WebSphere MT engine, the effect of CL rules on temporal, technical and cognitive post-editing effort was measured and the findings were that post-editing effort can be reduced by removing NTIs from the source text. The removal of NTIs involved making sure that the selected sentences did not contain any of 29 selected NTIs (e.g. sentences over 25 words, passive voice etc), and that was the extent of the editing on the selected sentences. In that study, it was also found that the removal of some NTIs had a greater impact on post-editing effort than the removal of others. One question which is close to the heart of language professionals remained unanswered by this study: how does the quality of the post-edited product compare with the quality of human translation? We assume that many language professionals would predict that the product of machine translation combined with post-editing is inferior in quality to the human translated product. This paper investigates that assumption in both a qualitative and quantitative manner by conducting a comparative evaluation of quality for sentences produced by MT and subsequently post-edited and sentences that have been translated by humans. In both scenarios, the work was completed by experienced professional translators who were paid for their time.

Before discussing our methodology and results, we will first give some consideration to the topic of MT evaluation. As this is a broad topic, we will restrict our discussion to what we feel is relevant for the study described here.

**MT Evaluation** Much has been written about the evaluation of MT output. In the early years of MT evaluation, human evaluators were necessarily involved in the exercise. However, the use of human judges invariably brings with it a number of issues, not least of which are subjectivity, cost and time. In an effort to eliminate these issues, automated evaluation metrics have been developed. The main presupposition behind them, for example, is that the closer MT output is to a professional human translation, the better it is. This *closeness* is measured numerically. On the one hand, it has been demonstrated that such automated metrics correlate well with human judgments and yet other researchers have claimed that perceived correlations may not be as high as previously thought. As researchers work with these metrics, we may well see a development in the not-too-distant future where MT systems will only be evaluated by automated metrics. Somewhat ironically, measures such as BLEU still require human input because the metric compares MT output with so-called “gold standard” *human* translations.

Most research on MT evaluation is concerned with evaluating raw MT output rather than post-edited text, as is the case in our study. It is our contention that a comparison of raw MT output with the final version of a human translation is an unequal comparison. Rather, post-edited MT output ought to be the basis for comparison with human versions.

The most obvious tests of the quality of a translation are:

• *Fidelity* or *accuracy*: the extent to which the translated text contains the “same” information as the original;

• *Intelligibility* or *clarity*: the ease with which a reader can understand the translation;

• *Style*: the extent to which the translation uses the language appropriate to its content and intention.

*Clarity* is an obvious and fundamental criterion for evaluating translation quality, and therefore constitutes the first parameter in our evaluation framework. Evaluators were guided in their interpretation of *clarity* by the provision of the following question: *How easily can you understand the translation?*

Obviously, translated text might be easily understood, but it may not be an accurate representation of the source text. Therefore, the second criterion chosen was *accuracy*, sometimes used synonymously with *fidelity*. We opted to use the term *accuracy*, simply because it would be confusing for evaluators to be confronted with two terms. Scoring for *accuracy* is normally done in combination with (but after) scoring for *intelligibility*. As much of the literature on MT evaluation includes *accuracy* as a parameter, it forms a vital part of this research too. As with the parameter *clarity*, evaluators were given guidance on their interpretation of this parameter through the question and possible answers: *To what extent does the translation contain the “same” information as the source text?* And *If the sentence contains instructions, do you think someone using the translation could carry out the instructions as well as someone using the original?*

The third and last chosen criterion was *style*. As already mentioned, style rarely occurs as a parameter in MT evaluations. Given that our aim was to compare human translation quality with machine translation and postediting quality, we felt that the inclusion of style as a parameter was justified. Translators are naturally reluctant to be responsible for what they consider an inferior product. Their instinct is to revise MT output to a quality expected from human translators, and they are as concerned with ‘stylistic’ quality as with accuracy and intelligibility. This provided us with further impetus to include style in the evaluation framework. Again, the evaluators were guided by some questions: *Is the language used appropriate for a software product user manual? Does it sound natural and idiomatic? Does it flow well?*

According to trhe study the following NTIs were discofered:

* Slang *(two instances)*
* Missing relative pronoun
* Abbreviation *(two instances)*
* Gerund *(six instances)*
* Ambiguous coordination due to ellipsis
* Post-modifying adjectival phrase
* Missing relative pronoun + finite verb "which is" or "that is"
* Misspelling
* Not an independent syntactic unit *(two instances)*
* Ambiguous non-finite verb phrase
* Problematic punctuation
* Missing “in order (to)”

**Самостійна робота № 17**

***Evaluating Machine Translation Systems***

***Read the following article and single out the aspects of evaluation of a machine translation system.***

The evaluation of MT systems is a complex task. This is not only because many different factors are involved, but because measuring translation performance is itself difficult. The first important step for a potential buyer is to determine the translational needs of her organization. Therefore she needs to draw up a complete overview of the translational process, in all its different aspects. This involves establishing the size of the translation task, the text type of the material and its form (is it machine readable and if so, according to which standards). It also involves considering organizational issues, e.g. the tasks of each member of staff concerned in some way with translation. With that information at hand she can start to investigate what the consequences of the purchase of an MT system would be. These are some of the factors to keep in mind:

**Organizational Changes** Incorporating an MT system into the translation process will impact upon both the process and the personnel involved. There will be consequences for system administrators and support staff, but above all for the translators themselves, whose tasks will change significantly. Whereas before they will probably have spent the major part of their time actually translating or editing human translations, they will now find themselves spending a lot of time updating the system’s dictionaries and post-editing the results of machine translation. There may also be a need to build automatic termbanks. Translators will need to receive training in order to perform these new tasks adequately. It is important that the personnel support the changeover to MT. They may not always be aware of the fact that MT can lead to more job satisfaction among translators since MT systems are particularly efficient at tedious, repetitive tasks whereas more challenging translation work often still needs to be done by the human translators. If translators in an organization have decided for some reason or other that they do not want to work with MT, imposing it on them is *guaranteed* to produce poor results.

**Technical environment** We have emphasised right from the start that success depends in part on MT being effectively incorporated as part of a wider document preparation process inside an organization. Smooth handling of text throughout the whole process will prevent unnecessary delays. The MT engine and the document system may well come from different suppliers but they must adhere to the same standards and formats for textual material.

Bear in mind that good document preparation facilities in themselves can improve translator productivity. A decade or so ago much of the productivity increase claimed by some vendors of smaller MT systems could be attributed to their providing rather good multi-lingual word processing facilities, at a time when many translators used only an electric typewriter. Some MT vendors still supply a whole MT system package where the engine is inextricably wrapped up with some specialised word processing and text-handling tool unique to that particular system. This is undesirable on two counts: first, if you are already familiar with a good multi-lingual word processor, little is gained by having to learn another which does much the same things; second, it is likely that an MT vendor’s home-grown text-processing facilities will be inferior to the best independent products, because most of the effort will have gone into developing the translation engine.

**Engine Performance: Speed** In some circumstances, the speed at which the engine churns out raw translated text won’t actually be crucial. If the system requires interaction with the translator whilst it is translating, then of course it should not amble along so slowly as to to keep the translator waiting all the time. But if it is functioning without direct interaction, it can proceed at its own pace in the background whilst the translator gets on with other jobs such as post-editing or hand translation of difficult material. This aspect also depends on the user’s translational needs: if the user’s material requires 15 hours daily on a fast MT system and 20 on a slower one, no one will notice the difference if the system is running overnight.

Of course, there are situations where the quick delivery of translation output is essential. But in general, slow speed is the one component of MT performance of which upgrading is relatively easy: by buying some faster hardware for it to run on.

**Engine Performance: Quality** This is a major determinant of success. Current general purpose commercial MT systems cannot translate all texts reliably. Output can sometimes be of very poor quality indeed. We have already mentioned that the post-editing task (and with it the cost) increases as translation quality gets poorer. In the worst case, using MT could actually increase translation costs by tying up translators in editing and maintenance tasks, ultimately taking up more time than would have been required to produce translations entirely by hand. Because of its enormous influence on the overall translation cost, translation quality is a major aspect in MT evaluation.

So how do we evaluate a system? Early evaluation studies were mainly concerned with the quality of MT. Of course, assessing translation quality is not just a problem for MT: it is a practical problem that human translators face, and one which translation theorists have puzzled over. For human translators, the problem is that there are typically many possible translations, some of them faithful to the original in some respects (e.g. literal meaning), while others try to preserve other properties (e.g. style, or emotional impact).

In MT, the traditional transformer architecture introduces additional difficulties, since its output sentences often display structures and grammar that are unknown to the target language. It is the translator’s task to find out what the correct equivalent is for the input sentence and its ill-formed translation. And, in turn, the evaluator’s task is to find out how difficult the translator’s task is.

A traditional way of assessing the quality of translation is to assign scores to output sentences. A common aspect to score for is **Intelligibility**, where the intelligibility of a translated sentence is affected by grammatical errors, mistranslations and untranslated words. Some studies also take style into account, even though it does not really affect the intelligibility of a sentence. Scoring scales reflect top marks for those sentences that look like perfect target language sentences and bottom marks for those that are so badly degraded as to prevent the average translator/evaluator from guessing what a reasonable sentence might be in the context. In between these two extremes, output sentences are assigned higher or lower scores depending on their degree of awfulness—for example, slightly fluffed word order (“*... in an interview referred Major to the economic situation...*” will probably get a better score than something where mistranslation of words has rendered a sentence almost uninterpretable (“*...the peace contract should take off the peace agreement....*). Thus scoring for intelligibility reflects directly the quality judgment of the user; the less she understands, the lower the intelligibility score. Therefore it might seem a useful measure of translation quality.

This is a four point scale which would be appropriate in evaluation the quality of a MT system

An Example of Intelligibility Scale

1) The sentence is perfectly clear and intelligible. It is grammatical and reads like ordinary text.

2) The sentence is generally clear and intelligible. Despite some inaccuracies or infelicities of the sentence, one can understand (almost) immediately what it means.

3) The general idea of the sentence is intelligible only after considerable study. The sentence contains grammatical errors and/or poor word choices.

4) The sentence is unintelligible. Studying the meaning of the sentence is hopeless; even allowing for context, one feels that guessing would be too unreliable.

By measuring intelligibility we get only a partial view of translation quality. A highly intelligible output sentence need not be a correct translation of the source sentence. It is important to check whether the meaning of the source language sentence is preserved in the translation. This property is called **Accuracy** or **Fidelity**. Scoring for accuracy is normally done in combination with (but after) scoring for intelligibility.

As with intelligibility, some sort of scoring scheme for accuracy must be devised. Whilst it might initially seem tempting to just have simple ‘Accurate’ and ‘Inaccurate’ labels, this could be somewhat unfair to an MT system which routinely produces translations which are only slightly deviant in meaning. Such a system would be deemed just as inaccurate as an automated ‘Monty Python’ phrasebook which turns the innocent request *Please line my pockets with chamois* into the target language statement *My hovercraft is full of eels*. Obviously enough, if the output sentence is complete gobbledegook (deserving of the lowest score for intelligibility) then it is impossible to assign a meaning, and so the question of whether the translation means the same as the original cannot really be answered. (Hence accuracy testing follows intelligibility rating).

The evaluation procedure is fairly similar to the one used for the scoring of intelligibility. However the scorers obviously have to be able to refer to the source language text (or a high quality translation of it in case they cannot speak the source language), so that they can compare the meaning of input and output sentences.

As it happens, in the sort of evaluation considered here, accuracy scores are much less interesting than intelligibility scores. This is because accuracy scores are often closely related to the intelligibility scores; high intelligibility normally means high accuracy. Most of the time most systems don’t exhibit surreal or Monty Python properties. For some purposes it might be worth dispensing with accuracy scoring altogether and simply counting cases where the output looks silly (leading one to suppose something has gone wrong).

It should be apparent from the above that devising and assigning quality scores for MT output—what is sometimes called ‘Static’ or ‘Declarative Evaluation’3 —is not straightforward.

Interpreting the resultant scores is also problematic. It is virtually impossible — even for the evaluator —to decide what a set of intelligibility and accuracy scores for a single MT system might mean in terms of cost-effectiveness as a ‘gisting’ device or as a factor in producing high quality translation.

**Самостійна робота 18**

***Polysemanticism and the choice of the equivalent in machine translation***

*Read the following information and give your own examples of word, sentence ans structure ambiguity.*

The best of all possible worlds for natural language processing (NLP), every word would have exactly one sense. While this is true for most NLP, it is an exaggeration as regards MT. It would be a *better* world, but not the best of all possible worlds, because we would still be faced with difficult translation problems. Some of these problems are to do with lexical differences between languages — differences in the ways in which languages seem to classify the world, what concepts they choose to express by single words, and which they choose not to lexicalize. We will look at some of these directly. Other problems arise because different languages use different structures for the same purpose, and the same structure for different purposes. In either case, the result is that we have to complicate the translation process.

However, there are cases which can’t be called lexical mismatches. They are rather called **lexical holes** when there is no equivalent in the target language. For example the words *черешня* and *вишня* in Ukrainian have only one translation into English – *a cherry,* there is no differentiating between these two phenomena.

There are cases of lexical holes where one language has to use a phrase to express what another language expresses in a single word. Examples of this include the ‘hole’ that exists in English with respect to Ukrainian and can’t be translated as word-to-word translation. For example, c*ommuter (людина, яка користується громадським транспортом); thirsty (бути спраглим), siblings* (*брати та сестри*) and so on. The problems raised by such lexical holes have a certain similarity to those raised by idioms: in both cases, one has phrases translating as single words.

Roughly speaking, **idioms** are expressions whose meaning cannot be completely understood from the meanings of the component parts. For example, whereas it is possible to work out the meaning of (7a) on the basis of knowledge of English grammar and the meaning of words, this would not be sufficient to work out that (7b) can mean something like ‘If Sam dies, her children will be rich’. This is because *kick the bucket* is an idiom.

(7) a. *If Sam* ***mends the bucket****, her children will be rich.*

b. *If Sam* ***kicks the bucket****, her children will be rich.*

The problem with idioms, in an MT context, is that it is not usually possible to translate them using the normal rules. There are exceptions, for example *take the bull by the horns* (meaning ‘face and tackle a difficulty without shirking’) can be translated literally into French as *prendre le taureau par les cornes*, which has the same meaning. But, for the most part, the use of normal rules in order to translate idioms will result in nonsense.

Instead, one has to treat idioms as single units in translation. Lexical holes and idioms are frequently instances of word- phrase translation. The difference is that with lexical holes, the problem typically arises when one translates from the language with the word into the language that uses the phrase, whereas with idioms, one usually gets the problem in translating from the language that has the idiom (i.e. the phrase) into the language which uses a single word. For example, there is no problem in translating *I do not know the solution* literally into French — the result is perfectly understandable. Similarly, there is no problem in translating *mourir* ‘literally’ into English (as *die*)— one is not forced to use the idiom *kick the bucket*.

In general, there are two approaches one can take to the treatment of idioms. The first is to try to represent them as single units in the monolingual dictionaries. What this means is that one will have lexical entries such as *kick the bucket*. One might try to construct special morphological rules to produce these representations before performing any syntactic analysis — this would amount to treating idioms as a special kind of word, which just happens to have spaces in it. As will become clear, this is not a workable solution in general. A more reasonable idea is not to regard lexical lookup as a single process that occurs just once, before any syntactic or semantic processing, but to allow analysis rules to replace pieces of structure by information which is held in the lexicon at different stages of processing, just as they are allowed to change structures in other ways. This would mean that *kick the bucket* and the non-idiomatic *kick the table* would be represented alike (apart from the difference between *bucket* and *table*) at one level of analysis, but that at a later, more abstract representation *kick the bucket* would be replaced with a single node, with the information at this node coming from the lexical entry kick the bucket. This information would probably be similar to the information one would find in the entry for *die*.

In any event, this approach will lead to translation rules saying something like the following, in a transformer or transfer system (in an interlingual system, idioms will correspond to collections of concepts, or single concepts in the same way as normal words).

The second approach to idioms is to treat them with special rules that change the idiomatic source structure into an appropriate target structure. This would mean that *kick the bucket* and *kick the table* would have similar representations all through analysis. Clearly, this approach is only applicable in transfer or transformer systems, and even here, it is not very different from the first approach—in the case where an idiom translates as a single word, it is simply a question of where one carries out the replacement of a structure by a single lexical item, and whether the item in question is an abstract source language word such as *kick the bucket* or a normal target language word

One problem with sentences which contain idioms is that they are typically ambiguous, in the sense that either a literal or idiomatic interpretation is generally possible (i.e. the phrase *kick the bucket* can really be about buckets and kicking). However, the possibility of having a variety of interpretations does not really distinguish them from other sorts of expression. Another problem is that they need special rules (such as those above, perhaps), in addition to the normal rules for ordinary words and constructions. However, in this they are no different from ordinary words, for which one also needs special rules. The real problem with idioms is that they are not generally fixed in their form, and that the variation of forms is not limited to variations in inflection (as it is with ordinary words). Thus, there is a serious problem in recognising idioms.

**Самостійна робота 19**

Translate the text from English into Ukrainian

Text 1. Technical innovations in stereo sound

After World War II the near-simultaneous arrival of full-frequency-range disc recor:- ing and magnetic tape recording stimulated popular interest in “high-fidelity”(Hi-Fi) souk. and a rapid expansion of the record industry. Since then, interest in better and more convenient sound reproduction has been stimu­lated by a constant parade of innovations - stereo tapes (1954); stereo records (1958); stere FM radio (1962).

The spread of multi-track recording during the 1960s, added new variety and creative to rock music; the arrival of transistors during the same period, made equipment smaller cheaper, and more reliable. Further achievements were: Dolby noise reduction (1967); stereo cassette tapes (1970); four-channel sound (ear} 1970s); Dolby Stereo sound for movies (1976); digital recording (late 1970s); “Walkman' portable headphone stereo player (1980); the compact disc (1983); the Hi-Fi stereo VC»i (1984); stereo television sound (1985); the DAT-digital audio tape (1987); video “hoir: theater” systems with Dolby Surround Sound (late 1980s); digital radio via cable-TV hookups (1991); the Digital Compact Cassette (1992); and the MiniDisc (1993).

T oday’s music listener has a very broad range of equipment choices. The highest soiqe quality and the greatest operating flexibility are obtained by connecting individual auc : components to form a system. A similarly broad range of cost and potential sound qualitj is available in car stereo systems designed for installation in automobiles.

Translate the text from Ukrainian into English:

Text 2

Відеокамерою можна записувати зображення та звук на магнітну відеоплівг\* яку потім можна демонструвати на телеекрані за допомогою відеомагнітофону а:« через пряме підключення до телевізора. Елементами типової відеокамери є: окуляр, об’єктив зі змінною фокусною відстанню (варіооб’єктив), візир, підкасетник, батареї та система керування.

Невеликі переносні любительські чорно-білі камери почали випускати у сере­дині 70-х років. Камери кольорового зображення з’явилися наприкінці 70-х. Оби­два типи відеокамер потребували використання портативного відеомагнітофона, що приєднувався за допомогою кабеля. (Великі професійні відеокамери, які суттєво переважають любительські як за конструкцією, так і за технічними можливостями, використовують у телестудіях). Найостаннішим винаходом у царині непрофесійних зідеокамер є “камкодер”, тобто портативна відеокамера, яка з’явилася на початку 30-х років. Як свідчить його назва, цей легкий апарат компактно поєднує відеокаме- ру (кам) та відеомагнітофон (рекордер).

Більшість моделей камкодерів мають вбудовану функцію відтворення запису, що дозволяє оператору переглядати вже зняті кадри. До того ж, майже всі типи кам­кодерів можна приєднувати до телевізора через кабель, аби переглядати запис вдома. Ще одним досягненням на шляху вдосконалення відеотехніки стала поява числового камкодера, який надає користувачам низку нових, невідомих раніше можливостей.

**Самостійна робота 20**

Translate the text from English into Ukrainian

**Text 3 Home Stereo System**

The following audio components, in combination, make up a complete stereo system.

The CD Player. Compact Disc players may be either single-disc models or multi-disc : hangers. A changer may be either a “carousel” changer, which accepts 5 CDs in a large cir­cular tray, or a “magazine” changer for which 5 to 10 CDs are pre-installed in a slotted carrier. A “combi” player handles CDs (single or multiple) and also plays video laserdiscs.

The Tape Deck. This usually is a cassette player or recorder with compartments for T-vo tape cassettes for easy copying. Audiophiles who prefer higher sound quality may use Dther recording systems: DAT, MiniDisc, reel-to-reel, or a Hi-Fi VCR.

The Tuner. This component receives radio broadcasts, usually from both AM and FM nations. In FM stereo, reception quality depends on the size, aiming, and location of the -eceiving antenna. Stereo sound may be distorted by signal reflections. Digital radio sig­nals, which are relatively immune to this fault, are delivered to homes via the same wires *-Z2.1* deliver cable-TV.

Translate the text from Ukrainian into English:

**Text 4 Домашня стерео система. Продовження**

**Підсилювач.** Комбінований, або вмонтований підсилювач складається з попереднього підсилювача та підсилювача потужності. Підсилювач забезпечує роботу акустичної системи, а тому він зазвичай має систему регулювання гучності та висоти тону. Приймач - це комбінований підсилювач та тюнер, вмонтовані до одного блоку для зручності користування та економії.

Акустична система зазвичай складається з двох або більше колонок, розподіль­ника сигналу (який спрямовує низькочастотні сигнали до низькочастотного гучно­мовця, а високочастотні сигнали - до високочастотного) та корпусу. Для забезпе­чення повноцінного стереоефекту ліва та права колонки мають бути розташовані на однаковій відстані від слухача. Якщо він буде трохи ближче до однієї з них, звук звідти досягне вуха раніше за звук з іншої колонки і це порушить стереоефект. Біль­шість типів колонок потребують їх встановлення на певній висоті (на підставці, по­лиці тощо), аби меблі не перешкоджали звуку досягати вух слухачів найкоротшу шляхом. Навушники - це власне мініатюрні гучномовці, які спрямовують звук безпо­середньо до вух. Вони забезпечують чисте стереозвучання і потребують настільки мало енергії, що можуть живитися від радіоприймачів або магнітофонів, що працю­ють на батарейках.

**Самостійна робота 21**

Translate the text from English into Ukrainian

**Text 5 Consumer Electronics Producers. Sony**

A cofounder of Sony Corporation, Morita Akio, b. Nagoya City, Japan, Jan. 26, 1921. d. Oct. 3, 1999, developed one of the world’s leading manufacturers in the consumer elec­tronics industry. By establishing factories to make television sets, video and audio equip­ment, semiconductors, and information-related products in the United States and other countries where its products are sold, Sony became a truly international corporation. After studying physics and graduating from Osaka Imperial University in 1944, Morita, with Ibuka Masaru, established Tokyo Telecommunications Engineering Corporation in 1946 the company’s name was changed to Sony Corporation in 1958.

Under their leadership Sony developed and marketed (marketing was Morita’s particu­lar genius; Ibuka was the engineer) the first widely used transistor radio; the Trinitron color television; the first successful home videocassette recorder, the Betamax; the Walkmar personal stereo; and, with Philips, the compact disc. As the enterprise grew, Morita became its president (1971), and then chairman of the board and chief executive officer (1976). Ht stepped down from his chief executive post in 1989, and resigned as chairman in Novem­ber 1994. Morita also served as chairman of the Japan-United States Business Council an: of Foreign Investment in Japan Development, Inc.

Translate the text from Ukrainian into English:

**Text 6 Виробники побутової електротехніки. Компанія “АЕГ”**

Ця важлива німецька компанія, що спеціалізується на виробництві електронного та електричного обладнання, входить (з 1985 року) до складу корпорації “Дайм – лер - Бенц АГ”. Вона виготовляє промислове та побутове електрообладнання, теле­комунікаційне обладнання, електронні промислові компоненти, офісне обладнання комп’ютери та побутову техніку.

Штаб-квартира знаходиться у Франкфурті на Майні. Компанія була заснована в Берліні у 1883 році, коли промисловець Еміль Ратенау за фінансової підтримки ком­панії “Сіменс енд Хальске”, ще однієї великої німецької компанії, заснував компа­нію “Альгемайне Електріцітатс Гезельшафт” (скорочено АЕГ). У 1966 році компанія “Телефункен АГ”, до того підрозділ АЕГ, була включена до її складу і у 1967 році назва компанії змінилася на “АЕГ Телефункен”.

Наприкінці XX століття компанія потрапила до скрутного фінансового станови­ща, яке деякі аналітики пояснювали тим, що вона продовжувала виготовляти дорогу побутову електротехніку (наприклад, телевізори та стереосистеми), вже після того як її цінова конкурентоздатність була підірвана закордонними виробниками. Ні­мецький уряд спочатку відмовився надати фінансову підтримку і в 1979 році передав контроль над компанією банкам, які її кредитували. Навіть хоча банки-кредитори списали більшість збитків компанії в 1981-82 роках, великі борги, що залишилися, загрожували існуванню компанії. Протягом 1983 року більшість підприємств ком­панії “Телефункен” були розпродані, в 1984 році компанія була реорганізована, а на початку 1985 року - її назва була спрощена до “АЕГ АГ”. В 1985 році концерн "Даймлер-Бенц АГ” став власником контрольного пакету акцій компанії.

**Самостійна робота 22**

Translate the text from English into Ukrainian

**Text 7** **COMPUTERS AND OFFICE EQUIPMENT (Комп’ютери та офісне обладнання)**

A personal computer (PC) is a complete microcomputer that is based on a microproc­essor, a small semiconductor chip that performs the operations of a central processing unit, or CPU. A PC also has other integrated circuits. It is designed for use by a single user and usually includes a keyboard and a monitor, or video display terminal.

Two of the chief measures of computing power are computer memory size and process­ing speed. The unit of memory is a byte, which can hold one character of a text. A kilobyte (Kbyte) is 1,024 bytes, a megabyte (Mbyte) is 1,024 Kbytes, and a gigabyte (Gbyte) is 1,024 Mbytes. These measures have been used to distinguish PCs from larger minicom­puters and mainframe computers, but the increasing power of the PC has blurred these distinctions. The memory capacity of early PCs was often as small as 16 Kbytes, but by the late 1990s typical PCs were equipped with 16 to 64 Mbytes of memory. This can often be expanded to 256 Mbytes or even several Gbytes in a workstation, which is the most power­ful form of PC.

The processing speed of PCs is commonly specified by the speed of the electronic clock(18) that controls internal operations. The latter measure is most commonly used with PCs. Early PCs had clock speeds of one or two megahertz (MHz), but speeds of 450 MHz or more are possible in modem designs. A computer system consists of three parts: the CPU, input-output devices (I/O devices), and memory.

Translate the text from Ukrainian into English:

**Текст 8 Пристрої вводу-виводу**

Найбільш поширеними пристроями вводу є клавіатура та такі індикаторні при­строї, як маніпулятор-“миша” та кульковий маніпулятор. Найбільш поширеним при­строєм виводу є дисплей на електронно-променевій трубці, або монітор. У портатив­них комп’ютерах використовуються пласкі дисплеї на рідких кристалах. Хоча так: дисплеї дорожчі за електронно-променеві трубки, вони також використовуються > високопродуктивних комп’ютерах, де принципове значення має мала вага та відсут­ність мерехтіння зображення. Такі дисплеї працюють у текстовому або графічному чорно-білому або повнокольоровому режимах. Візуальне зображення та індикатори: пристрої дозволяють працювати у режимі “навести та натиснути”, який є зручнішим за друк команд за допомогою клавіатури. Іншими поширеними пристроями вводу-виводу є сканери, модеми для зв’язку між комп’ютерами, “миша” та джойстик, принтери для друку копій на папері. Плотери можуть друкувати як на папері, так **і** на плівці. Принтери відтворюють графічну інформацію на папері з високою швид­кістю. Оптичні сканери - це пристрої вводу, які копіюють графічні зображення дам подальшого зберігання у числовій формі. Сканери, обладнені системою оптичного розпізнавання текстів, можуть зчитувати текст на папері і передавати одержану ін­формацію до текстових файлів.

**Самостійна робота 23**

Translate the text from English into Ukrainian

**Text 9 Printer**

A printer is a computer output device that records information on paper. The informa­tion can be in the form of written script, numerical data, or graphics. Printers can product letter- quality print, like a typewriter. There are two main types of printers: dot-matrix pri­nters and ink-jet printers. Dot-matrix printer employs a matrix of small pegs that, hit from behind, impart a series of dots on paper. The dot-matrix printer can form a wide variety o: characters, as well as graphics. Ink-jet printers share the flexibility of dot-matrix printer; and operate more quietly. In addition, ink-jet printers can be adapted to complex color printing. A typical modem ink-jet printer has a dual cartridge (black-and-white and colour printing cartridges), and is capable of printing on plain paper as well as on transparency an; special photo paper which greatly improves the image quality. The more advanced type o: printers is the laser printer which is capable of both black-and-white and colour printing.

Translate the text from Ukrainian into English:

**Text 10 Комп’ютерна пам’ять**

Первинна пам’ять - це блок пам’яті з безпосереднім доступом для центрального процесора. Сучасні процесори здатні працювати з обсягом первинної пам’яті до 4 п- габайт. Зазвичай ПК продаються з меншим обсягом первинної пам’яті, ніж процесор може обробляти. У подальшому її обсяг можна нарощувати.

Вторинна пам’ять - це зовнішня пам’ять, необхідна для зберігання даних, обсяг яких завеликий, аби зберігатися у первинній пам’яті, або якщо такі дані слід збері­гати постійно. (У більшості ПК зміст первинної пам’яті втрачається, якщо живлення комп’ютера вимикають.)

Найбільш поширеною формою вторинної пам’яті є магнітні диски. Жорсткі дис­ки, які часто називають вмонтованими, бо їх неможливо виймати з ПК, зазвичай можуть містити від 4 до 50 мільярдів символів текстової інформації. Дискети мають значно меншу ємність, але їх можна виймати та зберігати окремо. Нові типи змінних дисків зовні нагадують дискети, але мають ємність понад 100 мегабайт, що набли­жається до ємності малих жорстких дисків. Незважаючи на значні успіхи у розробці пристроїв для вторинного зберігання інформації, деякі комп’ютери можуть продава­тися взагалі без таких пристроїв.

**Самостійна робота 24**

Translate the text from English into Ukrainian

**Text11 Fax and Modem**

A facsimile, or fax, machine is a device capable of sending or receiving an exact copy of printed or pictorial matter over telephone lines in, usually, less than 60 seconds. By the mid-1990s faxing had become the preferred method for the rapid sending of printed mate­rial. The development of sophisticated scanning and digitizing techniques in computer and communications technologies, and the establishment of standards made it possible for all fax machines to communicate with one another over ordinary telephone lines. Either as stand-alone machines, or built into computers, contemporary fax devices can transmit data at a maximum 14,400 bits per second (bps) on conventional (analog) phone lines. To trans­mit via a machine, the original document is fed into the machine, where it is scanned by a series of light-emitting diodes (LEDs). The receiving machine, which is addressed through its telephone number, prints out the message using techniques similar to those for copying machines. (Some fax machines actually double as copiers.)

A modem is a device that converts one form of communication signal into another. It is used as a link between devices that use different forms of signals, such as a computer or a telephone. Modems can also carry out various control functions for coordinating the transmitted data. Digital data from a computer can be transmitted at the rate of several thousand bits per second over ordinary telephone lines and at even higher rates over special lines.

Translate the text from Ukrainian into English:

**Text 12**

Перший масовий ПК був розроблений у 1975 році компанією “Майкроінструментейшн енд телеметрі системз” (MITS), невеликою компанією, що займалася електронікою. Він мав назву “Альтаїр 8800”, був оснащений процесором типу “Ін-тел” та продавався як набір “зроби сам” (для самостійного збирання вдома) за $399.

Інші компанії, такі як “Епл”, “Кейпро”, та “Морроу” невдовзі запропонували власні комп’ютери. Комп’ютерна індустрія пройшла шлях від дивних наборів “зроби сам” до одні­єї з найважливіших у світі галузей виробництва товарів масового споживання. На 1997 рік обсяг світового ринку ПК виріс приблизно до $100 мільярдів, включаючи стабільний попит на все більш досконалі модифікації обладнання (модеми, моні­тори, принтери), та комп’ютерні програми, такі як електронні таблиці, текстові редактори, навчальні програми. Тим часом комп’ютерні гіганти, включаючи “Ай- Бі-Ем”, “Диджитал” та “Ен-Сі-Ар” перепрофілювали власні підприємства та вклю­чилися в активну працю на перспективному споживчому світовому ринку.

Важливість ПК неможливо переоцінити. У зв’язку з труднощами, які мав пере­січний споживач із збиранням та вживанням перших комп’ютерів, протягом певного періоду часу вони залишалися прерогативою відносно невеликої кількості спожива­чів на роботі та вдома. Однак у 80-х роках двадцятого століття комп’ютерна інду­стрія розробила нові інтегральні схеми, набагато швидші та потужніші за попередні. (На початку 90-х років двадцятого століття портативний лептоп вартістю $ 2 000 мав таку саму потужність як комп’ютер розміром з кімнату вартістю в мільйони доларів у 70-х роках). Невдовзі стало очевидним, що комп’ютерні програми будуть відігра­вати ключову роль на цьому ринку.

**Самостійна робота 25**

***ТЕКСТ ДЛЯ АНОТУВАННЯ ТА РЕФЕРУВАННЯ***

**Text 1**

**GOOGLE GLASS HAS ITS ELECTRONIC EYE ON HEALTH**

by Paul Marks

The experimental Google Glass headset has already inspired innovators to create applications that could bring big changes to healthcare.

"SO, WHY are you wearing Google Glass?" I ask the man ahead of me in the coffee line at Ubicomp, a computing conference in Zurich, Switzerland. He responds enthusiastically that he is trying to work out how people with diabetes could use Glass's camera to recognise the nutritional value of the food they eat and use that to predict their glucose levels, helping them better cope with their condition.

The wearer is Subrai Pai of the Georgia Institute of Technology in Atlanta, and his idea is just one of many healthcare applications for Glass. The camera-packing wireless eyepiece is also helping people to live with some of the problems of paralysis, blindness and deafness. And surgeons are eyeing Glass as a tool for improving surgery and medical education.

Last month, Christopher Kaeding, a surgeon at Ohio State University in Columbus, strapped Glass on before performing a knee operation to repair a patient's anterior cruciate ligament. As he went through the procedure, colleagues across town were able to view the action from Kaeding's point of view – by virtue of a Google Hangouts online forum – and offer advice, while medical students in yet another location watched and learned.

Beyond the operating theatre, Glass could be useful to people with sensory impairments. A blind person preparing to cook and wondering what's in a food tin could easily find out by taking a picture of the label and sending it, with a question, to crowd workers on Amazon's Mechanical Turk using a system developed by researchers at Carnegie Mellon University in Pittsburgh, Pennsylvania, and at the University of Maryland in Baltimore.

"Back comes a result in seconds saying 'no, the can does not contain nuts'. Or 'flip the box around, you're looking at the wrong side'," says Thad Starner, of Georgia Tech, who is Google's technical lead for Glass. "This technology also helps with things you just don't even think about as a sighted person, like is there a rash on my baby's head?"

Starner is also working with people with paralysis of all four limbs to see how Glass can help them. For instance, Glass makes a sound that is conducted through your cheekbone to signal the arrival of a text or email, which can be sent from your phone via Bluetooth or over Wi-Fi. A tilt of the user's head, or a wink, tells Glass's sensors to display the message. "They can then respond by voice and their words are sent to Google servers, converted to text and transmitted as SMS faster than their friends can text," says Starner.

Starner tells of a quadriplegic woman who has been empowered by Glass to act as navigator and videographer on camping trips with friends – using Glass's heads up, turn-by-turn satnav and its built-in camera. "Glass is reducing some of the barriers to such participation," he says.

The aim of Pai's project is to let people with diabetes view all of their health data in a simple Glass visualisation. "This could include data from insulin pumps, continuous glucose monitors, pedometers, heart-rate monitors and nutrition information from a food journal captured via Glass's camera," says Pai's colleague Nate Heintzman, who runs the project at the University of California, San Diego. He admits that the system is not yet ready to perform automated food-recognition but says that simply having data in one place will help users make better health decisions.

The benefits extend to more than just those who live with impairments. For parents learning to communicate with deaf children, Georgia Tech researcher Kim Xu has developed SmartSign, an app demonstrated by Starner at Ubicomp, that allows a child's hearing family to ask for the sign language of a particular word and have a short video "microlesson" on that subject streamed to the Glass screen.

Google is not saying when Glass will become an affordable consumer product, but when it does, a raft of health applications await it. Sensors that measure heart arrhythmias are already being built into clothing by researchers like Lucy Dunne, a smart-textiles designer at the University of Minnesota in St Paul. It is likely that Glass will connect with such sensors to record and display their data.

Despite the technical wizardry, the trickiest problem Google faces, says Dunne, is the same one that faces makers of all wearable technologies: making Glass into something that people actually want to wear. That will mean making Glass look a lot more attractive than its current uber-geeky look. "People want to look normal. So you have to innovate within subtle conformity restraints and aesthetics," she says.

"Fashion is hard."

**The Glass 2.0 wish list**

Google Glass has a mic and camera, plus sensors for motion, orientation, proximity and eye winks, but a few more gizmos would really up its game. So says Bernard Kress of GoogleX, the lab in Mountain View, California, where Glass is being developed. Top of his wish list is adding a Kinect-style depth camera to allow Glass to recognise its wearer's gestures, such as finger clicks and hand waves, to activate functions like sharing pictures quickly online. But he says he is still waiting for depth cameras to miniaturise enough.

Meanwhile, Japanese mobile network NTT DoCoMo has developed a way that a Glass-type headset could capture your face for video calls. Using four tiny fisheye video-camera lenses aimed at a user's face from the headset's edges, four distorted images of your face can be captured, corrected and stitched together to create a fullmotion selfie to be transmitted with your voice.

Kai Kunze at Osaka Prefecture University in Japan hopes Glass 2.0 comes with a gaze-tracking sensor. He has created an algorithm that logs your reading habits by watching for eye-movement patterns that differ when reading comics, newspapers, fashion magazines, textbooks or novels. It tots up your intake and warns you if you read too much junk.

(27 September 2013 New Scientist [www.newscientist.com](http://www.newscientist.com))

**Самостійна робота 26**

***ТЕКСТ ДЛЯ АНОТУВАННЯ ТА РЕФЕРУВАННЯ***

**3D-PRINTED OBJECTS OUTGROW THEIR PRINTERS**

by Niall Firth

3D printing may be set to change the world by letting us make all sorts of bespoke objects, but there's one little problem: the printers can only print items smaller than themselves. Until now, that is.

Skylar Tibbits at the Massachusetts Institute of Technology's Self-Assembly Lab and colleague Marcelo Coelho have come up with a way for standard 3D printers to print out large-scale objects. "It's challenging the notion that we always need a machine that's bigger than the thing it's printing," says Tibbits.

The approach, called Hyperform, converts the object to be printed into a single long chain made from interlocking links. An algorithm works out how that chain can be packed together into the smallest cube possible using a Hilbert curve – a fractalbased pattern that is the most efficient way of squeezing a single line into a small as space as possible. The resulting cube is small enough to be printed inside a standard printer.

**Hand assembly**

Once this cube is printed, the chain can be unravelled and assembled by hand to create the desired object. That's possible because each link in the chain has notches that allow it to bend only in a certain way. "You have to fold it by hand and click it into place," says Tibbits. Hyperform won the "The Next Idea" prize at the Ars Electronica 2013 technology festival in Linz, Austria, earlier this month.

But printing cubes made of such densely packed chains was too much for most of the consumer printers that Tibbits and his team tried. "We blew a lot of printers at first," he says. So they teamed up with Formlabs who, after a successful Kickstarter crowdfunding campaign, have just started shipping their Form 1 3D printer.

The Form 1 is capable of much higher resolution than standard consumer 3D printers. Instead of printing out layer upon layer of plastic, it uses stereolithography, in which a pool of liquid plastic is added to the base of the printer and a laser traces out the pattern required, causing the liquid plastic to cure and solidify. The technique can form layers just 25 microns thick, with details as small as 300 microns.

Hyperform has so far been used to create large structures such as a chandelier, and Tibbits sees it as being perfect for producing large 3D-printed consumer products. But the Form 1 printer uses resins which have limitations in terms of strength. "There is a range of things that are largish that we can do right away," says Tibbits. "But if you want to make large-scale furniture or buildings, there needs to be

an approach to make them stronger."

**4D printing**

Manually clicking each link into place isn't ideal either. That's where Tibbits' other work in so-called 4D printing might help. 4D printing uses materials that are 3D-printed to produce an intermediate object which, when exposed to water, will bend and twist itself into the final structure. "You can see how Hyperform and 4D printing are pointing towards each other," he says. Clément Moreau, CEO of French 3D printing firm Sculpteo, says projects like Hyperform are shaping the future of 3D printing. "This is yet another example of how 3D printing is more of a flexible manufacturing process than injection moulding because it constantly opens up new possibilities in terms of materials used and shapes which can be printed."

(26 September 2013 New Scientist www.newscientist.com )

**Самостійна робота 27**

***ТЕКСТ ДЛЯ АНОТУВАННЯ ТА РЕФЕРУВАННЯ***

**FIRST NANOTUBE COMPUTER COULD SPARK CARBON**

**REVOLUTION**

by Jacob Aron

COMPUTING, like life, may soon be carbon-based. A functioning computer has been built from carbon nanotubes – complete with its own operating system and software.

It is a simple device, made of only 178 transistors compared with the billions in today's silicon computers. And it is not the first time a computer has been made from something other than silicon.

But given the long-touted potential benefits of carbon nanotubes over silicon, it's a step that could spark a major revolution in computing, akin to the switch from vacuum tubes to silicon around 50 years ago.

"It's a simple computer, but it's not a trivial computer," says Subhasish Mitra of Stanford University in California, who led the development of the device with Philip Wong, also at Stanford.

The computer also represents a victory for much-hyped carbon nanotube transistors, created in 1998 by Cees Dekker and his group at Delft University of Technology in the Netherlands. "It is wonderful to see such a carbon nanotube computer realised, 15 years after our group discovered that carbon nanotube molecules could be used as the basic element of a computer," says Dekker.

Carbon nanotubes' electrical properties mean they make faster and more efficient transistors – the semiconducting switches that create logic gates and allow computation. But difficulties manipulating the tiny molecular rods left many asking if they would ever be useful.

Because they are so small, nanotubes can slip out of place and connect parts of a circuit that are not meant to touch. Mitra and his colleagues guided their tubes by growing them on a quartz wafer, aligning 99.5 per cent of them along the crystal's regular structure. Once the nanotubes were in place, they etched out any misaligned tubes.

The team also sent a large current through the circuit to burn out any useless metallic nanotubes and ensure that only semiconducting nanotubes were left behind (Nature, DOI: 10.1038/nature12502).

"Everybody says that nothing is manufacturable with nanotubes," says Mitra. "That question has been resolved."

Once it had a working chip, the team programmed it to run a counting program and a sorting algorithm. The computer can switch between the two programs, allowing it to multitask like more sophisticated machines. Its basic design is what is known as Turing complete, which means the carbon nanotube machine can theoretically compute anything a regular PC can – just much, much more slowly. It runs at a speed of 1 kilohertz, millions of times slower than modern machines.

This raw speed is deceptive, though, says Mitra, because the experimental chip is hooked up to measurement equipment that slows it down. "If you take out the measurement side of things you would get significant speed-up."

The computer's mere existence is more important than its complexity, says Aaron Franklin, a researcher at IBM in New York who was not involved in the work. "It is a key milestone on the path towards a competitive carbon nanotube computer," he says.

Even once the technology is ready, high costs mean you are unlikely to see a carbon chip inside your laptop or smartphone any time soon, Franklin adds. They might show up first in the enormous servers run by the likes of Google and Amazon.

"Servers are always going to benefit from improvements that help them have higher performance and run at lower power," he says.

(25 September 2013 New Scientist www.newscientist.com)

**Самостійна робота 28**

***ТЕКСТ ДЛЯ АНОТУВАННЯ ТА РЕФЕРУВАННЯ***

**SAMSUNG LAUNCH KICKSTARTS THE SMARTWATCH BOOM**

by Paul Marks

Cellphones liberated many of us from the need to wear a wristwatch – they could tell you the time and let you check your friend's Facebook status. But now the watch is poised to make an unexpected comeback in the shape of "smartwatches", which let you check your messages and social media without having to fish your phone out of your pocket.

Not convinced? Many still aren't, but big tech is banking on smartwatches being the next big thing. The first of the big name smartwatches was unveiled yesterday at the International Radio Exhibition in Berlin, Germany. Called the Galaxy Gear, this $299 Android-powered smartwatch has been developed by Samsung to communicate wirelessly with the firm's phones. While other firms have launched similar gadgets in the past, it is Samsung's launch that has really fired the gun on the race to corner the coming smartwatch market.

The idea is that smartwatches will liberate us from the hassle caused by the cellphone itself – sparing us the bother of retrieving our smartphones from our pockets to see who has called, tweeted, texted or emailed. Instead a flick of your wrist could tell your smartwatch to get wireless updates of texts from your phone.

Other "micro interactions" could also be programmed, such as voice commands to check Facebook messages or call your best friend.

Such watches could also take on the traditional role of a phone. Holding the Galaxy Gear to your ear lets you answer a call, Dick Tracy style, for example. "For everyday moments you don't have to take out your smartphone anymore," Samsung research director Pranav Mistry says.

**Fitness first**

But it doesn't end with less fiddly phoning: as they are in contact with your skin, smartwatches offer the perfect wearable platform for "quantified self" fitness apps. Developers could build in dedicated workout tracking devices like the FitBit or Nike FuelBand.

Samsung isn't the only company developing such tech. Apple is readying an iWatch to connect wirelessly with iPhones, while others hatching smartwatches include Google's Motorola Mobility operation, LG of South Korea and Qualcomm of San Diego, California. Then there's the host of crowdfunded start-ups typified by Pebble of Silicon Valley.

Competition comes in the form of Google Glass, which also controls a smartphone via micro interactions: the voice command "OK Glass" gets the system's attention before you tell it to, say, reply to a message or share a picture.

**Early days**

Thad Starner, head of Google's Glass project, believes it's early days and that there will be many ways to interact. "Wristwatches are certainly another way to do micro interactions. Simple features like displaying caller ID can be very powerful. I suspect we'll see a suite of devices in the future from which a user can choose what suits them best."

Robert Milner, who works on smart devices at UK-based Cambridge Consultants, agrees. "It is users that will drive the form these devices eventually take. Smartwatches could be a stepping stone to Google Glass, for instance, but in sports, glasses could get in the way. The watch is perhaps a better platform for adding multiple features. It is far from obvious which way this is all going to go."

Whatever happens, it is ease of use that will win out, says Starner. "The difficulty is in creating interfaces that provide the maximum utility for the minimum visual or manual attention on the part of the user," he says. "Creating the right set of features is where the magic is."

(11 September 2013 New Scientist [www.newscientist.com](http://www.newscientist.com))

**Самостійна робота 29**

***ТЕКСТ ДЛЯ АНОТУВАННЯ ТА РЕФЕРУВАННЯ***

**NANOTUBE-COATED SPIDER SILK CAN SENSE YOUR HEARTBEAT**

by Chelsea Whyte

Spider silk darkened with a coating of carbon nanotubes can tell if your heart just skipped a beat.

Following a few simple steps, researchers have made a silk-nanotube hybrid that is tough, flexible and electrically conductive. The material might find uses in a range of bendy medical sensors.

Long known as one of nature's toughest and most flexible materials, spider silk is not naturally conductive. Scientists have previously married metals such as gold with spider silk, but those hybrids didn't allow the silk to stretch as much as usual.

To create a conductive but less rigid silk, Eden Steven at Florida State University in Tallahassee collected bundles of silk from a species of golden orbweaver spider. He polarised a powder of carbon nanotubes so that the tubes would stick to the naturally charged silk, then mixed the materials with a few drops of water and pressed them between two sheets of Teflon.

**Wrap, shrink**

When the material dried out, the silk was coated with a thin layer of nanotubes. This composite is three times tougher than spider silk alone . As the silk naturally expands and contracts when exposed to different humidity levels, the new, flexible hybrid can be easily manipulated to create good electrical contact for wiring. "We simply wind the coated fibre around the contact area and, by controlling the humidity, we can let it shrink. The wire grips the contact area without having to use a conducting paste or solder."

The carbon-silk combination is also sensitive enough to detect the electrical signals from a heart pulse.

Commercially available pulse-detectors are often made of rigid materials. By contrast, the silk-based version can be wrapped around irregularly shaped objects, such as wrists or fingers, without losing sensitivity.

**Kitchen simplicity**

"These results open new opportunities in moulding and shaping actuators or sensors, where you could potentially think about different geometries or forms," says bioengineer Kimberly Hamad-Schifferli of the Massachusetts Institute of Technology. There are other methods of combining carbon nanotubes with biological materials, she adds, but they usually require expensive equipment and chemicals, and the end result is not mouldable.

"What's really astonishing is that the method of incorporation of the carbon nanotubes is incredibly simple," she says. "It looks like something you could do in your kitchen at home."

Scaling up production may be a challenge, though, as it is hard to farm spider silk in large amounts. But there has been recent progress making synthetic silk, Steven says, which could pave the way for large-scale production.

(10 September 2013 New Scientist www.newscientist.com)

**Самостійна робота 30**

**ПЕРЕКЛАДІТЬ ТЕКСТ ТА ВИКОНАЙТЕ ЗАВДАННЯ ДО НЬОГО**

**Definition of Subordinate Clause**

We all know at least one person who is way too needy. Some might use the word, 'clingy.' They cannot seem to go anywhere, make a decision or even get dressed without another person there to hold their hand along the way. The word 'dependent' comes to mind. Meaning, they are completely dependent on another person to function. Well, believe it or not, this is very similar to a subordinate clause.

A **subordinate clause** also called a **dependent clause** , it cannot stand alone in a sentence because it is an incomplete thought and must have that independent clause by its side to function properly. A **clause** is just another word for a group of words containing one subject and one verb. There are two types of clauses: independent and subordinate. **Independent clauses**, unlike subordinate ones, are complete because they make sense on their own. Subordinate clauses begin with subordinating conjunctions or relative pronouns, which both play a key role in making the clause subordinate.

Let's examine some examples to understand these clauses more clearly.

**Examples of Independent & Dependent Clauses**

'We finished cleaning our apartment.'

* 'We' is the subject.
  + 'Finished' is the verb.

As you can see, this clause is independent because it has a subject and a verb, and it can stand alone as a complete thought.

'After we returned from my mother's house'

* 'After' is the subordinating conjunction.
  + 'We' is the subject.
    - 'Returned' is the verb.

This subordinate clause is incomplete and would be considered a fragment if it appeared alone. It needs an independent clause by its side, so it can make sense and be considered one complete thought. Otherwise, we are left wondering, 'so what happened after you returned from your mother's house? Tell me more!'

When you put them together though. . .

'We finished cleaning our apartment + after we returned from my mother's house.'

Voila!! We have a complete sentence! This is called a **complex sentence** because it contains at least one independent and one subordinate clause.

**Subordinating Conjunctions & Relative Pronouns**

Subordinate clauses would actually be independent were it not for the subordinating conjunction or relative pronoun, because they do have a subject and a verb.

For example, in the clause, 'after we returned from my mother's house,' if we remove the subordinating conjunction, 'after,' we are left with 'we returned from my mother's house,' which is an independent clause or a complete sentence because it has a subject (we) and a verb (returned) and states clear, complete information.

Перекладіть складнопідрядні речення з кількома підрядними різних типів.

When the President transmits to the President pro tempore of the Senate and the Speaker of the House of Representatives his written declaration that no inability exists , he shall resume the powers and duties of his office unless the Vice President and a majority of either the principal officers of the executive department or of such other body as Congress may by law provide, transmit within four days to the President pro tempore of the Senate and the Speaker of the House of Representatives their written declaration that the President is unable to discharge the powers and duties of his office .

Прочитайте складнопідрядні речення та їхній переклад. Поясніть.

If any Bill shall not be returned by the President within ten Days (Sundays excepted) after it shall have been presented to him , the Same shall be a Law, in like Manner as if he had signed it . - Дане складнопідрядне речення має у своєму складі три придаткових: умови, часу і порівняння. Підрядне речення порівняння варто після головного пропозиції, з'єднується з ним союзом as if і відповідає на питання як? яким чином?

The Seats of the Senators of the first Class shall be vacated at the expiration of the second Year, of the second Class at the expiration of the fourth Year, and of the third Class at the expiration of the sixth Year, so that one third may be chosen every second Year. - У цьому складному реченні є тільки одне підрядне речення - цілі. Воно стоїть після головного пропозиції, з'єднується з ним союзом so that і відповідає на запитання навіщо? для чого? з якою метою?

The Congress, whenever two thirds of both Houses shall deem it necessary , shall propose Amendments to this Constitution. - Дане складнопідрядне речення має одне підрядне речення поступки, яке знаходиться всередині головного пропозиції і розбиває його на дві частини. Підрядне речення поступки вказує на обставину, всупереч якому відбувається дія головного пропозиції. У даному прикладі з головним реченням воно пов'язується союзом whenever.

Проаналізуйте, які граматичні трансформації відбулися при перекладі наступних складнопідрядних речень

A Person charged in any State with Treason, Felony, or other Crime, who shall flee from Justice, and be found in another State , shall on Demand of the executive Authority of the State from which he fled , be delivered up, to be removed to the State having Jurisdiction of the Crime. - Особа, обвинувачена в одному штаті у державній зраді, тяжкому чи іншому злочині, переховується від правосуддя і виявлене в іншому штаті , по вимогу виконавчої влади штату, з якого ця особа вчинила втечу , підлягає видачі для перепровадження в штат, юрисдикції якого підлягає даний злочин .. - Дана пропозиція має два визначальних придаткових пропозиції: перше замінюється причетним обігом, а друге зберігає структуру англійської придатковогопропозиції. Значить, при перекладі цієї пропозиції поєднуються дві граматичні трансформації - заміна придаткового пропозиції причетним оборотом + синтаксичне уподібнення.

Each State shall appoint, in such Manner as the Legislature thereof may direct , a Number of Electors, equal to the whole Number of Senators and Representatives to which the State may be entitled in the Congress . - Кожен штат призначає в такому порядку, який встановить його законодавчі збори

Senator or Representative shall, during the Time for which he was elected , be appointed to any civil Office under the authority of the United States, which shall have been created, or the Emoluments whereof shall have been increased during such time . - Ні сенатор, ні представник протягом терміну, на який він був обраний , не може бути призначений на будь-яку цивільну посаду в межах влади Сполучених Штатів, яка створена або доходи від якої збільшені протягом цього терміну . - У даному реченні є три визначальних придаткових пропозицій, і всі вони переведені дослівно, тобто без будь-яких синтаксичних змін.

And if the House of Representatives shall not choose a President whenever the right of choice shall devolve upon them, before the fourth day of March next following , then the Vice-President shall act as President, as in the case of the death or other constitutional disability of the President. - Якщо Палата представників, коли право вибору переходить до неї, не вибере Президента до четвертого дня наступного березня , тоді Віце-президент буде діяти в якості Президента, як у випадку смерті чи іншої конституційної нездатності Президента.

If after such Reconsideration two thirds of that house shall agree to pass the Bill, it shall be sent, together with the Objections, to the other House , by which it shall likewise be reconsidered, and if approved by two thirds of that House, it shall become a law. - Якщо після цього розгляду законопроект буде прийнятий двома третинами голосів палати, він направляється разом із запереченнями Президента в іншу палату, яка також розглядає його повторно. І якщо вона схвалить законопроект двома третинами голосів, то він стає законом.

he Congress may by Law provide for the Case of Removal, Death, Resignation or Inability, both of the President and Vice President, declaring what Officer shall then act as President, and such Officer shall act accordingly, until the Disability be removed, or a President shall be elected. - У разі відсторонення, смерті, відставки або нездатності як Президента, так і Віце-президента Конгрес може прийняти закон, який вказує, яка посадова особа буде діяти в якості Президента; таке посадова особа виконує відповідні обов'язки, поки не усунена причина нездатності Президента виконувати свої обов'язки або не обрано новий Президент.

Such Trial shall be held in the State where the said Crimes shall have been committed ; but when not committed within any State , the Trial shall be at such Place or Places as the Congress may by Law have directed . - Такий розгляд має відбуватися в тому штаті, де злочини вчинені ; але коли вони вчинені не в межах будь-якого штату , розгляд відбувається в тому місці або місцях, які Конгрес може вказати в законі.

**ЗАВДАННЯ ДЛЯ ПОТОЧНОГО ТА ПІДСУМКОВОГО КОНТРОЛЮ**

**ЗНАНЬ І ВМІНЬ З НАВЧАЛЬНОЇ ДИСЦИПЛІНИ**

**КОНТРОЛЬНА РОБОТА № 1**

I. ***Відповісти на питання: ( 1п. х 20б.)***

1. Науково-технічний текст. Особливості його відтворення

2. Переклад текстів мови документів

3. Вільний описовий переклад

4. Форми презентації та способи реалізації значення мовних одиниць

***II. Перекласти текст з англійської на українську мову: ( 20б.)***

**NewTechnologies**  
Not long ago, mobile phones could just transmit voice and SMS messages. Now they can display Internet information thanks to the Wireless Application Protocol or WAR. Some hybrid models combine a phone with a PDA. They look like a regular phone with a dialpad and a small screen on its front. But if you flip up the front cover you find a larger screen that is touch-sensitive. Some include a virtual keyboard which pops up when you want to enter email text or a WAP address. But the future is called 'third-generation' (3G) mobiles.

They transmit a caller's picture and voice simultaneously UMTS mobile phones deliver users information, e-commerce, games and videoconferencing via fixed, wireless and satellite networks. Internet TV sets allow you to surf the Web and have e-mail while you are watching TV, or vice versa. Imagine watching a film on TV and simultaneously accessing a Web site where you get information on the actors in the film. This is ideal for people who are reluctant to use PCs but are interested in the Internet. WebTV was the first company which brought Internet services to TV viewers through a set-top computer box. Another option is WorldGate's technology, which offers the Internet through cable TV.

The model built by OEM Metec integrates a complete Windows PC in a TV set. The next generation of Internet-enabled televisions will incorporate a smart-card for home shopping, banking and other interactive services.

Virtual reality lets people interact with artificial objects and environments through three-dimensional computer simulation. In a VR system, you are hooked to a computer through a controlling device, such as a glove, and head-mounted displays give you the feeling of being propelled into an artificial three-dimensional world. The computer brings to life events in a distant, virtual world using databases or real-time objects and sounds. Your senses are immersed in an illusionary, yet sensate, world.

ІІІ. Перекладіть слова та словосполучення:

Уявити ситуацію, обчислювальна машина, контролюється комп’ютерами, зберігати інформацію, проста причина, швидше та краще, писати музику.

**IV.** Заповніть пропуски, використовуючи наведені слова:

*Professor, predicted,* *descendant*, *efficient, imagine, complicated.*

Our teacher of computer science is a \_\_\_\_ of Cambridge University.

I cannot even \_\_\_ that some day everything will be controlled by computers.

Sometimes computers are much more \_\_\_ than human beings.

This mechanism is too \_\_\_\_ for our workers.

Some wise man \_\_\_\_ that the Earth will be destroyed because of machines, but I don’t believe such things.

This noble man was a \_\_\_\_ of a famous family.

V. Закінчіть речення:

By means of computer people can…

Nowadays we cannot live without computer because …

We need to learn computer science because …

VI. Перекладіть речення англійською:

Комп’ютер розширив сфери свого впливу у щоденному житті.

Комп’ютери можуть ефективно замінити людей на важкому виробництві.

Не зважаючи на те, що комп’ютерні технології були розроблені порівняно нещодавно, комп’ютери здатні виконувати складні операції.

**КОНТРОЛЬНА РОБОТА № 2**

I. ***Відповісти на питання:***

1. Граматичні особливості науково-технічних типів тексту

2. Науково-популярний тип тексту і його переклад

3. Типи перекладу і типи тлумачення

4. Особливості інформаційного типу тексту та їх відтворення

***II. Перекласти текст з англійської на українську або російську мову: ( 20б.)***

**Electronic Mail Software**

**Electronic mail (e-mail) software** enables users to send letters and documents from one computer to another. Many organizations have "electronic mail­boxes." If you were a sales representative, for example, such a mailbox would allow you to transmit a report you created on your word processor to a sales manager in another area. Or you could route the same message to a number of users on a distribution list.

**Desktop Accessories & Personal Information Managers** Desktop accessory software provides an electronic version of tools or objects commonly found on a desktop: calendar, clock, card file, calculator, and notepad. Personal information manager (PIM) software combines some features of word processing, database manager, and desktop accessory programs to organize specific types of information, such as address books. Pretend you are sitting at a desk in an old-fashioned office. You have a calendar, clock, calculator, Rolodex-type address file, and notepad. Most of these items could also be found on a student's desk. How would a computer and software improve on this arrangement? Many people find ready uses for types of software known as **desktop accessories and personal information managers (PIMs).**

**Desktop Accessories A desktop accessory, or desktop organizer,** is a software package that pro­vides an electronic version of tools or objects commonly found on a desk­top: calendar, clock, card file, calculator, and notepad. Some desktop-accessory programs come as standard equipment with some systems software (such as with Microsoft Windows). Others, such as Borland's SideKick or Lotus Agenda, are available as separate programs to run in your computer's main memory at the same time you are running other software. Some are principally **scheduling and calendaring programs**; their main purpose is to enable you to do time and event scheduling.

**ІІІ.** Перекладіть слова та словосполучення:

essential constituent parts, calculation, magnetic tape, inputting data, existing information, program instructions, displaying the results, high – speed printers.

IV. Заповніть пропуски, використовуючи наведені слова:

*Store, typewriter, stored, calculations, constituent parts,*

1. I know five essential \_\_\_ of a digital general – purpose computer.
2. My friend has a pretty electric \_\_\_.
3. The data may be \_\_\_ according to a plan desired by the programmed.
4. I suppose, that a device for performing \_\_\_on those numbers is an arithmetic unit.
5. The data may be merged with existing information already in the\_\_\_.

V. Закінчіть речення:

1. You may use an interrogating typewriter …

2. The usual method for inputting data for processing into a computer is …

3. Printer is …

**VI.** Перекладіть речення англійською:

На нашу думку, проблеми виникають саме з цим приладом.

Їх компанія придбала деякі периферійні прилади.

Інструкції до програм зберігаються у прикореневому каталозі.

Найважливіша інформація фірма зберігається у головному комп’ютері.

Цей комп’ютер використовується суто для арифметичних обчислювань.

**КОНТРОЛЬНА РОБОТА № 3**

1. **Прочитайте та перекладіть текст**

**New computers to sleep on the job**

As you know personal computers are great consumers of energy. In fact, with their printers a monitors, computers in the U.S.A. devour each year as much electricity as the entire state of Oregon.

To cut consumption in half, new “green” computers are being developed be more than a hundred PC firms in the US. When left on but unused for more than a few minutes, they go down to a standby or sleep mode, reducing energy consumption by as much as 80 percent. At a command the PCs return to full power. If left turned down to a standby or sleep mode at night, the new PCs should use an average of $17 worth of electricity a year, compared with $105 for an older model left on continuously. So get these latest “daydreaming” computers which will soon be on the market.

**consumer –** споживач

**to devour** – поглинати

**standby mode** – режим чекання

**2.** Доповніть визначення**:**

|  |  |
| --- | --- |
| daydream | the process of selling and buying different goods |
| computer | using of different services, goods or facilities |
| printer | the thing that is so wonderful as unreal one |
| market | the machine for performing texts and pictures from disc or memory to the paper |
| consumption | the machine for making different calculations and other operations with information |

**3.** Закінчить речення:

* 1. The new computers were developed to…
  2. When being unused for a few minutes they…
  3. PC returns to full power…
  4. Computers devour each year as much electricity as…
  5. Old models used…

1. Висловіть думку з приводу наступного:

It is an advertisement of new PCs.

It is an article in the newspaper for youth.

It is an extract from a scientific issue.

It is a technical instruction for explorers of PC.

Your opinion.

**5.** Перекладіть речення:

Комп’ютери в США поглинають за рік стільки ж електроенергії, як весь штат Орегона.

Нові “бережливі” комп’ютери вимикаються самостійно у режим чекання.

Такі вимкнені комп’ютери поглинають набагато менше енергії.

Нова модель скоро з’явиться у продажу.

Більше сотні комп’ютерних фірм розробили нову модель.

**КОНТРОЛЬНА РОБОТА № 4**

**І. Прочитайте та перекладіть текст**

**Cultural Touch to Video Games**

If someone asked you about the negative aspects of a video game, probably, the first thing that would come to your mind is that it isolates a person from other people. Now, Iwersk, an American video games firm, has remedied that. It has invented the first virtual reality video game that gives it a cultural touch and that can be played in a group of 6 people at the same time.

The game is called **The Loch Ness Expedition**. Each player is assigned a position in a virtually real submergible. The players, wearing polarized glasses, witness a three dimensional image of the bottom of the lake and life-like images of the marine animals. Their mission is to search for and rescue the long lost eggs of Nessie, saving it from extinction, while at the same time defending themselves against other monsters. So next time you want to look for adventure and don’t have time, you know where to go.

1. Знайдіть антоніми до поданих слів у тексті:

Positive, obviously, different, none, this time, top, artificial, the last thing.

1. Головна думка цього тексту це:
2. Don’t play video games.
3. It is necessary to give a cultural touch to video.
4. The new game is called The Loch Ness Expedition.
5. The players witness a three dimensional image of the bottom of the lake and life-like images of the marine animals.
6. If you want to have an adventure and not to be alone play this game.
7. Доповніть визначення**:**

|  |  |
| --- | --- |
| to isolate | * 1. to see something interesting, unusual unexpectedly |
| to remedy | * 1. to fight for one’s won life |
| to witness | * 1. to seek something |
| to search | * 1. to separate, to depart one person from the others |
| to defend | * 1. to change things for better |

1. Закінчіть речення:
2. The first negative thing about video games is…
3. Some American firms invented…
4. The action of the game takes place…
5. The mission of players is…
6. This game has such the advantages as…
7. Дайте відповідь на запитання:
8. Do you like video games? What kind of them?
9. Do you agree that video games isolate people from one another?
10. What is the cultural aspect of this game?
11. What qualities do you have to use in such a game?
12. Would you like to play a game like this? Why?

**КОНТРОЛЬНА РОБОТА № 5**

* 1. Перекладіть текст українською мовою.

**Game zone I**

Computer games have come a long way since the *Space Invaders* first crept across our screens 15 years ago. Whilst “retro” games like *Defender* and *Asteroids* are becoming popular once again, software companies are making their latest games faster, more stylish and more realistic than ever before.

Once upon a time, when *Star Wars* was the film that everyone wanted to see, your mum or dad might have had a home computer. In those days computers were great. CD ROMs hadn’t been invented and computers had black and white monitor. A mouse was something that the cat liked chasing. Those strange machines were also very quiet. There wasn’t much that you could do with a computer in those days. However, soon people discovered a use for them – playing games.

**Retro Rockets.**

Steve Turner wrote 3D Space Wars, one of the first ever 3D games for a home computer. Now he writes games like Virtual Soccer for the Playstation. Some old games are now becoming popular again. Recent re-releases for the PC and Playstation include Defender, (where you fly across the surface of a planet, rescuing little people from aliens) and Asteroids (where you shoot your way through a screen full of flying rocks). Certain rare games and machines are becoming more expensive.

*Doom and Quake*

ID Software is the company behind Doom – the most popular computer game ever. There are over 20 million copies of Doom in existence, although the company has only sold 2 million official copies. Last year, ID released Quake, a successor to Doom. Both games became successful because of their incredible 3D graphics. Players race through a surreal world of tunnels and passages, shooting monsters and trying to find an exit to the next level.

**2.** Дайте відповідь на запитання:

Have you ever played computer games?

What games have you played?

What computer games do you prefer?

What games based on films do you know? Have you played them?

What were computers like in days when Star Wars was the popular film?

What were the first 3D games for a home computer?

Why are Quake and Doom so popular now?

**3.** Знайдіть синоніми у тексті:

Big, to discover, to run after, but, to save, seldom, not cheap, heir, past belief

**4.** Поясніть такі поняття:

* 3D
* Playstation
* ID Software
* Surreal world

**5.** Перекладіть речення:

1. Компанії програмного забезпечення останнім часом створюють стильні, реалістичні та швидкі комп’ютерні ігри.
2. Раніше комп’ютери були величезні, без СД та з чорно-білими моніторами.
3. Ці старі комп’ютери зараз використовують для комп’ютерних ігор.
4. Певні рідкісні машини зараз дуже дорогі.
5. Гра Doom з’явилась раніше Quake.
6. Деякі сучасні ігри надзвичайно популярні через їх неймовірну тривимірну графіку.
7. Суть деяких ігор полягає в тому, що гравець має вбити монстрів і знайти перехід на наступний рівень.
8. Гравці в інші ігри мають справу з прибульцями.
9. В деякий інших іграх гравці мають не натрапити на літаючі камені – астероїди.
10. Останнім часом ретро - ігри стають дуже популярними.

**ТЕСТОВІ ПИТАННЯ ДЛЯ ЗАЛІКІВ / ІСПИТІВ**

***Тест № 1***

1. Many leaders in education believe all elementary schools should have classes on ***coding*** for children.

A кодування

B шифрування

C цитування

D програмування

E віршування

2) These technologies have serious **cybersecurity** ramifications that will open new doors to exploit weaknesses and take data theft to a completely new scale.

A комп’ютерна небезпека

B кібернетична охорона

C комп’ютерна безпека

D кібернетична небезпека

E компютерна охорона

3) **artificial intelligence**

A штучна інтелігенція

B мистецький інтелект

C інтелектуальне мистецтво

D штучне мистецтво

E штучний інтелект

4) **Bandwidth** is calculated in megabits or gigabits per second (Mbps or Gbps), while volume is calculated in packets per second (pps).

A ширина оркестру

B ширина пропускання

C широка смуга

D смугаста ширина

E широкий оркестр

5) This means that the use of **wearable technology** (of sorts) in the treatment and prevention of back problems is nothing new.

A технологія одягання

B технологія носіння

C носити технології

D одягати технології

E розумний одяг

6) This kind of device is enabled by improved **power consumption** in transmission technology

A потужність споживання

B споживання сили

C електроспоживання

D споживацька потужність

E енергійне споживання

7) Thin, flexible, **transparent**, and near-invisible, the platform sets new standards in both form factor and sensor data quality.

A транспортирний

B транспортабельний

C транспортний

D прозорий

E транспортований

8) They have been moving to more practical (e.g. thin, conformal, portable, automated) **solutions** for many years, and control the medical device market.

A розчинення

B вирішення

C розрив

D рідина

E проблема

9) [Apple](http://abcnews.go.com/Nightline/video/inside-apples-top-secret-health-lab-apple-watch-29804218) collected over two years of medical and fitness data prior to the **launch** of its watch, and continue to study many areas relevant to healthcare.

A стапель

B спуск

C баркас

D запуск

E політ

10) Because the virus used **mailing lists** as its source of targets, the messages often appeared to come from an acquaintance and so might be considered “safe”.

A списки пошти

B листи пошти

C поштові листи

D список адресатів

E списки адрес

11) All it took was a few users at each site to access the VBS **attachment** to generate the thousands and thousands of e-mails that would cripple e-mail systems under their weight.

A накладання арешту

B додаткове обладнання

C вкладений файл

D застібка

E кріплення

12) The Pentagon, CIA, and the British Parliament had **to shut down** their e-mail systems to get rid of the worm, as did most large corporations.

A опустити

B вимкнути

C ліквідувати

D сховати

E спустити

13) This particular **malware** caused widespread outrage, making it the most damaging worm ever.

A розпізнавання образів

B інформаційний порт

C шкідливе ПЗ

D одяг для чоловіків

E система програмування

14) The worm **overwrote** important files, as well as music, multimedia and more, with a copy of itself.

A надписував

B списував

C підписував

D замінював старі дані новими

E надавав доступ

15) It also sent the worm to everyone on a user’s **contact list.**

Aконтактна система

B листування

C контактний номер

D список контактів

E перелік листів

16) Helped by a group of friends called the Grammersoft Group, he **distributed** his virus the day before the school held their graduation ceremony.

A розклав

B класифікував

C розкидав

D розібрав

E розповсюдив

17) Narinnat Suksawat, a 25-year-old Thai **software engineer**, was the first person to write software that repaired the damage caused by the worm.

A оператор

B програміст

C комп’ютерна програма

D програмне забезпечення

E інженер

18) A computer simulation is a computer program, or **network of computers**, that attempts to simulate an abstract model of a particular system.

A ремонт компютерів

B обліковий запис

C електронна пошта

D експертна система

E мережа комп’ютерів

19) Computer simulations are used in many **fields**, including science, technology, entertainment, and business planning and scheduling.

A майданчиках

B полях

C галузях

D ділянках

E районах

20) Computer simulation was developed hand-in-hand with the rapid growth of the computer, following its first large-scale deployment during the Manhattan Project in World War II to model the process of **nuclear detonation**.

A ядро молекули

B ядерна фізика

C вибуховий пристрій

D ядерний вибух

E вибухова енергія

***Тест № 2***

1) There are many different types of computer simulation; the common feature they all share is the attempt **to generate** a sample of representative scenarios for a model.

A стимулювати

B продовжувати

C програмувати

D створювати

E вирішувати

2) Other **applications** of CGI computer simulations are being developed to graphically display large amounts of data in motion.

A додатки

B операції

C мережі

D сервери

E бази даних

3) Although sometimes ignored in computer simulations, it is very important to perform sensitivity analysis to ensure that **the accuracy of the results** is properly understood.

A результативна акуратність

B акуратність результатів

C акуратні результати

D точність результатів

E результативність

4) design of complex systems

A систематична розробка

B математичне обчислювання

C системна розробка

D розробка складних систем

E комплексний розвиток

5) weather forecasting

A викиди в атмосферу

B погодні умови

C передбачення умов

D прогнозування викидів

E прогноз погоди

6) The **reliability** and the trust people put in computer simulations depends on the validity of the simulation model, therefore verification and validation are of crucial importance in the development of computer simulations.

A надійність

B міцність

C точність

D варіативність

E релевантність

7) Computer graphics can be used **to display the results** of a computer simulation.

A поліпшувати результати

B відігравати роль

C мати результати

D показувати результати

E змінювати результати

8) Linux quickly evolved from a single-person project to a world-wide development project involving thousands of **developers**.

A підприємців

B користувачів

C розробників

D митців

E підприємств

9) The vast majority of the source code in the Linux kernel exists in **device drivers** that make a particular hardware device usable.

A водії машини

B методи водіння водії машини

C відписане майно

D способи просування

E драйвери пристрою

10) Each architecture subdirectory contains a number of other subdirectories that focus on a particular aspect of the kernel, such as **boot**, kernel, memory management, and others.

A синхронізація проектів

B вантажне відділення

C захисна споруда

D початкове завантаження

E порт протоколу

11) Each architecture subdirectory contains a number of other subdirectories that focus on a particular aspect of the kernel, such as boot, **kernel**, memory management, and others.

A горіх

B ядро

C зерно

D стрижень

E клавіша

22) Linux is also a dynamic kernel, supporting **the addition and removal** of software components on the fly.

A тролінг та трансляція

B програмування та прокрутка

C компіляція та алгоритмізація

D додавання та видалення

E накопичення та хостинг

13) The only constraint is that the underlying processor must **support** the new virtualization instructions.

A підтримувати

B створювати

C налаштовувати

D розвивати

E з’єднувати

14) to analyze the evidence

A аналізувати матеріали

B доводити правду

C аналізувати результати

D аналізувати докази

E спотворювати результати

15) to do some research

A обчислювати результати

B проводити дослідження

C обмінюватися файлами

D робити висновки

E робити вправи

16) For two hundred years, there was little development of the microscope until new industrial techniques produced **accurate and powerful lenses**.

A точні та сильнодіючі

B акуратні та надійні

C точні та яскраві

D акуратні та вагомі

E точні та потужні лінзи

17) The telegraph, which **was invented** in 1837, meant that messages could be sent round the world.

A був відкритий

B був забутий

C був винайдений

D був запатентований

E був зіпсований

18) Since antiquity there have been many attempts, some quite **fanciful**, to explain how the cosmos came into being.

A) familiar

B) skillful

C) unusual

D) hardly

E) costly

19. Scientists have failed to find a cold virus, though they have searched **persistently** for one.

A) half-heartedly

B) hurriedly

C) often

D) slyly

E) continuously

20. When products advertise extensively on television they are often rediculously **overpriced**.

A) inexpensive

B) costly

C) valueless

D) abandoned

E) nice