

Міністерство освіти і науки України

НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ
«ОДЕСЬКА ПОЛІТЕХНІКА»

ІНОЗЕМНА (АНГЛІЙСЬКА) МОВА

МЕТОДИЧНІ ВКАЗІВКИ ДО ПРАКТИЧНИХ ЗАНЯТЬ
З АНГЛІЙСЬКОЇ МОВИ ДЛЯ ЗДОБУВАЧІВ І КУРСУ

Спеціальність: G11 Машинобудування

Освітня програма: Автоспортивний Інжиніринг

Затверджено на засіданні
кафедри іноземних мов

Протокол № 5 від 09.01.2026 р.

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Методичні вказівки до практичних занять з англійської мови для здобувачів I курсу спеціальності: G11 Машинобудування Освітньо-Професійна Програма: Автоспортивний Інжиніринг / Уклад.: Т.І. Борисенко, І.Ф. Дуванська, О.І. Петрова, – Одеса: НУОП, 2026. – с 87.

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Передмова

Методичні вказівки для роботи зі здобувачами 1 курсу укладено відповідно до Програми вивчення іноземних мов у нефілологічному ЗВО і спрямовано на розвиток у здобувачів немовних спеціальностей навичок читання та перекладу загально-технічних та науково-технічних текстів, збагачення словникового запасу і оволодіння навичками письма та говоріння .

Практичне володіння іноземною мовою в рамках даного курсу припускає наявність таких умінь, які дають можливість:

- 1) вільно читати оригінальну літературу іноземною мовою у відповідній галузі знань;
- 2) оформляти витягнуту з іноземних джерел інформацію у вигляді перекладу або резюме;
- 3) робити повідомлення і доповіді іноземною мовою на теми, пов'язані з науковою роботою майбутнього фахівця;
- 4) вести бесіду за фахом.

Кожний урок складається з тексту й комплексу мовних вправ, які розраховані на удосконалення навичок активізації словарного і граматичного мінімуму професійного спрямування.

“Методичні вказівки” забезпечують підготовку до міжнародного усного спілкування англійською мовою для спеціальних цілей, а саме - оволодіння лексичними, граматичними і стилістичними навичками, а також умінням читати, перекладати, згортати і розгортати усну англomовну інформацію наукового функціонального стилю.

Lesson 1

Мета заняття: здатність працювати з різними джерелами, розшукувати, обробляти, аналізувати й синтезувати отриману інформацію. Знати професійний дискурс; уміти спілкуватися українською мовою в професійному середовищі, дотримуватись етики ділового спілкування; складати різні види документів; пояснювати фахівцям і нефахівцям інформацію, ідеї, проблеми, рішення

Read the text: Mechanical Engineering

Mechanical engineering is a branch of engineering that applies the principles of physics and materials science for analysis, design, manufacturing, and maintenance of mechanical systems. It involves the production and usage of heat and mechanical power for the design, production, and operation of machines and tools. It is one of the oldest and broadest engineering disciplines.

Mechanical engineering appeared as a field during the industrial revolution in Europe in the 18th century. However, its development can be traced back several thousand years around the world. As science, mechanical engineering appeared in the 19th century as a result of the developments in the field of physics. Mechanical engineering overlaps with aerospace engineering, civil engineering, electrical engineering, petroleum engineering, and chemical engineering.

Mechanical engineers use these core principles and tools like computer-aided engineering to design and analyze electric generators, internal combustion engines, turbines, refrigeration and air-conditioning equipment, machine-tools and other machinery.

The mechanical engineer is the jack-of-all trades among engineering professions. This is because the profession requires education and skills that span a broad range of technical, social, environmental, and economic problems. In general, however, the mechanical engineer is concerned with controlling the principles of motion, energy, and force through mechanical solutions.

Mechanical engineers are constantly being asked to make decisions. They must decide the size, shape, and material of every part of every mechanical product that is created. They also have to determine the best and most efficient ways to manufacture the products. Often those decisions are made in co-operation with other types of engineers. Some of the decisions they make can mean the difference between life and death: the safety features of automobiles, for example, are the responsibility of mechanical engineers.

Practically every company that designs and produces a product employs a mechanical engineer. But mechanical engineers can also be found in research labs and in other spheres.

Engineers must combine good understanding of science, mathematics, and computers with good knowledge of current technology. In addition to the sciences and math, engineers need good communication skills. Besides, a second language can be extremely valuable because many large industrial firms that employ mechanical engineers are multinational.

At the university level, mechanical engineering students learn advanced mathematics, chemistry, and physics. After some of these core courses, mechanical engineering students take specialized courses in fluid mechanics, materials science, robotics, manufacturing processes, thermodynamics, environmental sciences.

After starting coursework in mechanical engineering, it is useful to have a summer engineering job. It helps you learn the "real world" of engineering and offers an opportunity to apply all the theories and principles taught in class. Besides, it can also help you determine your professional likes and dislikes, your strengths and weaknesses.

Mechanical engineers often continue their education throughout their careers, because technology changes rapidly. Many of the skills a student learned at the university will become out of date after only a few years.

Exercise 1. Read and memorize using a dictionary:

Engineering

mechanical engineering

civil engineering

electrical engineering

chemical engineering

aerospace engineering

petroleum engineering

computer-aided engineering

branch

field

mechanical engineer

skill

course work (in)

summer engineering job

core course (in)

specialized course (in)

the sciences

advanced mathematics

mechanics

fluid mechanics

materials science

kinematics

thermodynamics

robotics

structural analysis

manufacturing process

environmental sciences науки про

motion

force

heat

machinery

machine

electric generator

internal combustion engine

turbine
 refrigeration equipment
 air-conditioning equipment
 tool
 machine-tool
 through
 out of date

Exercise 2. Match the equivalents

1. a second language	a) дослідна лабораторія
2. core concepts	b) майстер на всі руки
3. current technology	c) друга мова
4. development	d) сучасна технологія
5. good communication skills	e) сильні та слабкі сторони
6. in co-operation with	f) у співпраці з
7. to satisfy the needs of society	g) приймати рішення
8. jack-of-all trades	h) задовольняти потреби суспільства
9. strengths and weaknesses	i) ключові поняття
10. professional likes and dislikes	j) застосовувати всі теорії та правила
11. research lab	k) давати можливість
12. through mechanical solutions	l) охоплювати широку низку питань
13. throughout their careers	m) пройти курс з
14. to offer an opportunity	n) гарні навички спілкування
15. to make decisions	o) розвиток
16. apply all the theories and principles	p) що подобається і не подобається в професії
17. to decide the size, shape, and material	q) простежується назад на кілька тисячоліть
18. is traced back several thousand years	r) шляхом знаходження рішень за допомогою механіки
19. to span a broad range of problems	s) протягом усієї своєї трудової діяльності
20. to take courses in	t) визначати розмір, форму та матеріал

Exercise 3. Learn to recognize international words. Give the Ukrainian equivalents to the following words without a dictionary.

design, discipline, energy, industrial, machine, material, principle, physics, process, profession, result, to analyze, to combine.

Exercise 4. Use the dictionary to translate the words.

to appear, to create, to design, to determine, to develop, to employ, to involve, to overlap (*with*), to work (*on*), to be concerned (*with*).

Exercise 5. Answer the questions.

1. What is mechanical engineering?
2. Is mechanical engineering the oldest or the newest engineering discipline?
3. When did mechanical engineering appear as a field? As a science?
4. Mechanical engineering overlaps with other branches of engineering, doesn't it?
5. Why is the mechanical engineer the jack-of-all trades among engineering professions?
6. Where can mechanical engineers be employed?
7. Why is it valuable for a mechanical engineer to know a second language?
8. What knowledge and skills must mechanical engineers have?
9. What disciplines do mechanical engineering students study?
10. Why is it useful for a mechanical engineering student to have a summer engineering job?
11. Why do mechanical engineers often continue their education throughout their careers?

Exercise 6. Continue the phrases

1. A summer engineering job helps you.....
2. After starting coursework in mechanical engineering.....
3. Engineers must combine.....
4. Many of the skills a student learned at the university...
5. Mechanical engineering involves the production and usage of heat and mechanical power for.....
6. Mechanical engineering requires an understanding of.....
7. Mechanical engineers can also be found in.....
8. Mechanical engineers take specialized courses in.....
9. The development of mechanical engineering can be traced back several.....
10. The mechanical engineer is concerned with.....

Exercise 7. State whether the statements are true or false. Correct if necessary.

1. Mechanical engineering is a branch of engineering that applies the principles of physics and materials science for analysis, design, manufacturing, and maintenance of mechanical systems.
2. Mechanical engineering appeared as a field during the industrial revolution in Europe in the 19th century.
3. As science, mechanical engineering appeared in the 19th century as a result of the developments in the field of mechanics.
4. Mechanical engineering overlaps with aerospace engineering, civil engineering, electrical engineering, petroleum engineering, and chemical engineering.
5. The mechanical engineer isn't the jack-of-all trades among engineering professions.

6. In general, however, the mechanical engineer is concerned with controlling the principles of motion, energy, and force through mechanical solutions.
7. Engineers must combine a good understanding of science, mathematics, and computers with a good knowledge of current technology.
8. A second language cannot be extremely valuable because many large industrial firms that employ mechanical engineers aren't multinational.
9. At the university level, mechanical engineering students learn advanced mathematics, chemistry, and physics.
10. After starting coursework in mechanical engineering, it is useful to have a winter engineering job.

Exercise 8. Complete the text translating the words in brackets.

Note: application – застосування, art- мистецтво, constructing- створення, steam engine- паровий двигун, to split (*split*; *split*) off- відділитися

The term 'engineering' is a modern one. Dictionaries (1) ...**(визначають)** the word 'engineering' as the (2) ... **(практичне)** application of scientific and mathematical (3) ...**(принципи)**. Nowadays the term 'engineering' means, as a rule, the art of (4) ... **(проектування)**, constructing, or using (5) ... **(двигунів)**.

Engineering is divided into many (6) ...**(галузі)**. Up to 1750s there were only two main branches of engineering – (7) ... **(цивільне)** and military. It is well-known that with the invention of the steam engine and the growth of factories some civil engineers became interested in the practical application of (8) ...**(механіка)** and (9) ...**(термодинаміка)** to the machine design. They split off and were called (10) ... **(інженери-механіки)**.

Exercise 9. Match the words with their definitions.

1. aerospace engineering	a) is the discipline focused on studying, designing, and applying systems and devices that use electricity, electronics, and electromagnetism.
2. civil engineering	b) is the specialized field focused on exploring, developing, and extracting oil and natural gas from underground reservoirs.
3. electrical engineering	c) applies chemistry, physics, math, and biology to design, develop, and operate large-scale processes that transform raw materials into valuable products like fuels, foods, pharmaceuticals, and plastics.

4. petroleum engineering	d) is using specialized software to simulate, analyze, and optimize product performance and manufacturing processes before physical creation,
5. chemical engineering	e) is the broadest engineering field, applying physics, math, and materials science to design, analyze, manufacture, and maintain mechanical systems.
6. computer-aided engineering	f) is the field focused on designing, developing, testing, and producing aircraft, spacecraft, missiles, and related systems for operation within Earth's atmosphere (aeronautics) and in outer space (astronautics).
7. mechanical engineering	g) is the professional discipline focused on designing, constructing, and maintaining the public infrastructure and physical systems that shape modern society, including roads, bridges, buildings, water systems, airports, and environmental structures, ensuring functionality, safety, and sustainability for communities.

Exercise 10. Match the synonyms.

1) branch; 2) company; 3) create; 4) principle; 5) rapidly
a) concept; b) field; c) firm; d) make; e) quickly

Exercise 11. Match the antonyms.

1) current; 2) likes; 3) life; 4) safety; 5) strength
a) danger; b) death; c) dislikes; d) out of date; e) weakness

Exercise 12. Translate the text. Write a short paragraph summarizing it.

Mechanical engineering involves production, transition and use of mechanical power.

Mechanical engineers design, operate and test all kinds of machines. They develop and build engines that produce power from steam, petrol, nuclear fuels, and other sources of energy. They also develop and build different machines that use power, including heating and ventilation equipment, cars, machine tools, and industrial-processing equipment. Mechanical engineers are involved in every phase in the development of a machine, from the construction of an experimental machine to the installation of the finished machine and training of the workers who use it.

Mechanical engineers work in many industries, such as power generation, public utilities, transportation, and all types of manufacturing. Many mechanical engineers concentrate on research and development because new types of machinery are continually needed. Mechanical engineers are involved in every other branch of engineering, whenever a new or improved machine, device or piece of equipment is required.

Exercise 13. Compose a story on one of the topics (up to 100 words):

1. Mechanical engineers work in many industries.
2. Mechanical engineering is a branch of engineering that applies the principles of physics and materials science.
3. The history of mechanical engineering.

Lesson 2.

Мета заняття: вміти використовувати іноземну мову, включаючи усну та письмову форми в обсязі програмних вимог в продуктивних та рецептивних видах мовленнєвої діяльності. здатність працювати з різними джерелами, розшукувати, обробляти, аналізувати і синтезувати отриману інформацію.

Read the text: Simple Machines

Machine is a device that does work. Almost every activity in our daily life depends in some way on machines. People have constructed a wide variety of machines to satisfy their needs. Early people made stone axes that served as weapons and tools. The machines that were gradually developed gave people great control over their environment. To operate these improved machines, people harnessed the energy of falling water and of such fuels as coal, oil, and the atom. Today, we use so many machines that the age we live in is often called the machine age. Most machines consist of a number of elements, such as gears and ball bearings that work together in a complex way. But no matter how complex they are, all machines are based in some way on six types of simple machines. These six types of machines are the lever, the wheel and axle, the pulley, the inclined plane, the wedge, and the screw.

Lever. There are three basic types of levers, depending on where the effort is applied, on the position of the load, and on the position of the fulcrum. In a first-class lever, such as a crossbar, the fulcrum is between the load and the applied force. In a second-class lever, such as a wheelbarrow, the load lies between the fulcrum and the applied force. In a third-class lever, the effort is applied between the load and the fulcrum. For example, when a person lifts a ball in the

palm of the hand, the load is on the hand and the fulcrum is at the elbow. The forearm supplies the upward force that lifts the ball.

Wheel and axle. The wheel and axle are essentially a modified lever, but it can move a load farther than a lever can. In a windlass used to raise water from a well, the rope that carries the load is wrapped around the axle of the wheel. The effort is applied to a crank handle on the side of the wheel. The center of the axle serves as a fulcrum. The mechanical advantage of the windlass depends on the ratio between the radius of the axle and the distance from the centre of the axle to the crank handle.

Sometimes teeth called cogs are placed around the edge of the wheel, as in the sprocket of a bicycle or in a cogwheel. The wheel-and-axle machine has important applications when it is used to transport heavy goods by rolling rather than by sliding. The wheel itself is regarded as one of the most important inventions of all time. It is widely used in all types of machinery.

Pulley. A pulley is a wheel over which a rope or belt passes. It is a form of the wheel and axle. The mechanical advantage of a single pulley equals 1, because the downward force exerted on the rope equals the weight lifted by the other end of the rope that passes over the pulley. The main advantage of the single pulley is that it changes the direction of the force. For example, to lift a load, a person can conveniently pull down the rope, using the weight of the body. When one pulley is attached to a support and another is attached to the load and allowed to move freely, a definite mechanical advantage is obtained.

Inclined plane. The inclined plane is such a simple device that it hardly looks like a machine at all. The average person cannot raise a 100 kilogram box up 1 meter into the rear of the truck. But by placing a 4-meter plank from the truck to the ground, a person could raise the load easily. If there were no friction, the force required to move the box would be exactly 25 kilograms. The mechanical advantage of an inclined plane is the length of the incline divided by the vertical rise. By adding rollers, it is possible to make a roller conveyor that will reduce friction and have great efficiency.

Wedge. The wedge is an adaptation of the inclined plane. It can be used to raise a heavy load over a short distance or to split a log. The wedge is driven by blows from a mallet or sledgehammer. The effectiveness of the wedge depends on an angle of the thin end. The smaller the angle, the less the force required to raise a given load.

Screw. The screw is actually an inclined plane wrapped in a spiral around a cylinder or a cone. The mechanical advantage of a screw is approximately the ratio of the circumference of the screw to the distance the screw advances during each revolution.

A jackscrew, such as those used to raise homes and other structures, combines the usefulness of the screw and the lever. The lever is used to turn the screw. The mechanical advantage of a jackscrew is quite high, and a small effort will raise a heavy load.

By combining the principles of simple machines engineers develop new and specialized machines. The parts for many of these machines are often standardized so they can be used in a variety of machines that perform entirely different tasks

Exercise 1. Look up new words given below in your dictionary and memorize them.

1. friction

2. load

3. fulcrum
4. mechanical advantage
5. machine-
6. simple machine
7. lever
8. first-class lever
9. second-class lever
10. third-class lever
11. wheel and axle
12. pulley
13. single
14. inclined plane
16. screw
17. upward
18. downward
19. specialized
20. standardized
21. essentially
22. gradually
23. entirely

Exercise 2. Learn to recognize international words. Give the Ukrainian equivalents to the following words without a dictionary. Then compare your variants with the dictionary.

Activity, adaptation, application, basic, center, class, complex, cone, conveyor, cylinder, effectiveness, element, energy, form, machine, plank, revolution, roller, specialized, standardized, support, type, to combine, to modify.

Exercise 3. Use the dictionary to translate the words.

to apply, to attach (*to*), to construct, to equal, to obtain, to operate, to pass (*over*), to roll, to serve (*as*), to slide, to supply, to turn, to wrap (*around*).

Exercise 4. Match the equivalents.

1. to satisfy needs	a) докладати сили до
2. to give control over	b) розробляти машини
3. to harness the energy of	с) стримувати енергію, приборкати енергію
4. to do work	d) зменшувати тертя
5. to exert force on	e) вганяти ударами
6. to develop machines	f) виконувати роботу
7. to reduce friction	g) задовольняти потреби

8. to drive by blows	h) давати контроль над
9. early people	і) обод колеса, край колеса
10. in a complex way	ж) сложним образом
11. machine age	к) кут тонкого торця
12. the ratio between	л) може вільно рухатися
13. is allowed to move freely	м) вік машин
14. a variety of	н) різноманітність
15. the edge of the wheel	о) стародавні люди
16. an angle of the thin end	р) співвідношення між
17. wrapped in a spiral around a cylinder	қ) обгорнутий по спіралі навколо циліндра
18. the length of the incline divided by the vertical rise	г) відношення окружності гвинта до відстані
19. the ratio of the circumference of the screw to the distance	с) довжина нахилу, поділена на довжину вертикального підйому

Exercise 5. Answer the questions.

1. Is the machine a device that does work?
2. What does almost every activity in our daily life depend on?
3. Why have people constructed a wide variety of machines?
4. Who made stone axes that served as weapons and tools?
5. How often is the age we live in called?
6. What do most machines consist of?
7. How many types of levers are there?
8. Why are the wheel and axle essentially a modified lever?
9. When does the wheel-and-axle machine have important applications?
10. How is the wheel itself regarded? Where is it widely used?

Exercise 6. Open brackets using the right words:

Pulley (**is** | **isn't**) a wheel over which a rope or belt passes. It is (**a form** | **a type**) of the wheel and axle. The mechanical (**advantage** | **disadvantage**) of a single pulley equals 1, because the downward force exerted on the rope equals the weight lifted by the other end of the rope that passes over the pulley. The main advantage of the single pulley is that it (**changes** | **modifies**) the direction of the force. For example, (**to lift** | **to raise**) a load, a person can conveniently pull down the rope, using the weight of the body. When one pulley (**is attached** | **is linked**) to a support and another is attached to the load and allowed to move freely, (**a definite mechanical advantage** | **an indefinite mechanical advantage**) is obtained.

Exercise 7. Complete the sentences with the suggested words.

advantage, a roller, device, raise, plank, friction.

The inclined plane is such a simple _____ 1 _____ that it hardly looks like a machine at all. The average person cannot _____ 2 _____ a 100 kilogram box up 1 meter into the rear of the

truck. But by placing a 4 meter _____3_____ from the truck to the ground, a person could raise the load easily. If there were no _____4_____, the force required to move the box would be exactly 25 kilograms. The mechanical _____5_____ of an inclined plane is the length of the incline divided by the vertical rise. By adding rollers, it is possible to make _____6_____ conveyor that will reduce friction and have great efficiency.

Exercise 8. State whether the statements are true or false. Correct if necessary.

1. Machine is a device that does work
2. People have constructed a wide variety of homes to satisfy their needs.
3. All machines are based in some way on five types of simple machines.
- 4.. There are four basic types of levers, depending on where the effort is applied, on the position of the load, and on the position of the fulcrum.
5. The mechanical advantage of the windlass doesn't depend on the ratio between the radius of the axle and the distance from the center of the axle to the crank handle.
6. The wheel-and-axle machine has important applications when it is used to transport heavy goods by rolling rather than by sliding.
7. The wheel itself isn't regarded as one of the most important inventions of all time.
8. A pulley is a wheel over which a rope or belt passes.
9. The main disadvantage of the single pulley is that it changes the direction of the force.
10. The inclined plane is such a simple device that it hardly looks like a machine at all.

Exercise 9. Match the words with their definitions.

1. An inclined plane	a) is a simple mechanism that helps people move things more easily. It has three important parts - the fulcrum, the load, and the effort.
2. A pulley	b) is a basic type of simple machine that consists of a flat surface raised at an angle, allowing objects to be lifted or lowered more easily than by lifting them directly against gravity.
3. A lever	c) is a piece of metal with a pointed edge which is used for splitting a material such as stone or wood, by being hammered into a crack in the material.
4. A screw	d) is a wheel that carries a flexible rope, cord, cable, chain, or belt on its rim.
5. A wedge	e) is a simple machine made of a wheel attached to a smaller axle, rotating together to multiply force or distance.

6. wheel and axle	f) is simply an inclined plane around a cylinder.

Exercise 10. Match the synonyms.

- 1) apply; 2) great; 3) ramp; 4) efficiency; 5) do; 6) early
a) perform; b) effectiveness; c) large; d) exert; e) inclined plane; f) ancient

Exercise 11. Match the antonyms.

- 1) complex; 2) push; 3) upward; 4) thin; 5) low; 6) small; 7) short
a) thick; b) simple; c) high; d) great; e) pull; f) downward; g) long

Exercise 12. Compose a story on one of the topics (up to 100 words):

1. Describe how people use machines
2. Simple machines
3. Six types of machines: the lever, the wheel and axle, the pulley, the inclined plane, the wedge, and the screw.

Lesson 3

Мета заняття: вміти використовувати іноземну мову, включаючи усну та письмову форми обсязі програмних вимог в продуктивних та рецептивних видах мовленнєвої діяльності. Здатність працювати з різними джерелами, розшукувати, обробляти, аналізувати й синтезувати отриману інформацію.

Read the text: What is Automobile

Automobile is a self-propelled vehicle, used primarily on public roads but adaptable to other surfaces. Automobiles changed the world during the 20th century. From the growth of suburbs to the development of road and highway systems, the so-called horseless carriage has forever altered the modern landscape. The manufacture, sale and servicing of automobiles have become key elements of industrial economies. But along with greater mobility and job creation, the automobile has brought noise and air pollution, and automobile accidents rank among the leading causes of death and injury throughout the world. But for better or worse, the 1900s can be called the Age of the Automobile, and cars will no doubt continue to shape our culture and economy into the 21st century.

Automobiles are classified by size, style, number of doors and intended use. The typical automobile, also called a car, auto, motorcar, and passenger car, has four wheels and can carry up to six people, including a driver. Larger vehicles designed to carry more passengers are called vans, minivans, omnibuses or buses. Those used to carry cargo are called pickups or trucks, depending on their size and design. Minivans are van-style vehicles built on a passenger car frame that can usually carry up to eight passengers. Sport-utility vehicles, also known as SUVs, are more rugged than passenger cars and are designed for driving in mud or snow.

The automobile is built around an engine. Various systems supply the engine with fuel, cool it during operation, lubricate its moving parts, and remove exhaust gases it creates. The engine produces mechanical power that is transmitted to the automobile's wheels through a drivetrain, which includes a transmission, one or more drive shafts, differential gears and axles. Suspension systems, which include springs and shock absorbers, cushion the ride and help protect the vehicle from being damaged by bumps, heavy loads and other stresses.

All specialists in automobile industry dealing with manufacturing automobiles (cars or trucks) must know that the production of the automobile comprises the following phases: designing; working out the technology of manufacturing processes; laboratory tests; road tests; mass manufacturing (production).

The automobile must have high efficiency, long service life, driving safety, ease of handling and maintenance, pleasant appearance. Also it must be comfortable and ecological. In order to obtain these qualities the specialists should develop up-to-date methods of designing cars using new types of resistant to corrosion light materials. Also it is important to know computer sciences because computers offer quick and optimal solutions of the problems. Besides they are used for better operation of mechanisms in cars.

Before the car is put into mass production the units of the car are subjected to tests in the Works laboratory and then the car undergoes a rigid quality control in road tests. Why are these tests required? What qualities are required of the automobile? They are needed because the modern automobile must be rapid in acceleration, have smooth acting clutch, silent gearbox, dependable braking and steering systems, dependable ignition system, low fuel consumption and be stable on the road.

An automobile means any 4-wheeled vehicle propelled by fuel— which is manufactured primarily for use on public streets, roads, and highways.

A car accident also referred to as a car collision, car crash, or traffic collision, is an incident where a motor vehicle collides with another object.

A van is a medium-sized road vehicle, used especially for carrying goods, that often has no windows in the sides at the back.

A truck is a large vehicle that is used to transport goods by road.

A minivan is a large car, like a van, designed to carry up to eight people.

A sport-utility vehicle (SUV) is a car classification that combines elements of road-going passenger cars with features from off-road vehicles.

An engine is a machine with moving parts that converts power into motion, especially one that supplies motive power for a vehicle.

A transmission (also called a gearbox) is a complex and critical component of the car's drivetrain that controls the application of power from the internal combustion engine to the car's wheels.

A shock absorber or a damper is a mechanical or hydraulic device designed to absorb and damp shock impulses.

A car bumper is a protective structure installed at the front and rear of cars to absorb impact during collisions.

Exercise 1. Read and memorize using the dictionary:

accidents
air pollution
alter
axle ['æks(ə)l]
bump
car frame
cargo
cushion ['kʊʃ(ə)n]
drive shaft
drivetrain
exhaust [ig'zɔ:st]
gear [giə]
horseless carriage
injury
injury ['indʒəri]
load
lubricate
lubricate [lu:'brikeɪt]
mud
omnibus
self-propelled [prə'pel]
shock absorber
sport-utility vehicle
spring
suburbs
suspension [sə'spens(ə)n]
vehicle
acceleration
brake
capacity
clutch
comprises (v)
corrosion
dependable (adj)
fuel
gearbox
goods vehicles
handling
ignition
maintenance
manually
manufacturing
rapid (adj)
requirement
resistant (adj)
rigid (adj)
smooth

solar
steering system
truck
up-to-date
wheel

Exercise 2. Answer the following questions

1. What is an automobile? Where are automobiles primarily used?
2. When did automobiles change the world?
3. What has become key elements of industrial economies?
4. What year can be called the Age of the Automobile?
5. How are automobiles classified?
6. What else is the typical automobile called?
7. What are the names of large vehicles designed to carry more passengers?
8. How many passengers can minivans usually carry?
9. What are sport-utility vehicles designed for?
10. How is the automobile built?
11. What does the engine produce? And where is this power transmitted?
12. What do suspension systems include?

Exercise 3. Decide if the following sentences are true (T) or false (F)

1. Automobiles changed the world during the 19th century.
2. The size, style, number of doors have become key elements of industrial economies.
3. But along with greater mobility and job creation, the automobile has brought noise and air pollution, and automobile accidents rank among the leading causes of death and injury throughout the world.
4. Automobiles are classified by size, style, number of doors and intended use.
5. The typical automobile, also called a car, auto, motorcar, and passenger car, has four wheels and can carry up to eight people, including a driver.
6. Sport-utility vehicles, also known as SUVs, are less rugged than passenger cars and are designed for driving in mud or snow.
7. The automobile is built around an engine.
8. The engine produces chemical power that is transmitted to the automobile's wheels through a drivetrain, which includes a transmission, one or more drive shafts, differential gears and axles.

Exercise 4. Translate the following sentences into English

1. У середині автомобіля знаходиться двигун.
2. Ця система двигуна охолоджує його під час руху.

3. Мінівени здатні перевозити до восьми пасажирів.
4. Кінець 19-го сторіччя може називатися епохою автомобіля.
5. Двигун виробляє механічну енергію, яка передається на колеса авто-мобіля.
6. Спортивне легкове авто має більш жорстку конструкцію, ніж паса-жирське авто.
7. Амортизатори допомагають захистити авто від пошкоджень на нері-вних дорогах.
8. Звичайний автомобіль може перевозити до шести пасажирів, разом з водієм.
9. Кожен автомобіль має систему, яка видаляє відпрацьовані гази, які він створює.
10. Більшість сучасних автомобілів мають чотири колеса, рідинне або повітряне охолодження двигуна та сам двигун.
11. Розмір, стиль, кількість дверей та призначення для користування є ключовими моментами під час купівлі автомобіля.

Exercise 5. Pick out all international words from the text.

Exercise 6. Group the synonyms according to their similarity.

vehicle, change, world, modern, key, creation, pollution, accident, leading, shape
contamination, crash, principal, form, automobile, modify, globe, current, crucial, formation,

Exercise 7. Complete the sentences with the suggested words: (interrelationship, automobile, fuel, transmission, wheels, components)

Automobiles are powered and controlled by a complicated _____1_____ between several systems. The major systems of the _____2_____ are the power plant, the power train, the running gear, and the control system. Each of these major categories include a number of subsystems. The power plant includes the engine, _____3_____, electrical, exhaust, lubrication, and coolant systems. The power train includes the _____4_____ and drive systems, including the clutch, differential, and drive shaft. Suspension, stabilizers, _____5_____, and tires are the parst of the running gear, or support system. Steering and brake systems are the major _____6_____ of the control system, by which the driver directs the car.

Exercise 8. Ask questions to the given answers:

1) Question: _____?

Answer: The major systems of the automobile are the power plant, the power train, the running gear, and the control system.

2) Question: _____?

Answer: The power plant includes the engine, fuel, electrical, exhaust, lubrication, and coolant systems.

3) Question: _____?

Answer: The engine produces mechanical power that is transmitted to the automobile's wheels through a drive train.

Exercise 9. Match English words and word-groups with their definitions.

1. an automobile	a) is a medium-sized road vehicle, used especially for carrying goods, that often has no windows in the sides at the back
2. a car accident	b) means any 4-wheeled vehicle propelled by fuel— which is manufactured primarily for use on public streets, roads, and highways.
3.a van	c) is a large car, like a van, designed to carry up to eight people
4.a truck	d) is a mechanical or hydraulic device designed to absorb and damp shock impulses.
5. a minivan	e) also referred to as a car collision, car crash, or traffic collision, is an incident where a motor vehicle collides with another object.
6.a sport-utility vehicle (SUV)	f) is a large vehicle that is used to transport goods by road.
7. an engine	g) is a complex and critical component of the car's drivetrain that controls the application of power from the internal combustion engine to the car's wheels.
8. a transmission (also called a gearbox)	h) is a protective structure installed at the front and rear of cars to absorb impact during collisions.
9. a shock absorber or damper	i) a machine with moving parts that converts power into motion, especially one that supplies motive power for a vehicle.
10. a car bumper	j) is a car classification that combines elements of road-going passenger cars with features from off-road vehicles.

Exercise 10. Compose a story on one of the topics (up to 100 words):

1. What is an automobile?
2. Automobiles changed the world
3. The major systems of the automobile

Lesson 4

Мета заняття: вміти знаходити необхідну інформацію в технічній літературі, наукових базах даних та інших джерелах інформації, критично оцінювати і аналізувати її.

Read the text: Automobile Engineering

Automobile engineering is a vast field that integrates various branches of engineering (thermodynamics, mechanics, materials science, electronics, etc.) to design, develop, fabricate, and test vehicles and their components.

Automobile engineering is one of the stream of mechanical engineering. It deals with various types of automobiles, their mechanism of transmission systems and its applications. Automobiles are different types of vehicles used for transportation of passengers, goods, etc.

Basically all types of vehicles work on the principle of internal combustion processes or sometimes the engines are called internal combustion engines. Different types of fuels are burnt inside the cylinder at higher temperature to get the transmission motion in the vehicles. Most of the automobiles are the internal combustion engines vehicles only. Therefore, every mechanical and automobile engineer should have the knowledge of automobile engineering, its mechanisms and its various applications.

Automobile can also be defined as a vehicle which can move by itself. For example, cars, jeeps, buses, trucks, scooters, etc.

Automobiles or vehicles can be classified on different bases as given below.

On the basis of load:

- heavy transport vehicle or heavy motor vehicle (trucks, buses, etc.);
- light transport vehicle (pick-ups, station wagons, etc.);
- light motor vehicle (cars, jeeps, etc.).

On the basis of wheels:

- two wheeler vehicle (scooter, motorcycle, scooters, etc.);
- three wheeler vehicle (auto rickshaw, three wheeler scooter, etc.);
- four wheeler vehicle (car, jeep, trucks, buses, etc.);
- six wheeler vehicle (big trucks with two gear axles each having four wheels).

On the basis of fuel used:

- petrol vehicle (motorcycle, scooter, cars, etc.);
- diesel vehicle (trucks, buses, etc.);
- electric vehicle (battery drive);
- steam vehicle (an engine which uses steam);
- gas vehicle.

On the basis of body:

- sedan with two doors;
- sedan with four doors;
- station wagon;
- convertible (e.g. jeep, etc.);
- van;
- special purpose vehicle (ambulance, milk van, etc.).

A motor vehicle is a complex engineering construction. It is composed of several thousand parts. The smaller parts are joined together and form larger components, or units. One of the main components of any vehicle is the engine.

In addition to the engine itself, there are four separate mechanisms, which are used to feed the engine. These mechanisms are the fuel system, the lubrication system, the electrical system and the cooling system.

The fuel system is a separate mechanism that is used for feeding the engine. The fuel system consists of a tank, a fuel line or a pipe, a pump and a carburetor. The engine produces power when air and fuel are mixed and burnt.

So let's have a look at the fuel system operation. The fuel is stored in a fuel tank. The fuel tank is connected to a fuel pipe. The fuel pipe carries the fuel to the fuel pump. This pump can be either electric or mechanic in operation. Electric pumps are generally situated near the fuel tank whereas a mechanical pump is generally located beside the engine. It is driven by the camshaft. The fuel pump is connected to the carburetor. In the carburetor the fuel is mixed with air. It is important to have the right ratio of air to fuel. For example, the optimum ratio of air to petrol in the fuel mixture is 15 parts of air to 1 part of petrol. The fuel and the air are drawn into the combustion chamber, where they are compressed by the piston. In the engine the fuel and air are burnt and they produce power.

Components of the Automobile

The automobile is made up of three basic parts: the power plant, or the engine, the chassis and the body.

The engine is the source of power that makes the wheels rotate and the car move. It includes fuel, cooling, lubricating and electric systems. Most automobile engines have six or eight cylinders

The chassis includes a power train (power transmission), a running gear, steering and braking systems as well.

The power train carries the power from the engine to the car wheels.

The power transmission, in turn, contains the clutch, gearbox, propeller or cardan shaft, final drive, differential, rear axle and axle shafts. The running gear consists of a frame with axles, wheels and springs.

The body has a hood, fenders and accessories: the heater, stereo tape recorder, windshield wipers, conditioner, speedometer and so on.

Exercise 1. Read and memorize using a dictionary:

application

axle

combustion [kəm'bestʃ(ə)n]

convertible

cylinder ['silində]

deal with

fuel

heavy transport vehicle

internal combustion engine

light motor vehicle

sedan [si'dæn]

station wagon

petrol

engine (power plant)

chassis

body
 power train
 running gear
 steering system
 brakes
 clutch
 gearbox
 propeller shaft
 final drive
 differential
 rear axle
 axle shafts
 frame with axles
 wheels and springs
 hood
 fenders
 heater
 windshield wiper
 in turn
 source of power
 cooling
 lubricating

Exercise 2. Answer the questions:

1. What is automobile engineering?
2. What does automobile engineering integrate?
3. What does Automobile engineering deal with?
4. What are Automobiles?
5. How do all types of vehicles work in general?
6. Where are different types of fuels burnt?
7. How can automobile also be defined?
8. How can automobiles or vehicles be classified?

Exercise 3. Read and translate the international words.

Automobile, chassis, electric, system, control, differential, ventilator, cylinder.

Exercise 4. Match the left part with the right:

1. A motor vehicle	a) consists of a tank, a fuel line or a pipe, a pump and a carburetor.
2. The fuel system	b) is connected to a fuel pipe.
3. The engine	c) is a complex engineering construction
4. The fuel tank	d) produces power when air and fuel are mixed and burnt.
5. Electric pumps	e) is connected to the carburetor.
6. The fuel pump	f) are generally situated near the fuel tank whereas a mechanical pump is generally located beside the engine.

7. The automobile	g) includes a power train (power transmission), a running gear, steering and braking systems as well.
8. The chassis	h) contains the clutch, gearbox, propeller or cardan shaft, final drive, differential, rear axle and axle shafts.
9. The power train	i) is made up of three basic parts: the power plant, or the engine, the chassis and the body.
10. The power transmission, in turn,	j) carries the power from the engine to the car wheels.

Exercise 5. Agree or disagree with the following statements marking them as – True or False.

1. The automobile is made up of four basic parts.
2. The engine is the source of power that makes the wheels rotate and the car move.
3. The chassis includes the clutch, gearbox, propeller or cardan shaft, final drive.
4. The power transmission, in turn, contains a power train (power transmission), a running gear, steering and braking systems as well.
5. The power train carries the power from the engine to the car wheels.
6. The running gear consists of a frame with axles, wheels and springs.
7. The body has a frame with axles, wheels and springs.
8. Different types of fuels are burnt inside the cylinder at higher temperature to get the transmission motion in the vehicles.

Exercise 6. Ask questions to the given answers:

1) Question: _____?

Answer: One of the main components of any vehicle is the engine.

2) Question: _____?

Answer: The fuel system consists of a tank, a fuel line or a pipe, a pump and a carburetor.

3) Question: _____?

Answer: The engine produces power when air and fuel are mixed and burnt.

4) Question: _____?

Answer: The fuel pipe carries the fuel to the fuel pump.

Exercise 7. Match English words and word-groups with their definitions.

1. Automobile engineering (or automotive engineering)	a) is an engine which generates motive power by the burning of petrol, oil, or other fuel with air inside the engine, the hot gases produced being used to drive a piston or do other work as they expand.
2. Internal combustion engine	b) is a branch of vehicle engineering focused on designing, developing, manufacturing, and maintaining cars, trucks, motorcycles, and other road vehicles.

3. chassis	c) is an essential component of the electrical power grid. It involves the process of transmitting electricity over long distances.
4. power train	d) is the base frame of a car, carriage, or other wheeled vehicle.
5. power transmission	e) the parts of a motor vehicle not producing or controlling power, including the frame, suspension, steering, and brakes.
6. running gear	f) is the complete system in a vehicle (or machine) that generates power and delivers it to the wheels.
7. body	g) is a rotating component (typically circular in shape) that is intended to turn on an axle bearing.
8. wheel	h) is the basic “skeleton” of the car that forms the cabin, engine bay, and cargo area

Exercise 8. Open brackets using the right words:

So let's (**have a look** | **glance**) at the fuel system operation. The fuel (**is stored** | **is preserved**) in a fuel tank. The fuel tank (**is connected** | **is attached**) to a fuel pipe. The fuel pipe carries the fuel to the fuel pump. This pump can be either electric or mechanic in operation. Electric pumps are (**generally** | **typically**) situated near the fuel tank whereas a mechanical pump is generally located beside the engine. It is driven by the camshaft. The fuel pump is connected to the carburetor. In the carburetor the fuel (**is mixed** | **is combined**) with air. It is (**important** | **vital**) to have the right ratio of air to fuel. For example, the optimum ratio of air to petrol in the fuel mixture is (**15 parts** | **16 parts**) of air to 1 part of petrol. The fuel and the air are drawn into the combustion chamber, where they are (**compressed** | **pressured**) by the piston. In the engine the fuel and air are burnt and they produce power.

Exercise 9. Put the words in the correct order

- 1) have, many, they, how, got, trucks and buses?
- 2) types, are, the, automobiles, different, vehicles, of?
- 3) types, of, different, are, fuels, burnt, the, inside, cylinder?
- 4) used, cars, for, are, of, transportation, passengers?
- 5) knowledge, should, engineer, have, the, of, engineering, automobile?
- 6) what, fuel, is, kind, the, of, popular, most?
- 7) motorcycles, scooters, popular, are, and, teenagers, among?
- 8) combustion, of, the, automobiles, most, are, internal, vehicles, engines?

Exercise 10. Compose a story on one of the topics (up to 100 words):

1. Automobile Engineering
2. Components of the Automobile
3. A motor vehicle is a complex engineering construction.

Lesson 5

Мета заняття: Вільно спілкуватися з професійних проблем державною та іноземною мовами усно і письмово, обговорювати результати професійної діяльності з фахівцями та нефхівцями, аргументувати свою позицію з дискусійних питань.

Read the text: **Classification of Vehicles**

A vehicle is a machine designed to transport people or goods from one place to another. Vehicles play a vital role in modern society by supporting trade, communication, and daily life. Because vehicles differ widely in design, purpose, and operation, they are classified into different categories. Vehicle classification helps engineers, manufacturers, and users understand their function, efficiency, and suitability for specific tasks.

1. Classification Based on Purpose

Vehicles can be classified according to their intended use. Passenger vehicles are designed mainly for transporting people. For example, cars, buses, vans, and motorcycles. Goods or commercial vehicles are used to transport cargo and materials, such as trucks, lorries, and trailers. Special-purpose vehicles are designed for specific tasks, including ambulances, fire engines, military vehicles, cranes, and agricultural tractors.

2. Classification Based on Mode of Transport

According to the medium on which they operate, vehicles are divided into several types. Road vehicles include cars, buses, trucks, and two-wheelers that operate on roads. Rail vehicles such as trains, trams, and metros run on railway tracks. Water vehicles, also known as marine vehicles, include boats, ships, and submarines used on rivers, seas, and oceans. Air vehicles or aircraft, such as airplanes, helicopters, and drones, travel through the air. Space vehicles like rockets and satellites are designed to operate beyond the Earth's atmosphere.

3. Classification Based on Power Source

Vehicles can also be classified based on the type of energy used to operate them. Internal combustion engine vehicles use fuels such as petrol or diesel to produce power. Electric vehicles (EVs) operate using electric motors powered by batteries. Hybrid vehicles combine an internal combustion engine with an electric motor to improve fuel efficiency. Alternative fuel vehicles use sources such as compressed natural gas (CNG), liquefied petroleum gas (LPG), hydrogen, or biofuels.

4. Classification Based on Number of Wheels

Based on the number of wheels, vehicles are classified as two-wheelers (motorcycles, scooters, bicycles), three-wheelers (auto-rickshaws), and four-wheelers (cars, jeeps). Vehicles with more than four wheels, such as buses and trucks, are referred to as multi-axle vehicles.

5. Classification Based on Drive System

Vehicles may also be classified according to how power is transmitted to the wheels. In front-wheel drive vehicles, power is delivered to the front wheels. Rear-wheel drive vehicles transmit power to the rear wheels. All-wheel drive and four-wheel drive vehicles supply power to all wheels, improving traction and stability on rough or slippery surfaces.

Vehicle classification provides a systematic way to study and understand different types of vehicles. It helps in selecting the right vehicle for a specific purpose and supports advancements in vehicle design, safety, and efficiency. For engineering students, understanding vehicle classification forms a foundation for further study in automobile and transport engineering.

A car or passenger car is a wheeled motor vehicle used for transporting passengers, which also carries its own engine. Most definitions of the term specify that automobiles are designed to run primarily on roads, to have seating for one to eight people, to typically have four wheels, and to be constructed principally for the transport of people rather than goods. This category includes

motor vehicles used while performing service duties for transporting personnel, small cargos, and technical equipment as well.

A lorry (truck) is a motor vehicle designed to transport cargo. Lorries vary greatly in size, power and configuration. Lorries can be very large and powerful, and may be configured to carry specialized equipment. Modern trucks are powered by either gasoline or Diesel engines, with the latter dominant. Border guard units are equipped with lorries, trailers and semitrailers used for the transport of personnel and cargo, towing other transportation (

A bus is a road vehicle designed to carry passengers. Buses have a capacity as high as 300 passengers.

Motorcycles form separate category of transportation for guarding the state border. It is a single-track, two-wheeled motor vehicle. Motorcycles vary considerably depending on the task for which they are designed, such as long distance travel, navigating congested traffic, cruising or off-road conditions.

A snowmobile is a land vehicle for winter travel on snow. Designed to be operated on snow and ice, they require no road or trail. Design variations enable some machines to operate in deep snow or forests; most are used on open terrain, including lakes or driven on paths or trails.

Tractors perform the functions of transporting cargos for engineering maintenance of the border sector and conducting special engineering works. They are divided into two groups: wheeled tractors and caterpillar tractors.

Exercise 1. Read and memorize using a dictionary:

comprehensive

suitability

trailer

mode of transport

two-wheeler

auto-rickshaw

multi-axle vehicles

front-wheel drive vehicles

rear-wheel drive vehicles

traction

on rough or slippery surfaces

supports advancements

Exercise 2. Answer the questions:

1. What is a vehicle?
2. Where do vehicles play a vital role?
3. Why are vehicles classified into different categories?
4. What does vehicle classification help engineers, manufacturers, and users understand?
5. What are passenger vehicles mainly designed for?
6. What are special-purpose vehicles designed for?
7. What do road vehicles include?
8. What are space vehicles like rockets and satellites designed for?
9. How can vehicles also be classified based on the type of energy used?

10. What are vehicles with more than four wheels, such as buses and trucks, referred to?
11. How may vehicles also be classified according to the transmission of power to the wheels?
12. What does vehicle classification provide?

Exercise 3. Match the left part with the right:

1. Vehicles	a) include cars, buses, trucks, and two-wheelers that operate on roads
2. Road vehicles	b) play a vital role in modern society by supporting trade, communication, and daily life.
3. Rail vehicles	c) include boats, ships, and submarines used on rivers, seas, and oceans.
4. Water vehicles, also known as marine vehicles,.	d) use fuels such as petrol or diesel to produce power.
5. Air vehicles or aircrafts,	e) such as trains, trams, and metros run on railway tracks
6. Internal combustion engine vehicles	f) operate using electric motors powered by batteries.
7. Electric vehicles (EVs)	g) combine an internal combustion engine with an electric motor to improve fuel efficiency.
8. Hybrid vehicles	h) such as airplanes, helicopters, and drones, travel through the air.

Exercise 4. Open brackets choosing the right words:

4. Classification Based on Number of Wheels

Based on the number of wheels, vehicles are (**classified**| **graded**) as two-wheelers (motorcycles, scooters, bicycles), three-wheelers (auto-rickshaws), and four-wheelers (cars, jeeps). Vehicles with (**more**| **less**) than four wheels, such as buses and trucks, are referred to as multi-axle vehicles.

5. Classification Based on Drive System

Vehicles may also be classified according to how power is (**transmitted**| **delivered**) to the wheels. In front-wheel drive vehicles, power is (**delivered**| **supplied**) to the front wheels. Rear-wheel drive vehicles (**transmit**| **convey**) power to the rear wheels. All-wheel drive and four-wheel drive vehicles (**supply**| **provide**) power to all wheels, improving traction and stability on rough or slippery surfaces.

Exercise 5. Ask questions to the given answers:

1) Question: _____?

Answer: Vehicle classification provides a systematic way to study and understand different types of vehicles.

2) Question: _____?

Answer: Motorcycles form separate category of transportation for guarding the state border

3) Question: _____?

Answer: A snowmobile is a land vehicle for winter travel on snow.

4) Question: _____?

Answer: Tractors perform the functions of transporting cargos for engineering maintenance of the border sector and conducting special engineering works.

Exercise 6. Complete the sentences with the suggested words: vehicle, automobiles, transport, personnel, designed, large, gasoline, trailers

A car or passenger car is a wheeled motor _____1_____ used for transporting passengers, which also carries its own engine. Most definitions of the term specify that _____2_____ are designed to run primarily on roads, to have seating for one to eight people, to typically have four wheels, and to be constructed principally for the _____3_____ of people rather than goods. This category includes motor vehicles used while performing service duties for transporting _____4_____, small cargos, and technical equipment as well.

A lorry (truck) is a motor vehicle _____5_____ to transport cargo. Lorries vary greatly in size, power and configuration. Lorries can be very _____6_____ and powerful, and may be configured to carry specialized equipment. Modern trucks are powered by either _____7_____ or Diesel engines, with the latter dominant. Border guard units are equipped with lorries, _____8_____ and semitrailers used for the transport of personnel and cargo, towing other transportation.

Exercise 7. Agree or disagree with the following statements marking them as – True or False.

1. Vehicles do not play a vital role in modern society by supporting trade, communication, and daily life.
2. Passenger vehicles are designed mainly for transporting people.
3. Goods or commercial vehicles are used to transport cargo and materials, such as trucks, lorries, and trailers.
4. Special-purpose vehicles are designed for transporting people.
5. Road vehicles include trains, trams, and metros that operate on roads.
6. Water vehicles, also known as marine vehicles, include boats, ships, and submarines used on rivers, seas, and oceans.
7. Hybrid vehicles combine an internal combustion engine with an electric motor to deteriorate fuel efficiency.
8. Alternative fuel vehicles use sources such as compressed natural gas (CNG), liquefied petroleum gas (LPG), hydrogen, or biofuels.

Exercise 8. Find synonyms to the following words.

divide, perform, operate, require, vary, capacity, equip, modern, transport, include power, supply, contemporary, transfer, contain, separate, execute, work, demand, differ.

Exercise 9. Match English words and word-groups with their definitions.

1. A truck, a lorry.	a) is a large transport conveyance designed to be pulled by a truck or tractor.
2. A trailer	b) is a tall metal structure with a long horizontal part, used for lifting and moving heavy objects.
3. An ambulance	c) is an artificial body placed in orbit round the earth or moon or another planet in order to collect information or for communication.
4. A military vehicle	d) is a naval vessel designed to operate underwater.
5. A crane	e) is any vehicle for land-based military transport and activity, including combat vehicles.
6. A satellite	f) is a type of aircraft that uses rotating, or spinning, wings called blades to fly.
7. A submarine	g) is a vehicle that is equipped for transporting the injured or the sick.
8. A helicopter	h) is a large, heavy road vehicle used for carrying goods, materials, or troops;

Exercise 10. Compose a story on one of the topics (up to 100 words):

1. Classification of vehicles
2. A car or passenger car is a wheeled motor vehicle
3. A lorry (truck) is a motor vehicle designed to transport cargo.

Lesson 6

Мета заняття: вміти використовувати іноземну мову, включаючи усну та письмову форми в обсязі програмних вимог в продуктивних та рецептивних видах мовленнєвої діяльності. здатність працювати з різними джерелами, розшукувати, обробляти, аналізувати і синтезувати отриману інформацію.

Read the text: **Introduction to Automobile Construction**

Automobiles are made up of several different components. There can be as many as 3,000 parts even in the smallest vehicle. These parts are designed to work in harmony with each other. Understanding the individual parts of an automobile is a very complex matter. Automobiles are comprised of the following main components: the body, the engine, the chassis, the electric equipment, and the additional equipment.

Automobile construction is the study of how motor vehicles are designed, built, and assembled. It combines principles from mechanical engineering, materials science, electronics, and manufacturing. Understanding automobile construction helps students learn how different vehicle systems work together to provide safe, efficient, and comfortable transportation.

A modern automobile consists of several major systems. The most important are the chassis, the engine, the transmission, the suspension, the steering system, braking system, electrical system, and body structure. Each system has a specific function, but all must operate together for the vehicle to function properly.

The chassis is the basic supporting structure of the vehicle. It carries the engine, the transmission, the suspension, and the body. In many modern cars, the chassis and body are combined into a single structure called a monocoque or unibody, which improves strength and reduces weight. The chassis must be strong enough to withstand loads, vibrations, and impacts during driving.

The engine is the power source of the automobile. Most vehicles use internal combustion engines, which convert chemical energy of fuel into mechanical energy. The main parts of an engine include the cylinder block, the pistons, the crankshaft, the camshaft, the valves, and the fuel system. The engine produces rotational motion, which is transmitted to the wheels to move the vehicle.

The transmission system transfers power from the engine to the wheels. It allows the vehicle to operate efficiently at different speeds and loads. Transmissions can be manual or automatic. Key components include the clutch or the torque converter, the gearbox, the driveshaft, the differential, and the axles. The differential allows the wheels to rotate at different speeds while turning.

The suspension system connects the wheels to the vehicle body and absorbs shocks from road irregularities. It improves ride comfort, stability, and handling. Common suspension components include springs, shock absorbers, control arms, and stabilizer bars. A well-designed suspension helps maintain tire contact with the road.

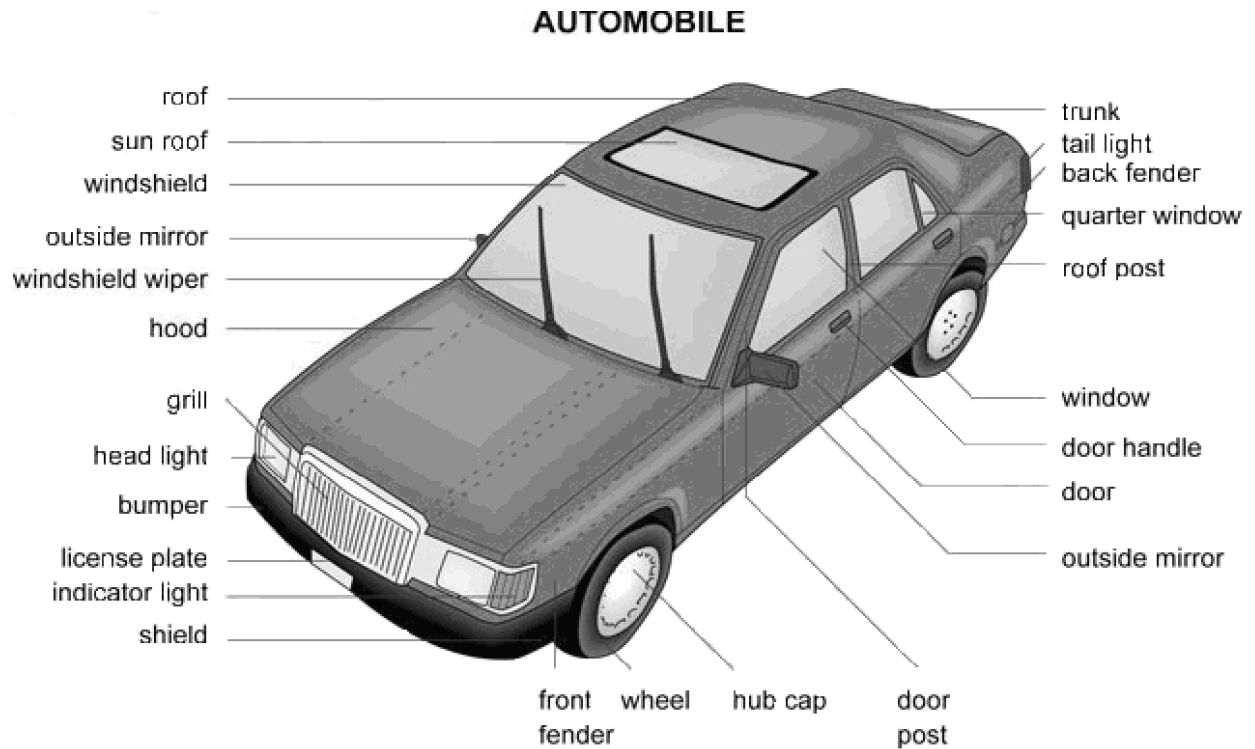
The steering system enables the driver to control the direction of the vehicle. It consists of the steering wheel, the steering column, the steering gear, and the linkages. Many vehicles use power steering systems, which reduce the effort required to turn the wheels.

The braking system is a critical safety system. It slows down or stops the vehicle by converting kinetic energy into heat through friction. Modern cars use hydraulic braking systems with disc or drum brakes. Additional systems such as ABS (Anti-lock Braking System) improve control during emergency braking.

The electrical system supplies power to start the engine and operate lights, instruments, sensors, and electronic control units. It includes the battery, the alternator, the starter motor, the wiring, and the electronic components.

Finally, the body structure provides space for passengers and cargo while protecting occupants during accidents. It is designed using lightweight but strong materials such as steel, aluminum, and composites. Aerodynamics and aesthetics are also important considerations in body design.

In conclusion, automobile construction involves the integration of multiple systems working together. A basic understanding of these systems is essential for students beginning their studies in automotive engineering or vehicle technology.



Exercise 1. Read and memorize using a dictionary:

aerodynamic
be comprised of
body
brakes
casting
chassis
transmission
suspension
steering system
braking system
consume
convert
cooling system
crank mechanism
electric equipment
engine
fuel
fuel tank
gas-distributing mechanism
ignition system
lubrication system

metal sheet
pedal
starting system
system of fuel supply
wheel
piston
crankshaft
camshaft
valve

Exercise 2. Answer the questions:

1. How many parts can even the smallest car have?
2. How are these parts designed?
3. What are automobiles comprised of?
4. What is automobile construction?
5. What does it combine?
6. What does understanding of automobile construction help students learn?
7. What are the most important major systems of a modern automobile?
8. What is the basic supporting structure of the vehicle?
9. Why does the chassis have to be strong enough?
10. What is the power source of the automobile.?
11. Why do most vehicles use internal combustion engines?
12. What do the main parts of an engine include?
13. What does the engine produce?
14. What does the transmission system transfer?
15. What does the differential allow the wheels to do?
16. What does the suspension system connect?
17. What does the steering system enable the driver to control?
18. Why do many vehicles use power steering systems?
19. The braking system is a critical safety system, isn't it? What does the braking system slow down or stop?
20. What do additional systems such as ABS (Anti-lock Braking System) improve?
21. What does the electrical system supply?
22. What does the electrical system include?
23. What does the body structure provide?

Exercise 3. Match the left part with the right:

1. Automobiles	a) has a specific function, but all must operate together for the vehicle to function properly.
2. An automobile construction	b) are comprised of the following main components: the body, engine, chassis, electric equipment, and additional equipment.

3. Each system	c) use hydraulic braking systems with disc or drum brakes
4. Transmissions	d) is the study of how motor vehicles are designed, built, and assembled.
5. Common suspension components	e) are also important considerations in body design.
6. A well-designed suspension	f) can be manual or automatic.
7. Modern cars	g) provides space for passengers and cargo while protecting occupants during accidents.
8. A body structure	h) the integration of multiple systems working together.
9. Aerodynamics and aesthetics	i) helps maintain tire contact with the road.
10. Automobile construction involves	j) include springs, shock absorbers, control arms, and stabilizer bars.

Exercise 4. Open brackets using the right words:

The engine is the power source of the automobile. Most vehicles (**use| apply**) internal combustion engines, which (**convert| transform**) the chemical energy of fuel into mechanical energy. The main parts of an engine (**include| contain**) the cylinder block, the pistons, the crankshaft, the camshaft, the valves, and the fuel system. The engine (**produces| generates**) rotational motion, which is transmitted to the wheels to move the vehicle.

The transmission system (transfers | shifts) power from the engine to the wheels. It allows the vehicle to (**operate | run**) efficiently at different speeds and loads. Transmissions can be manual or automatic. Key components include the clutch or the torque converter, the gearbox, the driveshaft, the differential, and the axles. The differential allows the wheels to (**rotate | revolve**) at different speeds while turning.

Exercise 5. Complete the sentences with the suggested words: control, use, critical, stops, improve, connects, include, helps.

The suspension system _____1_____ the wheels to the vehicle body and absorbs shocks from road irregularities. It improves ride comfort, stability, and handling. Common suspension components _____2_____ the springs, the shock absorbers, the control arms, and the stabilizer bars. A well-designed suspension _____3_____ maintain tire contact with the road.

The steering system enables the driver _____4_____ the direction of the vehicle. It consists of the steering wheel, the steering column, the steering gear, and the linkages. Many vehicles _____5_____ power steering systems, which reduce the effort required to turn the wheels.

The braking system is a _____6_____ safety system. It slows down or _____7_____ the vehicle by converting kinetic energy into heat through friction. Modern cars use hydraulic braking systems with disc or drum brakes. Additional systems such as ABS (Anti-lock Braking System) _____8_____ control during emergency braking.

Exercise 6. Match English words and word-groups with their definitions.

1.A chassis	a) is a machine with moving parts that converts power into motion, especially one that supplies motive power for a vehicle.
2.An engine	b) is the intricate network of wires, circuits, and components (battery, alternator, starter, fuses, sensors, ECU) that generates, stores, and distributes electrical power to start the engine, run accessories (lights, radio, AC), and operate modern electronic controls, acting as the vehicle's "nervous system".
3.A transmission	c) is the frame of a vehicle, usually including the wheels and engine, onto which the metal covering is fixed.
4.A suspension	d) is the mechanism by which power is transmitted from an engine to the axle in a motor vehicle.
5. A steering system	e) is a crucial assembly of mechanical, hydraulic, or electronic components that controls a vehicle's speed, bringing it to a safe stop or holding it stationary by converting its kinetic energy into thermal (heat) energy, primarily through friction.
6 .A braking system	f) is the system of springs and shock absorbers by which a vehicle is supported on its wheels.
7. A car's electrical system	g) is a vehicle's mechanism for directional control, converting the driver's rotational input from the steering wheel into the angular movement of the wheels.
8. A car's body structure	h) is its fundamental skeletal framework, integrating the chassis (frame) and outer panels into one unit (unibody) or as separate components (body-on-frame) to provide strength, safety, shape, and a platform to mount all other parts, protecting occupants and cargo from external forces and ensuring stiffness and durability for a good ride.

Exercise 7. Render the following sentences into Ukrainian.

1. The body of the car is an enclosed space where the driver and the passengers are seated and some loads are located. The shape of the car body is aerodynamic to make the vehicle able to move faster.

2. The engine is a machine designed to convert energy into useful mechanical motion. In common usage, an engine burns or otherwise consumes fuel. The engine may also serve as a “prime mover”, a component that transforms the flow or changes in pressure of a fluid into mechanical energy. The engine consists of a number of mechanisms and systems. Principal

mechanisms are the following: a crank mechanism and a gas-distributing mechanism. Principal systems of the automobile are system of fuel supply, lubrication system, cooling system, ignition system, starting system.

3. Chassis is designated to provide the motion of the car. It consists of transmission, running gear, steering system. Electric equipment belongs to the chassis relatively as it functions not only in the chassis but in the car body and engine.

4. One of the most vital parts of an automobile is the fuel tank. The fuel tank stores and supplies fuel to the engine, and this is needed to make the car run.

5. Brakes are also a very important part of a vehicle when it comes to safety and being able to avoid accidents. Steel of very high quality is used to make brakes, in order to increase the performance of rollers used to apply brakes. An important part of the brake system is the pedal assembly.

6. Finally, there are wheels of the vehicle. Wheels come in many different designs. Generally, there are two categories of wheels. These two categories are machine castings and stamped metal sheet. There are some wheels that are a combination of both.

Exercise 8. Translate the following words into English:

1. гальма	
2. двигун	
3. електричне обладнання	
4. колесо	
5. кузов	
6. мастильна система	
7. пальне	
8. педаль	
9. система живлення	
10. система запалення	
11. система охолодження	
12. система пуску	
13. складатися (з)	
14. шасі	
15. ходова частина	
16. система керування	

Exercise 9. Translate the following words into Ukrainian:

1. aerodynamic	
2. casting	
3. consume	

4. convert	
5. crank mechanism	
6. fuel tank	
7. gas-distributing mechanism	
8. running gear	
9. starting system	
10. steering system	
11. system of fuel supply	

Exercise 10. Complete the following sentences:

1. The engine is a machine designed to _____.
2. An important part of the brake system is _____.
3. Automobiles are comprised of _____.
4. Brakes are _____.
5. Chassis consists of transmission, running gear, and _____.
6. Chassis is designated to provide _____.
7. The body of the car is _____.
8. The engine consists of _____.
9. The fuel tank stores and supplies _____.
10. Wheels come _____.

Exercise 11. Decide whether the following sentences are true or false:

1. An engine is designed to convert energy into useful mechanical motion.
2. Automobiles are comprised of the following main components: the body, the transmission, the steering system, the engine and the electric equipment.
3. Automobiles are made up of several similar components.
4. Brakes are made of rubber, plastic or plasticine.
5. Chassis consists of transmission, running gear and steering system.
6. The body is a special place only for the driver.
7. The engine consists of crank mechanism, gas-distributing mechanism, system of fuel supply, lubrication system, cooling system, ignition system and starting system.
8. The fuel tank stores and supplies fuel to the engine.
9. The shape of the car body is aerodynamic to make the vehicle able to brake quickly.
10. Wheels come in the only design. It is stamped metal sheet.

Exercise 12. Compose a story on one of the topics (up to 100 words):

1. Automobile construction involves the integration of multiple systems working together.
2. Describe the anatomy of the car

Lesson 7

Мета заняття: вміти використовувати іноземну мову, включаючи усну та письмову форми в обсязі програмних вимог в продуктивних та рецептивних видах мовленнєвої діяльності. Здатність працювати з різними джерелами, розшукувати, обробляти, аналізувати й синтезувати отриману інформацію.

Read the text: **Car Body. Car Classification According to the Body Type**

The body of the car is a fundamental part fixing all units and mechanisms, interior and exterior equipment (safety belts, rear-view mirrors, windshield wiper, etc.). In general, all these parts of the car are located on the body. That's way the body is called integral. It provides the space for a driver, passengers and loads. The bodies of the modern cars are different and multifunctional.

The most popular type of the car body is sedan (hardtop). It is the four-door or two-door, B-pillar body. The boot is separated from the part where the driver and passengers sit.

Estate car (universal) is similar to sedan but the part where the driver and passengers sit is bigger and comprises the boot. The fifth vertical door is designated to open and close the boot.

Pickup is a small truck. Instead of the boot it has open truck body separated from the driver's space by stationary partition.

Hatchback is a motor vehicle with a sloping door at the back that opens upwards. Hatchback has features of sedan and estate car. It looks like sedan but the line of the back window and the boot are rectified.

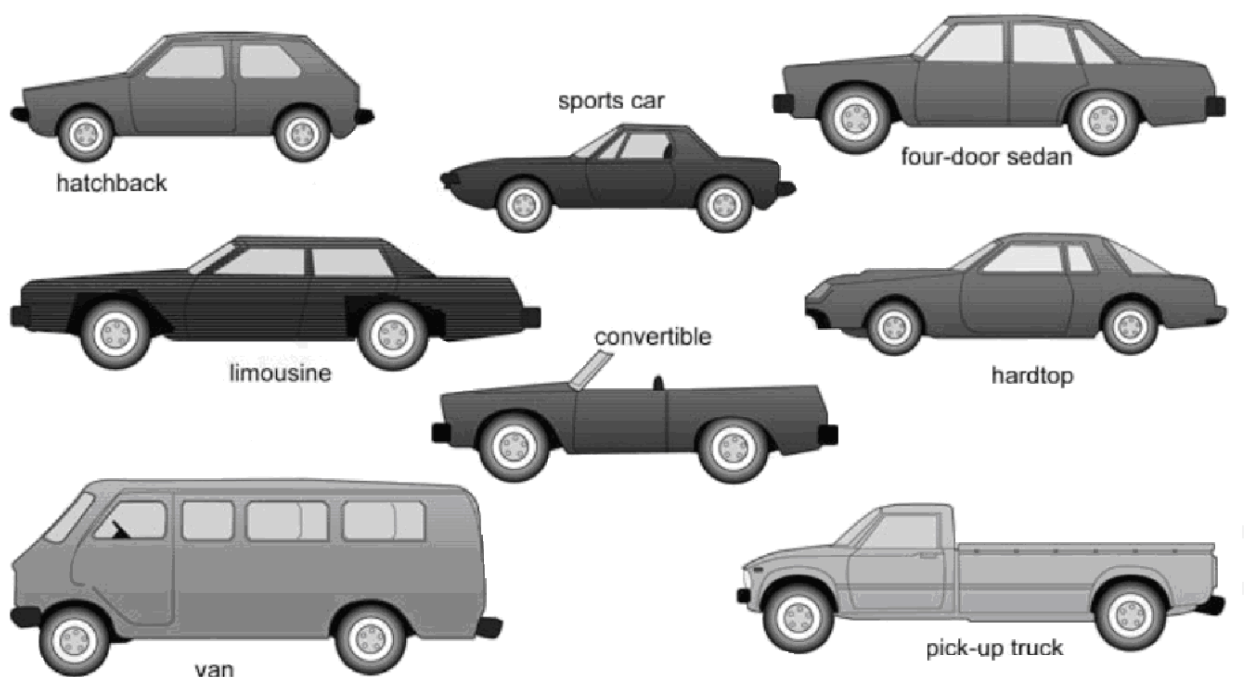
Coupe speculates to two-door body with one row of full-size seats. There is one more row of the seats in the back but they are smaller and designated to carry the children. Nowadays the back seats come into full-size as well. Coupe is widespread among different types of the car: high-speed sports cars, small family cars, etc.

Limousine is a hardtop car with enlarged passengers' space. It is separated from the part where a driver sits by glass partition. The passengers can accommodate opposite to each other. Usually limousine is considered to be executive and luxury car.

Cabriolet is a car with a roof that can be folded down or removed. Roadster is convertible sports car. The vehicle is stylish, dynamic but it is not designated for racing.

Spider means type of a convertible racing. The motor vehicle is remarkable for its simplicity and it is not loaded with different options.

Minivan is a large car, like a van, designed to carry up to eight people; and microvan is smaller than minivan.



Car Classification According to the Overall Dimensions

The motor vehicles are divided into 6 groups in accordance with their overall dimensions. They are indicated by Latin letters: A, B, C, D, E, F.

The group A includes small cars. Their length is not less than 3.6 meters, and the width is up to 1.6 meters (“Daewoo Matiz”, “Honda Jazz”, “Renault Twingo”).

Cars 3.6–3.9 meters long and 1.5–1.7 meters wide belong to the group B. Most of these cars have hatchback body (three-door or five-door body) and they are usually all-wheel drive vehicles (FIAT “Punto”, “Opel Corsa”).

The group C includes cars 3.9–4.4 meters long and 1.7–1.8 meters wide. This group is also called “golf-class” named after “Volkswagen Golf”. Other cars of the group C are the following: “Renault Megane”, “Opel Astra”, “Ford Focus”.

The group D unites cars 4.4–4.7 meters long and 1.7–1.8 meters wide. These cars are the following: “Audi A4”, “Opel Vectra”, “Volkswagen Passat”.

The group E includes motor vehicles with the length of more than 4.6 metres and width of more than 1.7 meters. “Opel Omega”, “Renault Safrane” belong to the group E.

The group F includes cars more than 4.6 metres long and 1.7 meters wide. These vehicles are considered to be luxury and executive cars: “Jaguar XJ8”, “Mercedes-Benz S500/ S600”, “Rolls-Royce”, “Audi A8”.

It is necessary to admit that there are some other types of automobiles with variations of car bodies: cabriolet, coupe, estate car, off-road car. They form separate groups of vehicles.

Exercise 1. Read and memorize using the dictionary:

be separated from

boot

B-pillar body

cabriolet – [kæbrɪə(u)'leɪ]

comprise

convertible

coupe – [ku:p]

enlarged

estate car (universal)

executive car

exterior

full-size

fundamental

hatchback

A **hatchback** is a car with an extra door at the back which opens upwards.

high-speed

integral

interior

limousine [lɪmə'zi:n]

A limousine is a large and very comfortable car.

Limousines are usually driven by a chauffeur and are used by very rich or important people.

loaded with options

luxury car

microvan

minivan

multifunctional

partition

pickup

rear-view mirror

rectified

remarkable

roadster

roof

safety belt

sedan (hardtop) [sɪ'dæn]

A sedan is a car with seats for four or more people, a fixed roof, and a boot that is separate from the part of the car that you sit in.

sloping

spider

stationary

truck

windshield wiper

Exercise 2. Answer the following questions:

1. What is the body of the car?
2. Where are all these parts of the car located in general?
3. The bodies of modern cars are different and multifunctional, aren't they?
4. What is the most popular type of the car body?
5. Is estate car (universal) similar to sedan? What can you say about the part where the driver and passengers sit?
6. What is the fifth vertical door designated?
7. Is pickup a small truck?
8. What does a pickup have instead of the boot?
9. What is a hatchback?
10. What does a coupe involve?
11. Where is a coupe widespread?
12. What is a limousine?
13. What is a cabriolet?
14. Is roadster a convertible sports car? Roadster is not designated for racing, is it?
15. What does spider mean?
16. What is a minivan? How many passengers can a minivan carry up? Is a microvan smaller or larger than a minivan?

Exercise 3. Decide whether the following sentences are true or false:

1. The motor vehicles are divided into 8 groups in accordance with their overall dimensions.
2. The group A includes small cars. Their length is not less than 3.6 meters, and the width is up to 1.6 meters
3. Cars 3.6–3.9 meters long and 1.5–1.7 meters wide belong to the group A.

4. The group B includes cars 3.9–4.4 meters long and 1.7–1.8 meters wide. This group is also called “golf-class” named after “Volkswagen Golf”.
5. The group D unites cars 4.4–4.7 meters long and 1.7–1.8 meters wide. These cars are the following: “Audi A4”, “Opel Vectra”, “Volkswagen Passat”.
6. The group E includes motor vehicles with the length of less than 4.6 meters and width of less than 1.7 meters. “Opel Omega”, “Renault Safrane” belong to the group E.
7. The group F includes cars more than 4.6 meters long and 1.7 meters wide. These vehicles are considered to be luxury and executive cars: “Jaguar XJ8”, “Mercedes-Benz S500/ S600”, “Rolls-Royce”, “Audi A8”.

Exercise 4. Match the words with their definitions:

1. A cabriolet	a) is defined as a closed roof, 2-door passenger car with a three-box body for the engine and the passenger compartment.
2. A coupe	b) a car with a door across the full width at the back end that opens upwards to provide easy access for loading.
3. An estate car	c) is a car with a roof that folds down.
4. A hatchback	d) is a type of vehicle designed to be used on rough or uneven surfaces, like dirt trails or rocky terrain, rather than on smooth roads. off-road vehicle
5. A limousine (or limo)	e) is a big car with a large space for bags behind the back seat.
6. A minivan	f) is a low-built car designed for performance at high speeds, often having a roof that can be folded back.
7. An off-road car (or Off-Road Vehicle, ORV) внедорожник, вездеход"	g) is a large, chauffeur-driven luxury vehicle with a partition between the driver compartment and the passenger compartment which can be operated mechanically by hand or by a button electronically.
8. A pickup	h) is a large, family car whose seats can be moved or removed, for example, so that it can carry large loads.
9. A roadster	i) is an open two-seat car with emphasis on sporting appearance or character.
10. A sedan	j) is a medium-sized motor vehicle, typically without side windows in the rear part, for transporting goods.
11. A spider	k) is an open-top car with two seats.
12. A sports car	l) is a large, heavy road vehicle used for carrying goods, materials, or troops; a lorry.

13.A truck	m)is a 4-door passenger car with a trunk that is separate from the passengers with a three-box body: the engine, the area for passengers, and the trunk.
14. A van	n) a small truck that has an open back with low sides

Exercise 5. Fill in the gaps in the sentences with the words from the box:

**equipment, provides, partition, sloping, high-speed,
enlarged, executive, roof, convertible, designed**

1. Cabriolet is a car with a ___1___ that can be folded down or removed.
2. Coupe is widespread among different types of the car: ___2___ sports cars, small family cars, etc.
3. Hatchback is a motor vehicle with a ___3___ door at the back that opens upwards.
4. Limousine belongs the group F of ___4___ and luxury cars.
5. Limousine is a hardtop car with ___5___ passengers' space.
6. Minivan is a large car ___6___ to carry up to eight people.
7. Pickup has open truck body separated from the driver's space by stationary ___7___.
8. Roadster is a stylish and dynamic ___8___ car.
9. The body of the car is a fundamental part fixing all units and mechanisms, interior and exterior ___9___.
10. The car body ___10___ the space for a driver, passengers and loads.

Exercise 6. Put the following active sentences into passive:

1. Gas tank stores extra gas.
2. He uses rearview mirror to look backward.
3. Instrument panel gives information on the state of a vehicle.
4. Power steering amplifies the movements of the steering wheel.
5. Radiator cools the motor.
6. Shock absorber reduces shocks.
7. The control panel shows the work of a car.
8. This button controls the radio.
9. Transmission carries engine power to axles.
10. Turn signal level operates the turn signals.

Exercise 7. Translate the following sentences into English:

1. Сумки ставлять у багажник.
2. Зламаний автомобіль буксирується в майстерню.
3. Потужність двигуна вимірюється кінськими силами.
4. До даху автомобіля прикріплений багажник.
5. Бензин виробляється з нафти.
6. Великі вантажі перевозяться автопоїздами.
7. Позашляховик – це автомобіль, що призначений для пересування по бездоріжжю.
8. Багажник відділений від салону.
9. У кабріолеті дах опускається.

10. Пасажири розташовуються на задньому сидінні.

Exercise 8. Match the following words to make proper combinations.

1. convertible	a) vehicles
2. motor	b) options
3. different	c) truck body
4. to carry up to	d) window
5. open	e) racing
6. sloping	f) seats
7. estate	g) car
8. the back	h) sports cars
9. full-size	i) eight people
10. high-speed	j) space
11. enlarged passengers' space	k) partition
12. glass partition	l) door

Exercise 9. Compose a story on one of the topics (up to 100 words):

1. Car Body
2. Car Classification According to the Body Type
3. Car Classification According to the Overall Dimensions

Lesson 8

Мета заняття: вміти використовувати іноземну мову, включаючи усну та письмову форми в обсязі програмних вимог в продуктивних та рецептивних видах мовленнєвої діяльності. здатність працювати з різними джерелами, розшукувати, обробляти, аналізувати і синтезувати отриману інформацію.

Read the text: **Internal Combustion Engines**

Engines. The most common types of engine for land vehicles are the petrol engine and the diesel engine.

Petrol engines are usually lighter and smaller than diesel engines. This makes them cheaper and this is why most cars and motorbikes use petrol engines. Petrol engines are also less noisy than diesel engines. They usually go faster. On the other hand, diesel engines use less fuel and last longer than petrol engines and this is why larger vehicles such as trucks and trains use them. They are also safer than petrol engines because there is less danger of fire.

There are two main types of petrol engine – 4-stroke and 2-stroke. All cars and larger motor-cycles use 4-stroke engines. But most smaller motorbikes use 2-stroke engines. These are lighter and smaller than 4-stroke engines and are therefore cheaper.

The internal combustion engine is an engine in which the combustion of a fuel occurs with an oxidizer (usually air) in a combustion chamber. In an internal combustion engine, the expansion of the high temperature and pressure gases, which are produced by the combustion,

directly applies force to component of the engine, such as the pistons, and by moving it over a distance, generates useful mechanical energy.

A large number of different designs for internal combustion engines have been developed and built, with a variety of different strengths and weaknesses. Powered by an energy-dense fuel (which is very frequently petrol) the internal combustion engine delivers an excellent power-to-weight ratio with few disadvantages. The real strength of internal combustion engines is in mobile application and they dominate as a power supply for cars, aircraft, and boats, from the smallest to the largest. Where very high power-to-weight ratios are required, internal combustion engines appear in the form of gas turbine. These applications include jet aircraft, helicopters, large ships and electric generators.

All internal combustion engines depend on the exothermic chemical process of combustion: the reaction of a fuel, typically with oxygen from the air. The combustion process typically results in the production of a great quantity of heat. Internal combustion engines require ignition of the mixture, either by spark ignition or compression ignition.

Petrol engine ignition systems generally rely on a combination of a lead-acid battery and an induction coil to provide a high-voltage electrical spark to ignite the air-fuel mix in the engine's cylinders. This battery is recharged during operation using an electricity-generating device such as an alternator or generator driven by the engine. Petrol engines take in a mixture of air and petrol and compress it, then use a spark plug to ignite the mixture when it is compressed by the piston head in each cylinder.

Automobile engine is a set of mechanisms and systems. Principal mechanisms are the following: crank mechanism and gas-distributing mechanism. Principal systems of the automobile are system of fuel supply, lubrication system, cooling system, ignition system, starting system.

The most spread types of internal combustion engines are two-stroke engine and four-stroke engine. Two-stroke engines are widely used in snowmobiles, mopeds, and many motorcycles. Two-stroke engines have the advantage of an increased specific power ratio, typically around 1.5 times that of a typical four-stroke engine. The largest internal combustion engines in the world are two-stroke diesels, used in some locomotives and large ships. Two-stroke system manages to pack one power stroke into every two strokes of the piston (up-down). This is achieved by exhausting and re-charging the cylinder simultaneously. The steps involved here are:

1. Intake and exhaust occur at bottom dead center. Some form of pressure is needed.
2. Compression stroke: Fuel-air mix compressed and ignited.
3. Power stroke: piston is pushed downwards by the hot exhaust gases.

Engines based on the four-stroke have one power stroke for every four strokes (up-down-up-down) and employ spark plug ignition. Combustion occurs rapidly, and during combustion the volume varies little. They are used in cars, larger boats, some motorcycles, and many light aircraft. They are generally quieter, more efficient, and larger than their two-stroke counterparts.

The steps of the system involved here are:

1. Intake stroke: air and vaporized fuel are drawn in.
2. Compression stroke: fuel vapor and air are compressed and ignited.
3. Combustion stroke: fuel combusts and piston is pushed downwards.
4. Exhaust stroke: exhaust is driven out. During the 1st, 2nd, and 4th stroke the piston is relying on power and the momentum generated by the other pistons. In that case, a four-cylinder engine would be less powerful than a six or eight-cylinder engine.

Exercise 1. Study the following words and word combinations:

apply
 charge
 combustion
 combustion chamber
 compression ignition
 cooling system
 crank mechanism
 device
 energy-dense fuel
 engine
 exhaust
 exothermic chemical process
 expansion
 four-stroke engine
 fuel
 gas-distributing mechanism
 generate
 high-voltage electrical spark
 ignite
 ignition system
 induction coil
 intake
 internal combustion engine
 lead-acid battery
 lubrication system
 oxidizer
 petrol
 piston
 ratio
 spark ignition
 spark plug
 starting system
 stroke
 system of fuel supply
 two-stroke engine
 vaporize

Exercise 2. Translate the following words into English:

1. аккумулятор	
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2. газорозподільний механізм	
3. двигун внутрішнього згорання	
4. іскрове запалювання	
5. котушка запалювання	
6. кривошипно-шатунний механізм	
7. система змащення	
8. пальне	
9. поршень	
10. свічка запалювання	
11. система живлення	
12. система запалювання	
13. система охолодження	
14. система пуску	
15. чотиритактний двигун	

Exercise 3. Translate the following words into Ukrainian:

Charge, combustion, device, dense, exhaust, generate, ignite, induction, coil, intake, petrol, piston, ratio, plug, stroke, fuel supply

Exercise 4. Answer the following questions:

1. What are the most common types of engine for land vehicles?
2. Petrol engines are usually lighter and smaller than diesel engines, aren't they?
3. Why do most cars and motorbikes use petrol engines?
4. Petrol engines are also less noisy than diesel engines, aren't they? Do they usually go faster?
5. Why do larger vehicles such as trucks and trains use diesel engines?
6. Why are diesel engines safer than petrol engines?
7. How many types of petrol engine are there?
8. All cars and larger motor-cycles use 4-stroke engine, don't they?
9. Why do most smaller motorbikes use 2-stroke engines?
10. What is the internal combustion engine?
11. How many different designs for internal combustion engines have been developed and built?
12. What is the real strength of internal combustion engines?
13. What do all internal combustion engines depend on?

Exercise 5. Decide whether the following sentences are true or false:

1. The combustion process typically results in the production of a great quantity of cold.
2. Internal combustion engines require ignition of the mixture, either by spark ignition or compression ignition.

3. Petrol engine ignition systems generally rely on a combination of a lead-acid battery and an induction coil to provide a low-voltage electrical spark to ignite the air-fuel mix in the engine's cylinders.
4. Petrol engines take in a mixture of air and petrol and compress it, then use a spark plug to ignite the mixture when it is compressed by the piston head in each cylinder.
5. Automobile engine is a set of mechanisms and systems.
6. Principal mechanisms are the following: crank mechanism and gas-distributing mechanism.
7. The most spread types of internal combustion engines are four-stroke engines.
8. Two-stroke engines are widely used in locomotives and large ships.
9. All cars and larger motor-cycles use 2-stroke engines.
10. But most smaller motorbikes use 4-stroke engines. These are heavier and larger than 2-stroke engines and are therefore more expensive.

Exercise 6. Complete the sentences below with the suggested words: chemical process, mechanical energy, spark ignition, induction coil, combustion chamber, internal combustion, mobile application.

1. All internal combustion engines depend on the exothermic ___1___ of combustion.
2. In an internal combustion engine the expansion of the high temperature and pressure gases generates useful ___2___.
3. Internal combustion engines require ignition of the mixture, either by ___3___ or compression ignition.
4. Petrol engine ignition systems generally rely on a combination of a lead-acid battery and an ___4___.
5. The combustion of fuel occurs with air in a ___5___.
6. The most spread types of ___6___ engines are two-stroke engine and four-stroke engine.
7. The real strength of internal combustion engines is in ___7___.

Exercise 7. Match the words with their definitions:

1. battery	a) is a physical property of matter that causes it to experience a force when placed in an electromagnetic field.
2. electric charge (symbol q, sometimes Q)	b) is a device that is placed inside a car engine, clock, radio, etc. and that produces the electricity that makes it work
3. combustion engines	c) is a material such as coal, gas, or oil that is burned to produce heat or power.
4. crankshaft	d) are defined as engines that convert fuel into mechanical energy through the process of combustion, where a fuel-air mixture ignites and burns, resulting in the production of combustion products and the generation of power during the expansion stroke.
5. cylinder	e) are defined as the gaseous emissions released from a vehicle's engine.

6. exhaust gases	f) is a vital part of the engine. It's a chamber where fuel is combusted and power is generated.
7. fuel	g) is a machine that converts one form of energy into another, especially mechanical energy into electrical energy, as a dynamo, or electrical energy into sound, as an acoustic generator. a person or thing that generates.
8. generator	h) is the amount of energy transferred or converted per unit time. In the International System of Units, the unit of power is the watt, equal to one joule.
9. ignition systems	i) is a mechanical component used in a piston engine to convert the reciprocating motion into rotational motion.
10. piston	j) a device in an engine that produces an electrical spark that lights the fuel and makes the engine start
11. power	k) is a part of an engine that moves up and down inside a cylinder.
12. spark plug	l) are used by heat engines to initiate combustion by igniting the fuel-air mixture.

Exercise 8. Ask questions to the given answers:

1. Question: _____?

Answer: All internal combustion engines depend on the exothermic chemical process of combustion: the reaction of a fuel, typically with oxygen from the air.

2. Question: _____?

Answer: This battery is recharged during operation using an electricity-generating device such as an alternator or generator driven by the engine.

3. Question: _____?

Answer: Two-stroke engines are widely used in snowmobiles, mopeds, and many motorcycles.

4. Question: _____?

Answer: The largest internal combustion engines in the world are two-stroke diesels, used in some locomotives and large ships.

Exercise 9. Find synonyms to the following words.

internal, directly, different, frequently, deliver, appear, quantity, generally, principal, widely amount, commonly, main, extensively, inner, immediately, various, often, provide, emerge.

Exercise 10. Compose a story on one of the topics (up to 100 words):

1. Automobile engine
2. The internal combustion engine

3. The most spread types of internal combustion engines.

Lesson 9

Мета заняття: вміти використовувати іноземну мову, включаючи усну та письмову форми в обсязі програмних вимог в продуктивних та рецептивних видах мовленнєвої діяльності. здатність працювати з різними джерелами, розшукувати, обробляти, аналізувати і синтезувати отриману інформацію.

Read the text: **Transmission**

The transmission provides speed and torque conversions from a rotating power source to another device using gear ratios. The term transmission refers to the whole drive train, including gearbox, clutch, prop shaft (for rear-wheel drive), differential and final drive shafts. The most common use is in motor vehicles, where the transmission adapts the output of the internal combustion engines to the drive wheels. The transmission reduces the higher engine speed to the slower wheel speed, increasing torque in the process. Transmissions are also used on pedal bicycles, fixed machines, and anywhere else rotational speed and torque needs to be adapted.

Often, a transmission will have multiple gear ratios, with the ability to switch between them as speed varies. This switching may be done manually (by the operator), or automatically. Directional (forward and reverse) control may also be provided. Single-ratio transmissions also exist, which simply change the speed and torque (and sometimes direction) of motor output.

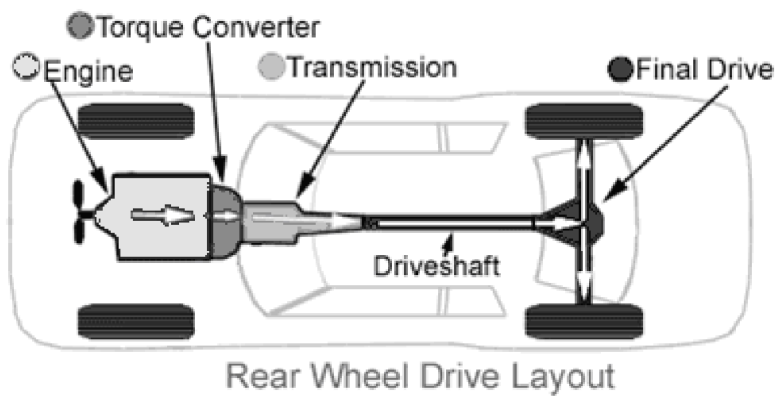
In motor vehicle applications, the transmission will generally be connected to the crankshaft of the engine. The output of the transmission is transmitted via driveshaft to one or more differentials, which in turn drive the wheels. While a differential may also provide gear reduction, its primary purpose is to change the direction of rotation.

The need for a transmission in an automobile is a consequence of the characteristics of the internal combustion engine. Engines typically operate over a range of 600 to about 7,000 revolutions (though this varies, and is typically less for diesel engines), while the car's wheels rotate between 0 rpm and around 1,800 rpm. Furthermore, the engine provides its highest torque outputs approximately in the middle of its range, while often the greatest torque is required when the vehicle is moving from rest or traveling slowly. Therefore, a system that transforms the engine's output so that it can supply high torque at low speeds, but also operate at highway speeds with the motor still operating within its limits, is required. Transmissions perform this transformation.

Many transmissions and gears used in automotive and truck applications are contained in a cast iron case, though more frequently aluminium is used for lower weight especially in cars. There are usually three shafts: a main shaft, a countershaft, and an idler shaft.

The main shaft extends outside the case in both directions: the input shaft towards the engine, and the output shaft towards the rear axle (on rear wheel drive cars- front wheel drives generally have the engine and transmission mounted transversely, the differential being a part of the transmission assembly.) The shaft is suspended by the main bearings, and is split towards the input end. At the point of the split, a pilot bearing holds the shafts together. The gears and clutches ride on the main shaft, the gears being free to turn relative to the main shaft except when engaged by the clutches.

Types of automobile transmissions include manual, automatic or semi-automatic transmission.



Exercise1. Study the following words and word combinations:

aluminium
approximately
assembly
axle
bearing
case
cast iron
clutch
countershaft
crankshaft
differential
drive train
driveshaft
final drive shaft
forward
front-wheel drive
gear
gear ratio
gearbox
idler shaft
main shaft
manual
mount
operate
prop shaft
rear
rear-wheel drive
reverse
revolution
rotate
shaft
single-ratio
supply
suspend
switch

torque
transmission
transmit

Exercise 2. Answer the questions.

1. What does the transmission provide?
2. What does the term transmission refer to?
3. What does the transmission reduce?
4. Where are transmissions also used?
5. Where will the transmission generally be connected to the crankshaft of the engine?
6. How do engines typically operate? How do the car's wheels rotate?
7. The shaft is suspended by the main bearings, and is split towards the input end, isn't it?
8. What types of automobile transmissions do you know?
9. What does the term "transmission" mean?

Exercise 3. Translate the following words into English:

1. диференціал	
2. діяти	
3. задньопривідний	
4. коробка передач	
5. оберт (обертання)	
6. передавати	
7. передньопривідний	
8. перемикачі	
9. підшипник	
10. пристрій	
11. ручний	
12. трансмісія	
13. установлювати	
14. зчеплення	

Exercise 4. Translate the following words into Ukrainian:

1. countershaft	
2. crankshaft	
3. drive train	
4. driveshaft	
5. final drive shaft	
6. forward	
7. gear ratio	
8. idler shaft	
9. main shaft	
10. prop shaft	

11. rotate	
12. single-ratio	
13. suspend	
14. torque	

Exercise 5. Open brackets choosing the right words: output, speeds, perform, transmission, operate, wheels, torque, rest.

The need for a _____ 1 _____ in an automobile is a consequence of the characteristics of the internal combustion engine. Engines typically _____ 2 _____ over a range of 600 to about 7,000 revolutions (though this varies, and is typically less for diesel engines), while the car's _____ 3 _____ rotate between 0 rpm and around 1,800 rpm. Furthermore, the engine provides its highest _____ 4 _____ outputs approximately in the middle of its range, while often the greatest torque is required when the vehicle is moving from _____ 5 _____ or traveling slowly. Therefore, a system that transforms the engine's _____ 6 _____ so that it can supply high torque at low speeds, but also operate at highway _____ 7 _____ with the motor still operating within its limits, is required. Transmissions _____ 8 _____ this transformation.

Exercise 6. Decide whether the following sentences are true or false:

1. The transmission provides speed and torque conversions from a rotating power source to another device using differential.
2. The term transmission refers to the whole drive train, including gearbox, clutch, prop shaft (for rear-wheel drive), differential and final drive shafts.
3. The transmission increases the lower engine speed to the higher wheel speed, increasing torque in the process.
4. Often, a transmission will have multiple gear ratios, with the ability to switch between them as speed varies.
5. Directional (forward and reverse) control may also be provided.
6. Engines typically operate over a range of 500 to about 6,000 revolutions (though this varies, and is typically less for diesel engines), while the car's wheels rotate between 0 rpm and around 18,000 rpm.
7. Many transmissions and gears used in automotive and truck applications are contained in a cast iron case, though more frequently aluminium is used for lower weight especially in cars.
8. There are usually four shafts:
9. Types of automobile transmissions include manual and automatic.
10. Many transmissions and gears used in automotive and truck applications are contained in a gold case.

Exercise 7. Ask questions to the given answers:

1) Question: _____?

Answer: The gears and clutches ride on the main shaft, the gears being free to turn relative to the main shaft except when engaged by the clutches.

2) Question: _____?

Answer: Transmissions are also used on pedal bicycles, fixed machines, and anywhere else rotational speed and torque needs to be adapted.

3) Question: _____?

Answer: A differential may also provide gear reduction; its primary purpose is to change the direction of rotation.

Exercise 8. Match the words with their definitions:

1. countershaft	a) is a system that allows the drive wheels to turn at different speeds.
2. differential	b) is a mechanism used to transmit motion and power from a main driving shaft to an individual machine,
3. drive line	c) is the system of components in a vehicle that transfers power from the engine to the wheels, making the vehicle move.
4. drive train	d) the components of the power train of an automotive vehicle that are between the transmission and the differential,
5. driveshaft	e) is a system distributing power equally to all four wheels, and is most appropriate for off-road conditions.
6. clutch	f) a mechanism for connecting and disconnecting an engine and the transmission system in a vehicle, or the working parts of any machine.
7. four-wheel drive (4WD or 4x4)	g) equipment in a vehicle that changes the relation between engine speed (or pedal speed on a bicycle) and the speed of the wheels moving forwards or backwards
8. gear	h) a component for transmitting mechanical power, torque, and rotation, usually used to connect other components of a drivetrain that cannot be connected directly.
9. main shaft	i) is a system that applies engine power to the front wheels of a vehicle.
10. rear-wheel drive (RWD)	j) is a mechanical component used in a piston engine to convert the reciprocating motion into rotational motion.
11. front-wheel drive	k) is a force that causes something to rotate.
12. crankshaft	l) helps deliver the power from an engine to the wheels.
13. revolution	m) a set of parts in a motor vehicle or bicycle that control how fast the wheels turn.

14. torque	n) is one complete circular turn of the engine's internal components, specifically the crankshaft. The engine's speed is measured in Revolutions Per Minute (RPM).
15. A car's transmission	o) is a shaft that transmits motion to other parts without altering speed or torque
16. idler shaft	p) is a form of engine and transmission layout used in motor vehicles, in which the engine drives the rear wheels only.

Exercise 9. Render the following sentences into Ukrainian.

1. Manual transmissions cost less than automatics to begin with. When you go to a car dealer you will notice that the manual version of the same model is about a thousand dollars cheaper. In the long run, manuals require less service, thus making maintenance cheaper too.
2. Any mechanic can tell you that working on a manual transmission is much easier than working with automatic gearboxes. So the repair costs for automatics are significantly higher.
3. Manuals – if properly operated – will go hundreds of thousands of kilometers without problems. The lubricant needs to be replaced periodically but not as frequently as in automatics.
4. With automatic transmissions, at stop lights you have to keep your foot on the brake pedal otherwise the start keeps rolling forward. The main difference in operating a car with a manual vs one with automatic transmission is that you need to shift gears based on the vehicle's speed and this requires the use of the clutch pedal and the gear shift.
5. Automatics also have a clutch except instead of a clutch pedal, a torque converter is used to separate the engine from the transmission – and it all happens automatically without the need of driver input. Speaking of driver input: manual enthusiasts need all their pride and discipline in traffic jams when they need to shift gears every minute for hours.

Exercise 10. Compose a story on one of the topics (up to 100 words):

1. Manual and Automatic Transmission.
2. The term transmission refers to the whole drive train.

Lesson 10.

Мета заняття: вміти використовувати іноземну мову, включаючи усну та письмову форми в обсязі програмних вимог в продуктивних та рецептивних видах мовленнєвої діяльності. Здатність працювати з різними джерелами, розшукувати, обробляти, аналізувати й синтезувати отриману інформацію.

Read the text: Steering System

Steering is the term applied to the collection of components, linkages, etc. which will allow a vehicle to follow the desired course. The most conventional steering arrangement is to turn the front wheels using a hand-operated steering wheel which is positioned in front of the driver, via the steering column, which may contain universal joints, to allow it to deviate somewhat from a straight line.

Many modern cars use rack and pinion steering mechanisms, where the steering wheel turns the pinion gear; the pinion moves the rack, which is a linear gear that meshes with the pinion, converting circular motion into linear motion along the transverse axis of the car. This motion applies steering torque to the swivel pin ball joints that replaced previously used kingpins of the stub axle of the steered wheels via tie rods and a short lever arm called the steering arm. The rack and pinion design has the advantages of a large degree of feedback and direct steering “feel”. A disadvantage is that it is not adjustable, so that when it does wear and develop lash, the only cure is replacement.

Older designs often use the recirculating ball mechanism, which is still found on trucks. The steering column turns a large screw (the “worm gear”) which meshes with a sector of a gear, causing it to rotate about its axis as the worm gear is turned; an arm attached to the axis of the sector moves the pitman arm, which is connected to the steering linkage and thus steers the wheels. The recirculating ball mechanism reduces the considerable friction by placing large ball bearings between the teeth of the worm and those of the screw; at either end of the apparatus the balls exit from between the two pieces into a channel internal to the box which connects them with the other end of the apparatus, thus they are “recirculated”. The recirculating ball mechanism has a great mechanical advantage, so that it was found on larger, heavier vehicles while the rack and pinion was originally limited to smaller and lighter ones.

Power steering assists the driver of an automobile in steering by directing a portion of the vehicle’s power to traverse the axis of one or more of the road wheels. As vehicles have become heavier and switched to front wheel drive, along with increases in tire width and diameter, the effort needed to turn the steering wheel manually has increased. Thus, auto makers have developed power steering systems. There are two types of power steering systems – hydraulic and electric. A hydraulic-electric hybrid system is also possible.

A hydraulic power steering uses hydraulic pressure supplied by an engine-driven pump to assist the motion of turning the steering wheel. Electric power steering is more efficient than the hydraulic power steering, since the electric power steering motor only needs to provide assistance when the steering wheel is turned, whereas the hydraulic pump must run constantly. In electric power steering, the assist level is easily tunable to the vehicle type, road speed, and even driver preference. An added benefit is the elimination of environmental hazard posed by leakage and disposal of hydraulic power steering fluid. Also in the event of the engine cutting out, assist will not be lost – whereas hydraulic will stop working, as well as making the steering doubly heavy as the driver has to turn the power-assist mechanism on top of the steering system itself.

Exercise1. Study the following words and word combinations

adjustable

advantage

apply

attach

ball bearing

conventional

convert

desired course

deviate

electric power steering

elimination

engine-driven pump
feedback
friction
hydraulic power steering
joint
kingpin
lash
linear gear
linkage
mesh
pinion
pinion gear
pitman arm
power steering
rack
rack and pinion steering mechanism
recirculating ball mechanism
reduce
replace
screw
lever arm
steering
steering arm
steering torque
steering wheel
stub axle
swivel pin
tie rod
transverse axis
worm gear

Exercise 2. Answer the following questions:

1. What is the term steering applied for?
2. What do many modern cars use?
3. What the advantages does the rack and pinion design have?
4. What is often used in old structures?
5. What does the recirculating ball mechanism reduce?
6. Why does the recirculating ball mechanism have a great mechanical advantage?
7. What does power steering assist the driver of an automobile in steering?
8. What have auto makers developed?
9. What does a hydraulic power steering use?
10. Why is the electric power steering more efficient than the hydraulic power steering?

Exercise 3. Decide whether the following sentences are true or false:

1. Modern cars use rack and pinion steering mechanisms.

2. The rack and pinion design has the disadvantages of a large degree of feedback and direct steering “feel”.
3. Older designs often use the recirculating ball mechanism, which is still found on trucks.
4. The steering column turns a small screw (the “worm gear”).
5. The recirculating ball mechanism increases the considerable friction by placing large ball bearings between the teeth of the worm and those of the screw;
6. There are two types of power steering systems – hydraulic and electric.
7. A hydraulic-electric hybrid system is impossible.
8. Electric power steering is less efficient than the hydraulic power steering.

Exercise 4. Complete the sentences below with the suggested words and word-combinations: a great mechanical advantage, power steering systems, the electric power steering, hydraulic pressure, linkages, the front wheels, rack and pinion steering mechanisms, advantages, adjustable, recirculating ball mechanism.

1. A hydraulic power steering uses _____ 1 _____ supplied by an engine-driven pump to assist the motion of turning the steering wheel.
2. Steering is the term applied to the collection of components _____ 2 _____, etc. which will allow a vehicle to follow the desired course.
3. The most conventional steering arrangement is to turn _____ 3 _____ using a hand-operated steering wheel which is positioned in front of the driver.
4. Many modern cars use _____ 4 _____, where the steering wheel turns the pinion gear.
5. The rack and pinion design has the _____ 5 _____ of a large degree of feedback and direct steering “feel”.
6. A disadvantage is that it is not _____ 6 _____, so that when it does wear and develop lash, the only cure is replacement.
7. Older designs often use the _____ 7 _____, which is still found on trucks.
8. The recirculating ball mechanism has _____ 8 _____, so that it was found on larger, heavier vehicles while the rack and pinion was originally limited to smaller and lighter ones.
9. Thus, auto makers have developed _____ 9 _____.
10. _____ 10 _____ is more efficient than the hydraulic power steering.

Exercise 5. Match the words with their definitions:

1. A steering	a) is a vehicle system that uses pressurized hydraulic fluid, pumped by an engine-driven
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	pump, to multiply the force the driver applies to the steering wheel,
2. Power steering systems	b) is the action of steering a vehicle, vessel, or aircraft.
3. A hydraulic power steering (HPS)	c) combines hydraulic power for energy storage and propulsion with electric power, often using an internal combustion engine to drive either a generator or a hydraulic pump.
4. An electric power steering (EPS)	d) is a thin, pointed piece of metal with a raised edge twisting round along its length and a flat top with a cut in it, used to join things together.
5. A hydraulic-electric hybrid system	e) use hydraulic or electric assistance to reduce driver effort when turning a vehicle,
6. A steering wheel	f) (EPS) uses an electric motor, controlled by an Electronic Control Unit (ECU), to assist the driver in turning the steering wheel,
7. A rack and pinion	g) is a force that resists the relative motion between two surfaces, fluids, or materials sliding against each other, always acting opposite to the direction of motion
8. the recirculating ball mechanism	h) is a bearing in which the parts are separated by a ring of small freely rotating metal balls which reduce friction.
9. A screw	i) is a wheel that a driver rotates in order to steer a vehicle.
10. a gear	j) is a simple mechanical system designed to convert rotational motion into linear motion (or vice versa). It consists of two main components: a circular gear called the pinion and a flat, straight bar with teeth called the rack.
11. friction	k) is a toothed component within the transmission that meshes with other gears to change the engine's rotational speed and torque.
12. A ball bearing	l) is a type of gearing system that uses a continuous stream of ball bearings to reduce friction between a threaded rod (worm gear) and a metal block (ball nut).

Exercise 6. Ask questions to the given answers:

1) Question: _____?

Answer: Many modern cars use rack and pinion steering mechanisms, where the steering wheel turns the pinion gear; the

2) Question: _____?

Answer: Older designs often use the recirculating ball mechanism, which is still found on trucks.

3) Question: _____?

Answer: There are two types of power steering systems – hydraulic and electric.

4) Question: _____?

Answer: A hydraulic power steering uses hydraulic pressure supplied by an engine-driven pump to assist the motion of turning the steering wheel.

Exercise 7. Translate the following words into English:

1. відхилятися від потрібного напрямку	
2. гідравлічне рульове керування	
3. електричне рульове керування	
4. замінити, замінити	
5. звичайний, стандартний	
6. зменшувати, обмежувати	
7. лінійна (ступенева) передача	
8. використовувати	
9. напрямок руху	
10. перевага	
11. перетворювати	
12. рульове керування	
13. руль, рульове колесо	
14. черв'ячна передача	

Exercise 8. Translate the following words into Ukrainian:

1. electric power steering	
2. hydraulic power steering	
3. linear gear	
4. pinion gear	
5. recirculating ball mechanism	
6. rack and pinion steering mechanism	
7. pitman arm	
8. steering arm	
9. steering torque	
10. steering wheel	
11. transverse axis	
12. worm gear	

Exercise 9. Find synonyms to the following words.

Linkage, adjustable, advantage, apply, attach, conventional, convert, deviate, joint, reduce standard, transform, turn aside, combined, decrease, connection, adaptable, benefit, utilize, join.

Exercise 10. Compose a story on one of the topics (up to 100 words):

1. Steering System.
2. Describe the difference in the design of modern cars and older ones.

Lesson 11.

Мета заняття: вміти використовувати іноземну мову, включаючи усну та письмову форми в обсязі програмних вимог в продуктивних та рецептивних видах мовленнєвої діяльності. здатність працювати з різними джерелами, розшукувати, обробляти, аналізувати і синтезувати отриману інформацію.

Read the text: Four-Wheel Steering

Four-wheel steering (or all-wheel steering) is a system employed by some vehicles to improve steering response, increase vehicle stability while maneuvering at high speed, or to decrease turning radius at low speed.

In most active four-wheel steering systems, the rear wheels are steered by a computer and actuators. The rear wheels generally cannot turn as far as the front wheels. Some systems allow the rear wheels to be steered in the opposite direction as the front wheels during low speeds. This allows the vehicle to turn in a significantly smaller radius – sometimes critical for large trucks or tractors and vehicles with trailers.

Many modern vehicles offer a form of passive rear steering to counteract normal vehicle tendencies. On many vehicles, when cornering, the rear wheels tend to steer slightly to the outside of a turn, which can reduce stability. The passive steering system uses the lateral forces generated in a turn and the bushings to correct this tendency and steer the wheels slightly to the inside of the corner. This improves the stability of the car, through the turn. This effect is called compliance understeer and it, or its opposite, is present on all suspensions.

In an active four-wheel steering system, all four wheels turn at the same time when the driver steers. There can be controls to switch off the rear steer and options to steer only the rear wheel independent of the front wheels. At slow speeds the rear wheels turn opposite of the front wheels, reducing the turning radius by up to twenty-five percent, while at higher speeds both front and rear wheels turn alike (electronically controlled), so that the vehicle may change position with less yaw, enhancing straight-line stability. The “snaking effect” experienced during motorway drives while towing a travel trailer is thus largely nullified. Four-wheel steering found its most widespread use in monster trucks, where maneuverability in small arenas is critical, and it is also popular in large farm vehicles and trucks. Some of modern European Intercity buses also utilize four-wheel steering to assist maneuverability in bus terminals, and also to improve road stability.

Articulated steering is a system by which a four-wheel drive vehicle is split into front and rear halves which are connected by a vertical hinge. The front and rear halves are connected with

one or more hydraulic cylinders that change the angle between the halves, including the front and rear axles and wheels, thus steering the vehicle. This system does not use steering arms, king pins, tie rods, etc. as does four-wheel steering. If the vertical hinge is placed equidistant between the two axles, it also eliminates the need for a central differential, as both front and rear axles will follow the same path, and thus rotate at the same speed.

Exercise 1. Look up new words given below in your dictionary and memorize them.

Four-wheel steering (or all-wheel steering)

steering response

maneuver

turning radius

the rear wheels

actuators

the front wheels

vehicles with trailers

passive rear steering

counteract

when cornering

the lateral forces

bushings

compliance understeer

on all suspensions

with less yaw

nullified

monster trucks

a vertical hinge

steering arms

king pins

tie rods

equidistant

mesh

pinion

pinion gear

pitman arm

power steering

rack

rack and pinion steering mechanism

recirculating ball mechanism

reduce

replace

screw

lever arm

steering

steering arm

steering torque

steering wheel

tie rod –

transverse axis

worm gear

articulated steering

Exercise 2. Answer the questions:

1. What is a four-wheel steering (or all-wheel steering)?
2. How are the rear wheels steered in most active four-wheel steering systems?
3. What do many modern vehicles offer?
4. What does the passive steering system use?
5. When do all four wheels turn at the same time in an active four-wheel steering system?
6. What do some of modern European Intercity buses utilize four-wheel steering for?
7. What is an articulated steering?
8. Why are the front and rear halves connected with one or more hydraulic cylinders?

Exercise 3. Look through the text again and complete the following sentences:

1. Four-wheel steering (or all-wheel steering) is a system
2. In most active four-wheel steering systems, the rear wheels are.....
3. Many modern vehicles offer a form
4. In an active four-wheel steering system, all four wheels
5. Some of modern European Intercity buses also utilize.....
6. Articulated steering is a system by which a four-wheel drive vehicle

Exercise 4. Open brackets choosing the right words:

Four-wheel steering (or all-wheel steering) is a system (**employed**| **utilized**) by some vehicles to improve steering response, (**increase**| **decrease**) vehicle stability while maneuvering at (**high**| **low**) speed, or to (**decrease**| **increase**) turning radius at low speed.

In most active four-wheel steering systems, the rear wheels are (**steered**| **oriented**) by a computer and actuators. The rear wheels (**generally**| **broadly**) cannot turn as far as the front wheels. Some systems (**allow** | **provide**) the rear wheels to be steered in the opposite direction as the front wheels during (**low**| **high**) speeds. This allows the vehicle to turn in a (**significantly**| **considerably**) smaller radius – sometimes critical for (**large**| **small**) trucks or tractors and vehicles with trailers.

Exercise 5. Complete the sentences with the suggested words and translate this part of the text into your native language: to counteract, tend, uses, to correct, improves, called.

Many modern vehicles offer a form of passive rear steering ____1____ normal vehicle tendencies. On many vehicles, when cornering, the rear wheels ____2____ to steer slightly to the outside of a turn, which can reduce stability. The passive steering system ____3____ the lateral forces generated in a turn and the bushings ____4____ this tendency and steer the wheels slightly to the inside of the corner. This ____5____ the stability of the car, through the turn. This effect is ____6____ compliance understeer and it, or its opposite, is present on all suspensions.

Exercise 6. Find synonyms to the following words.

improve, increase, decrease, allow, significantly, offer, correct, switch off, change, popular

provide, proper, turn off, alter, famous, develop, enhance, decline, permit, substantially.

Exercise 7. Find antonyms to the following words.

Popular, modern, assist, improve, articulate, front, connect, vertical, more, eliminate
rear, disconnect, horizontal, less, introduce, unpopular, outdated, hinder, deteriorate, inarticulate,

Exercise 8. Match English words and word-groups with their definitions.

1. A four-wheel steering(4WS)	a) is simply any wheel located at the back of a vehicle, such as a car, truck, or bicycle.
2.a vehicle	b) is a vehicle technology where the rear wheels can steer in coordination with the front wheels,
3.a rear wheel	c) is a mechanism, typically in a vehicle's rear axle, that uses the forces generated during driving (such as cornering forces or body roll) to create a subtle steering effect on the wheels, without requiring an external power source, sensors, or electronic control systems.
4.a front wheel	d)is an extremely large pickup truck with greatly oversized tyres.
5. a passive steering system	e) is a machine designed for self-propulsion, usually to transport people, cargo, or both.
6.a driver	f) is a design for heavy machinery where a vehicle is split into two sections connected by a pivot joint, allowing the front and rear parts to bend independently, creating a very small turning radius for superior maneuverability in tight, off-road, or construction environments.
7. a travel trailer	g) experienced during motorway drives while towing a travel trailer is thus largely nullified.
8. a monster truck	h) is simply the wheel located at the front of a vehicle, but the term often refers to front-wheel drive (FWD),
9 an articulated steering	i) is a type of trailer designed to be pulled behind a vehicle and provides living space for travel or camping.
10. a snaking effect	j) is a person who drives a vehicle.

Exercise 9. Pick out all international words from the text.

Exercise 10. Compose a story on one of the topics (up to 100 words):

1. Four-Wheel Steering
- 2.A form of passive rear steering

Lesson 12

Мета заняття: вміти використовувати іноземну мову, включаючи усну та письмову форми в обов'язі програмних вимог в продуктивних та рецептивних видах мовленнєвої діяльності. здатність працювати з різними джерелами, розшукувати, обробляти, аналізувати і синтезувати отриману інформацію.

Read the text: **Braking System**

A brake is a device which inhibits motion. Its opposite component is a clutch. Most commonly brakes use friction to convert kinetic energy into heat. Brakes are generally applied to rotating axles or wheels, but may also take other forms such as the surface of a moving fluid. Some vehicles use a combination of braking mechanisms, such as drag racing cars with both wheel brakes and a parachute.

Friction brakes on automobiles store braking heat in the drum brakes or disc brake while braking then conduct it to the air gradually. When traveling downhill some vehicles can use their engines to brake.

When the brake pedal is pushed a piston pushes the pad towards the brake disc which slows the wheel down. On the brake drum it is similar as the cylinder pushes the brake shoes towards the drum which also slows the wheel down.

Brakes may be broadly described as using friction, pumping, or electromagnetics. One brake may use several principles: for example, a pump may pass fluid through an orifice to create friction.

Friction (pad/shoe) brakes are often rotating devices with a stationary pad and a rotating wear surface. Common configurations include shoes that contract to rub on the outside of a rotating drum, such as a band brake; a rotating drum with shoes that expand to rub the inside of a drum, commonly called a “drum brake”, although other drum configurations are possible; and pads that pinch a rotating disc, commonly called a “disc brake”. Other brake configurations are used, but less often.

Pumping brakes are often used where a pump is already a part of the machinery. For example, an internal-combustion piston motor can have the fuel supply stopped, and then internal pumping losses of the engine create some braking. Pumping brakes can dump energy as heat, or can be regenerative brakes that recharge a pressure reservoir called a hydraulic accumulator.

Electromagnetic brakes are likewise often used where an electric motor is already a part of the machinery. For example, many hybrid gasoline/electric vehicles use the electric motor as a generator to charge electric batteries and also as a regenerative brake. Some diesel/electric railroad locomotives use the electric motors to generate electricity which is then sent to a resistor bank and dumped as heat. Some vehicles, such as some transit buses, do not already have an electric motor but use a secondary “retarder” brake that is effectively a generator with an internal short-circuit.

Brakes operate on a simple hydraulic principle. If a force is exerted on the piston putting pressure on the fluid confined in the left hand container, the fluid is forced out through the narrow tube at the bottom and into the right hand container, exerting a force on the second piston, forcing it to move upward.

Exercise 1. Study the following words and word- combinations

axle
brake
clutch
conduct
device
disc brake
drag
drum brake
dump
expand
fluid
friction
gradually
inhibit
internal
kinetic
machinery
motion
orifice
pad
pedal
pinch
piston
pump
push
recharge
regenerative
resistor bank
retarder
rotating
rub
shoe
short-circuit
stationary

Exercise 2. Answer the questions:

1. What is a brake?
2. What is its opposite component?
3. What do most commonly brakes use friction for?
4. What are brakes generally applied to?
5. What combination of braking mechanisms do some vehicles use?
6. What can some vehicles use when traveling downhill?
7. How may brakes be broadly described?
8. What are friction (pad/shoe) brakes?
9. Where are pumping brakes often used?

10. Where are electromagnetic brakes likewise often used?
11. How do brakes operate?

Exercise 3. Which sentence on the right goes with the sentence on the left

1. Brakes are generally applied	a) in the drum brakes or disc brake while braking then conduct it to the air gradually.
2. Friction brakes on automobiles store braking heat	b) using friction, pumping, or electromagnetics.
3. Brakes may be broadly described as	c) to rotating axles or wheels, but may also take other forms such as the surface of a moving fluid.
4. Pumping brakes can dump energy as heat,	d) the electric motor as a generator to charge electric batteries and also as a regenerative brake.
5. Many hybrid gasoline/electric vehicles use	e) or can be regenerative brakes that recharge a pressure reservoir called a hydraulic accumulator.
6. Some diesel/electric railroad locomotives use	f) do not already have an electric motor but use a secondary “retarder” brake
7. Some vehicles, such as some transit buses,	g) friction to convert kinetic energy into heat.
8. Most commonly brakes use friction to convert kinetic energy into heat.	h) the electric motors to generate electricity which is then sent to a resistor bank and dumped as heat.

Exercise 4. Complete the sentences with the suggested words: store, conduct, use, pushes, slows

Friction brakes on automobiles _____ 1 _____ braking heat in the drum brakes or disc brake while braking then _____ 2 _____ it to the air gradually. When traveling downhill some vehicles can _____ 3 _____ their engines to brake.

When the brake pedal is pushed a piston _____ 4 _____ the pad towards the brake disc which slows the wheel down. On the brake drum it is similar as the cylinder pushes the brake shoes towards the drum which also _____ 5 _____ the wheel down.

Exercise 5. Decide if the following statements are true (T) or false (F), then correct the false ones.

1. A brake is a device which supplies motion.
2. Most commonly brakes use engine to convert kinetic energy into heat.
3. Some vehicles use a combination of braking mechanisms, such as drag racing cars with both wheel brakes and a parachute.
4. When traveling downhill some vehicles can use a combination of braking mechanisms to brake.

5. When the brake pedal is pushed a piston pushes the pad towards the brake disc which speeds up the wheel down.
6. Brakes may be broadly described as using friction, pumping, or electromagnetics.
7. Friction (pad/shoe) brakes are often stationary devices with a stationary pad and a rotating wear surface.
8. Electromagnetic brakes are likewise often used where an electric motor is already part of the machinery.

Exercise 6. Match the words with their definitions:

1. a brake	a) is a mechanism for connecting and disconnecting an engine and the transmission system in a vehicle, or the working parts of any machine.
2. a clutch	b) is a machine that uses the energy from fuel or steam to produce movement: The car has a four-cylinder engine.
3. an engine	c) is the foot-operated lever inside a vehicle that a driver presses to activate the braking system, using hydraulic or other force to slow down or stop the vehicle by applying friction to the wheels, typically located to the left of the accelerator pedal.
4. friction	d) is a device or mechanism, often using friction, to slow or stop the motion of a vehicle or machine, operated by a pedal or lever.
5. a brake pedal	e) are components in vehicle braking systems that convert a vehicle's kinetic energy into heat energy using friction to slow or stop it, with brake pads clamping onto a spinning disc (disc brakes) and brake shoes pressing outwards against a rotating drum (drum brakes).
6. a piston	f) is a technique used to stop a road vehicle (e.g. a car) as quickly as possible without skidding the wheels.
7. friction brakes (pads/shoes)	g) is the force that resists relative motion between two surfaces, fluids, or materials in contact, acting in the opposite direction of movement and converting kinetic energy into heat,
8. pumping the brakes	h) are electromechanical devices that use electric current to create a magnetic field, generating force to slow, stop, or hold a moving object, often with minimal friction by inducing eddy currents or through direct magnetic attraction,

9. Electromagnetic brakes (EM brakes)	i) is a device that converts mechanical energy into electrical energy.
10. a generator	j) is a short, solid piece of metal that moves up and down inside a cylinder in an engine to press the fuel into a small space and to send the power produced by it

Exercise 7. Make the statements negative.

1. Most commonly brakes use friction to convert kinetic energy into heat.
2. Brakes are generally applied to rotating axles or wheels, but may also take other forms such as the surface of a moving fluid.
3. When traveling downhill some vehicles can use their engines to brake.
4. Brakes may be broadly described as using friction, pumping, or electromagnetics.
5. Friction (pad/shoe) brakes are often rotating devices with a stationary pad and a rotating wear surface.
6. Pumping brakes can dump energy as heat.
7. For example, many hybrid gasoline/electric vehicles use the electric motor as a generator to charge electric batteries and also as a regenerative brake.
8. Brakes operate on a simple hydraulic principle.

Exercise 8. Find synonyms to the following words.

Inhibit, convert, apply, store, conduct, push, slow, describe, for example, pass, decelerate, characterize, for instance, cross, prevent, transform, employ, preserve, guide, press.

Exercise 9. Ask questions to the given answers:

1. Question: _____?

Answer: Brakes operate on a simple hydraulic principle

2. Question: _____?

Answer: For example, many hybrid gasoline/electric vehicles use the electric motor as a generator to charge electric batteries and also as a regenerative brake.

3. Question: _____?

Answer: Common configurations include shoes that contract to rub on the outside of a rotating drum, such as a band brake.

4. Question: _____?

Answer: Brakes may be broadly described as using friction, pumping, or electromagnetics.

Exercise 10. Compose a story on one of the topics (up to 100 words):

1. Braking System.
2. Describe different kinds of breaks

Lesson 13

Мета заняття: вміти використовувати іноземну мову, включаючи усну та письмову форми в обсязі програмних вимог в продуктивних та рецептивних видах мовленнєвої діяльності. здатність працювати з різними джерелами, розшукувати, обробляти, аналізувати і синтезувати отриману інформацію.

Read the text: **Car Electrical System**

The electrical system of the automobile was at first limited to the ignition equipment. However, electric lights and horns began to replace the kerosene and acetylene lights and the bulb horns with the advent of the electricity. Electrification was rapid and complete, and, by 1930, six-volt systems were standard. Today, an automobile requires an elaborate electrical system of circuits to produce, store, and distribute all the electricity it requires for everyday operation. Many different auxiliary electrical devices are used in modern cars, such as: radios, cellular phones, rear window defrosters and electric door locks.

The electrical system consists of a battery, generator, starting (cranking) motor, ignition system, lighting system, and various accessories and controls.

The car's initial source of electricity is a battery; whose most important function is to start the engine. A 12-volt storage battery consists of layers of positively and negatively charged lead plates that make up each of six two-volt cells. The cells are filled with an electricity-conducting liquid (electrolyte). The interaction of the plates and the electrolyte produces chemical energy that becomes electricity when a circuit is formed between the negative and positive battery terminals.

The generator is the basic source of energy for the various electrical devices of the automobile. An alternator that is belt-driven from the engine crankshaft is also used at times. The design is usually an alternating-current type with built-in rectifiers and a voltage regulator to match the generator output to the electric load and also to the charging requirements of the battery, regardless of engine speed. To store excess output of the generator, a lead-acid battery is used which serves as a reservoir. Energy for the starting motor is made available along with power for operating other electric devices when the engine is not running or when the generator speed is not sufficient to carry the load.

The ignition system consists of the spark plugs, coil, distributor, and battery, and provides the spark to ignite the air-fuel mixture in the cylinders of the engine. In order to jump the gap between the electrodes of the spark plugs, the 12-volt potential of the electrical system must be stepped up to about 20,000 volts. This happens with the aid of a circuit that starts with the battery, one side of which is grounded on the chassis and leads through the ignition switch to the primary winding of the ignition coil and back to the ground through an interrupter switch. A high voltage is induced across the secondary of the coil by interrupting the primary circuit. The high-voltage secondary terminal of the coil leads to a distributor that acts as a rotary switch, alternately connecting the coil to each of the wires leading to the spark plugs.

The starting motor drives a small spur gear, which is so arranged that it automatically moves into mesh with gear teeth on the rim of the flywheel as the starting-motor armature begins to turn. As soon as the engine starts, the gear is disengaged, which prevents the starting motor from getting damaged due to over speeding. The starting motor is designed for high current consumption and delivers considerable power for its size for a limited time.

The automobile lighting system includes the wiring harness, all the lights, and the various switches that control their use.

The headlight switch is the heart of the lighting system. It controls the headlights, parking lights, side marker lights, taillights, license plate light, instrument panel lights, and interior lights. Individual switches are provided for special purpose lights such as directional signals, hazard warning flashers, back up lights, and courtesy lights. Night driving has long been dangerous due to the glare of headlights that blind drivers approaching from the opposite direction. To correct this problem resistance-type dimming circuits, which decreased the brightness of the headlights when meeting another car, were first introduced.

In the 1960s, signal lamps and other special-purpose lights were increased in usage. Amber-colored front and red rear signal lights are flashed as a turn indication; all these lights are flashed simultaneously in the “flasher” system for use when a car is parked along a roadway or is traveling at a low speed on a high-speed highway. Red-colored rear signals are used to denote braking. To provide illumination to the rear when backing up, backup lights are required.

Exercise 1. Read and memorize using the dictionary:

accessories
advent
approach
array
auxiliary
battery
cellular phone
circuit
coil
conduct (electricity)
crankshaft
current
elaborate
electrical system
generator
hazard
headlights
horn
ignition equipment
illuminate
initial
layer
plate
license plate
limit
mesh
potential
rapid
rectifier
replace
source
spark plug
spur gear
switch
taillight
wire

Exercise 2. Answer the questions:

1. How was the electrical system of the automobile at first limited?
2. Why does a car need a complex electrical circuit system today?
3. What different auxiliary electrical devices are used in modern cars?
4. What does the electrical system consist of?
5. What does a 12-volt storage battery consist of?
6. What does the interaction of the plates and the electrolyte produce?
7. What is a generator?
8. What does the ignition system consist of?
9. What is the starting motor designed for?
10. What does an automobile lighting system include?
11. What is the headlight switch?
12. When were signal lamps and other special-purpose lights increased in usage?

Exercise 3. Match the left part with the right:

1. Electric lights and horns began	a) to produce, store, and distribute all the electricity it requires for everyday operation.
2. Today, an automobile requires an elaborate electrical system of circuits	b) to replace the kerosene and acetylene lights and the bulb horns with the advent of the electricity.
3. Many different auxiliary electrical devices are used	c) is a battery, whose most important function is to start the engine.
4. The electrical system consists of	d) in modern cars, such as: radios, cellular phones, rear window defrosters and electric door locks.
5. The car's initial source of electricity	e) a battery, generator, starting (cranking) motor, ignition system, lighting system, and various accessories and controls.
6. A 12-volt storage battery consists of.	f) an electricity-conducting liquid (electrolyte).
7. The cells are filled with	g) chemical energy that becomes electricity when a circuit is formed between the negative and positive battery terminals.
8. The interaction of the plates and the electrolyte produces	h) layers of positively and negatively charged lead plates that make up each of six two-volt cells

Exercise 4. Translate the following words into English:

1. акумулятор	
2. вимикач, перемикач	
3. генератор	

4. звуковий сигнал автомобіля	
5. дріт, провід	
6. електрична система	
7.електровипрямляч (випрямний блок генератора)	
8. задній габаритний ліхтар	
9. свічка запалення	
10 мобільний телефон	
11. напруга	
12. номерний знак	
13. передній ліхтар, фара	
14. проводити (струм)	
15 .система запалення	
16. струм	

Exercise 5. Translate the following words into Ukrainian

1. accessories	
2. approach	
3. auxiliary	
4. battery	
5. circuit	
6. coil	
7. crankshaft	
8. elaborate	
9. generator	
10. ignition equipment	
11. layer	
12. potential	
13. rectifier	
14. source	
15. spur gear	

Exercise 6. Open brackets choosing the right words:

The generator is the (**basic**| **primary**) source of energy for the (**various** | **different**) electrical devices of the automobile. An alternator that is belt-driven from the engine crankshaft is also (**used**| **exploited**) at times. The design is usually an alternating-current type with built-in

rectifiers and a voltage regulator **(to match| to fit)** the generator output to the electric load and also to the charging **(requirements|| regulations)** of the battery, regardless of engine speed. To store excess output of the generator, a lead-acid battery is used which **(serves| matches)** as a reservoir. Energy for the starting motor is made available along with power for operating other electric **(devices | tools)** when the engine is not running or when the generator speed is not **(sufficient| competent)** to carry the load.

Exercise 7. Complete the sentences with the suggested words: consists of, provides, between, stepped up, a circuit, leads, back, across, terminal, connecting.

The ignition system _____1_____ the spark plugs, coil, distributor, and battery, and_____2_____ the spark to ignite the air-fuel mixture in the cylinders of the engine. In order to jump the gap _____3_____ the electrodes of the spark plugs, the 12-volt potential of the electrical system must be _____4_____ to about 20,000 volts. This happens with the aid of _____5_____ that starts with the battery, one side of which is grounded on the chassis and _____6_____ through the ignition switch to the primary winding of the ignition coil and _____7_____ to the ground through an interrupter switch. A high voltage is induced _____8_____ the secondary of the coil by interrupting the primary circuit. The high-voltage secondary _____9_____ of the coil leads to a distributor that acts as a rotary switch, alternately _____10_____ the coil to each of the wires leading to the spark plugs.

Exercise 8. Match English words and word-groups with their definitions.

1. a license plate	a) is a device that converts chemical energy contained within its active materials directly into electric energy by means of an electrochemical oxidation-reduction (redox) reaction.
2. a cellular phone	b) is a sign on a road vehicle that shows its registration number.
3. a battery	c) is a phone that you can carry with you and use to make or receive calls wherever you are.
4. a generator	d) is a collection of components that work together to create and distribute light.
5. an ignition system	e) is an electric motor for starting an engine.

6. a lighting system	f) is an electrical device which converts an alternating current into a direct one by allowing a current to flow through it in one direction only.
7.a starting motor	g) is a device in an engine that produces an electrical spark that lights the fuel and makes the engine start.
8. a headlight switch	h) is defined as the subsystem in an engine that receives an electrical signal from the engine controller and delivers a spark to ignite the fuel-air mixture,
9. a rectifier	i) is a device that converts mechanical energy into electrical energy.
10.a spark plug	j) allows you to turn on the lights. If the switch does not work, you will not be able to turn on the lights

Exercise 9. Find antonyms to the following words.

begin, advent, rapid, produce, distribute, various, important, charged, filled, basic
unimportant, empty, unfilled, secondary, stop, disappearance, slow, destroy, collect, similar,

Exercise 10. Compose a story on one of the topics (up to 100 words):

1. Car Electrical System

2.What is the basic source of energy for the electrical devices of the automobile? And its function?

Lesson 14

Мета заняття: вміти використовувати іноземну мову, включаючи усну та письмову форми в обсязі програмних вимог в продуктивних та рецептивних видах мовленнєвої діяльності. здатність працювати з різними джерелами, розшукувати, обробляти, аналізувати і синтезувати отриману інформацію.

Read the text: Car Electronic System

A vast increase in automotive electronic systems has created an array of new engineering opportunities and challenges. The past four decades have witnessed an exponential increase in a number of electronic systems in vehicles. Today, the cost of electronics in luxury vehicles can amount to more than 23 percent of the total manufacturing cost.

The growth of electronic systems has had implications for vehicle engineering. For example, today's vehicles may have more than 4 kilometers of wiring – compared to 45 meters in vehicles manufactured in 1955. In July 1969, Apollo 11 employed a little more than 150

Kbytes of onboard memory to go to the moon and back. Just 30 years later, a family car might use 500 Kbytes to keep the CD player from skipping tracks.

The resulting demands on power and design have led to innovations in electronic networks for automobiles. Researches have focused on developing electronic systems that safely and efficiently replace entire mechanical and hydraulic applications. Vehicle's control networks connect automotive electronic equipment and facilitate the sharing of information and resources among devices.

In the past, wiring was the standard means of connecting one element to another. Added wiring increased vehicle weight, weakened performance, and made adherence to reliability standards difficult. For an average vehicle, every 50 kilograms of wiring increases fuel consumption by 0.2 liters for each 100 kilometers travelled. Fortunately, today's car makers are to solve this problem.

Thus, automotive electronics is a fast-growing industry in pace with the increase of car ownership, and the demand for it is ever-increasing. Therefore, it is the right time to develop self-navigation products that can eventually evolve into an all-inclusive electronic information system that integrates and displays communication, navigation, entertainment and meter panel information such as speed, temperature, fuel and operating status.

Automotive electronic products must feature environmental resistance to harsh humidity, temperature and vibration and high mechanical strength. On the other hand, when automobiles are becoming increasingly electronic, the number of automotive electronics products in use has risen dramatically, which in turn requires themselves to be small and light.

An automotive electronics system mainly includes the main control unit, the display unit, Global Positioning System (GPS), 3G/GSM (third generation Global System for Mobile Communications)) wireless communication, burglar alarm, visual reversing radar, in-car entertainment system, car status display and so on.

MEC-4003 (installed computer) is the core of the system control part, responsible for data acquisition, processing and display on the screen. As the core processing part of the system, the requirements on stability, reliability and continuity are very high.

The GPS module is used to receive the signals from GPS satellite and locate the vehicle terminal. Location coordinates are sent to the main controller. The main controller also sends setting commands to the GPS module to control its status and operating mode. The GPS module needs to be equipped with special GPS antenna to receive GPS satellite signals. Generally, the signals from at least three satellites are required for precise positioning. Positioning will be more accurate when the antenna is placed on the roof of the automobile.

The 3G/GSM module can easily use GSM network for communication and is connected to and communicate with the main controller at a specified baud rate through serial ports. The main controller can also control the GSM module to send short messages using 3G/GSM commands, transmit data and make voice calls by using GPRS (General Packet Radio Service). In order to control the time interval between sending and receiving messages, it is better to use the SIM cards provided by the same telecom operator. The 3G/GSM module also supports two microphones, two speakers, and one buzzer. One of the microphones and one of the speakers can be connected to the earphone on the handle to make the automotive telephone usable.

The car reversing radar, namely visual car reversing aid system, is a video camera installed on the luggage boot cover or bumper, and the video it shoots is transmitted to and displayed on the electronic screen in front of the driver's seat so that the driver can see the rear view clearly through the electronic display. It solves the problems of reversing, night vision and so on.

The detection of automobile status includes the testing items of speed, distance, rotation speed, oil pressure, air pressure, meters of water temperature, fuel and charge and so on.

Structurally, it comprises three parts: hardware platform, system software and application software.

Exercise 1. Look up new words given below in your dictionary and memorize them.

adherence
array
burglar alarm
buzzer
challenge
core
data
demand
earphone
efficient
enhance
entire
estimate
eventually
evolve
facilitate
fuel consumption
harness
wire harness
harsh
humidity
implication
entertainment
install
network
press release
reduce
reliability
resistance
sheer
sophistication
vast
wireless
wiring

Exercise 2. Answer the questions:

1. What has a vast increase in automotive electronic systems created?
2. How much can electronics in luxury cars cost today?
3. When did Apollo 11 employ a little more than 150 Kbytes of onboard memory to go to the moon and back?
4. What has led to innovations in electronic networks for automobiles?
5. What have researches focused on?
6. What connects automotive electronic equipment and facilitate the sharing of information and resources among devices?

7. What was the standard means of connecting one element to another in the past?
8. What is a fast-growing industry in pace with the increase of car ownership?
9. What environmental factors do automotive electronic products need to be resistant to?
10. What does an automotive electronics system mainly include?
11. What is MEC-4003? What is it responsible for?
12. What is the GPS module used for?

Exercise 3. Which sentence on the right goes with the sentence on the left.

1. The growth of electronic systems	a) more than 4 kilometers of wiring
2. Today's vehicles may have	b) that safely and efficiently replace entire mechanical and hydraulic applications.
3. Researches have focused on developing electronic systems	c) has had implications for vehicle engineering.
4. Added wiring increased	d) must feature environmental resistance to harsh humidity, temperature and vibration and high mechanical strength.
5. Automotive electronics	e) vehicle weight, weakened performance, and made adherence to reliability standards difficult.
6. Automotive electronic products	f) is a fast-growing industry in pace with the increase of car ownership, and the demand for it is ever-increasing.
7. The GPS module is used	g) with special GPS antenna to receive GPS satellite signals.
8. Positioning will be more	h) are required for precise positioning.
9. The GPS module needs to be equipped	i) when the antenna is placed on the roof of the automobile.
10. The signals from at least three satellites	j) to receive the signals from GPS satellite and locate the vehicle terminal.

Exercise 4. Complete the sentences with the suggested words: receive, main, commands, special, satellites, accurate, communication, control, interval, supports, connected.

The GPS module is used to _____ 1 _____ the signals from GPS satellite and locate the vehicle terminal. Location coordinates are sent to the _____ 2 _____ controller. The main controller also sends setting _____ 3 _____ to the GPS module to control its status and operating mode. The GPS module needs to be equipped with _____ 4 _____ GPS antenna to receive GPS satellite signals. Generally, the signals from at least three _____ 5 _____ are required for precise positioning. Positioning will be more _____ 6 _____ when the antenna is placed on the roof of the automobile.

The 3G/GSM module can easily use GSM network for _____ 7 _____ and is connected to and communicate with the main controller at a specified baud rate through serial ports. The main controller can also _____ 8 _____ the GSM module to send short messages using 3G/GSM commands, transmit data and make voice calls by using GPRS (General Packet Radio

Service). In order to control the time _____9_____ between sending and receiving messages, it is better to use the SIM cards provided by the same telecom operator. The 3G/GSM module also _____10_____ two microphones, two speakers, and one buzzer. One of the microphones and one of the speakers can be _____11_____ to the earphone on the handle to make the automotive telephone usable.

Exercise 5. Find synonyms to the following words.

transmit, clearly, solve, detect, comprise, increase, employ, develop, replace, connect
enhance, utilize, establish, substitute, link, send, distinctly, decide, identify, include.

Exercise 6. Match English word-groups with their definitions.

1. a burglar alarm system	a) is a vehicle system that processes and modifies electrical signals and power to monitor, control, and carry out functions in the automobile.
2. automotive electronics	b) is the primary interface used to communicate the operating condition and health of a vehicle to the driver.
3. the car status display (also known as the dashboard, instrument panel, or driver display)	c) is a network of electronic devices designed to detect unauthorized entry into a building or area. These systems are primarily used to protect against burglary, vandalism, and other security threats.
4. the main control unit (CU)	d) is a device with a screen that displays characters or graphics representing data in a computer memory.
5. the display unit	e) is a collection of hardware and software in automobiles that provides audio or video entertainment.
6. the Global Positioning System (GPS)	f) is a car safety aid that helps drivers detect obstacles when reversing by using ultrasonic or radar technology.
7. reversing radar	g) is a component of a computer's central processing unit (CPU) that directs the operation of the processor.
8. in-car entertainment system or in-vehicle infotainment (IVI)	h) is a satellite-based navigation system that provides location and time information anywhere on Earth.

Exercise 7. Decide if the following statements are true (T) or false (F), then correct the false ones.

1. Today, the cost of electronics in luxury vehicles can amount to less than 23 percent of the total manufacturing cost.
2. Today's vehicles may have less than 4 kilometers of wiring

3. The resulting demands on power and design have led to innovations in electronic networks for automobiles.
4. Researches have focused on developing electrical systems that safely and efficiently replace entire mechanical and hydraulic applications
5. Automotive electronics is a slow-growing industry in pace with the decrease of car ownership.
6. The GPS module is used to receive the signals from GPS satellite and locate the vehicle terminal.

Exercise 8. Pick out all international words from the text.

Exercise 9. Ask questions to the given answers:

1. Question: _____?

Answer: The detection of automobile status includes the testing items of speed, distance, rotation speed, oil pressure, air pressure, meters of water temperature, fuel and charge and so on.

2. Question: _____?

Answer: Location coordinates are sent to the main controller.
sources.

3. Question: _____?

Answer: The main controller also sends setting commands to the GPS module to control its status and operating mode.

4. Question: _____?

Answer: The GPS module is used to receive the signals from GPS satellite and locate the vehicle terminal.

Exercise 10. Compose a story on one of the topics (up to 100 words):

1. Car Electronic System
2. Automotive electronics is a fast-growing industry

Lesson 15

Мета заняття: вміти використовувати іноземну мову, включаючи усну та письмову форми в обсязі програмних вимог в продуктивних та рецетивних видах мовленнєвої діяльності. Здатність працювати з різними джерелами, розшукувати, обробляти, аналізувати й синтезувати отриману інформацію.

Read the text: Introduction to Autosports Engineering

Welcome to the exciting world of Autosports Engineering! This course is designed to give you an introduction to the key principles and concepts that underpin the engineering of vehicles used in motorsports. Autosports, or motorsport engineering, combines elements of mechanical, electrical, and aeronautical engineering, among other fields, to design, build, and optimize high-performance vehicles for racing. As first-year students, this is your gateway into a fascinating and fast-paced industry where precision, creativity, and innovation are paramount.

What is Autosports Engineering?

Autosports engineering is the specialized branch of engineering focused on the development, testing, and optimization of vehicles used in competitive motorsports. This can include everything from Formula 1 cars, rally cars, touring cars, and motorcycles, to electric racing vehicles like those used in Formula E. Engineers in this field must be able to balance speed, safety, handling, and durability, all while adhering to the strict regulations set by motorsport governing bodies.

Key Concepts in Autosports Engineering.

Vehicle Dynamics. The performance of a race car is primarily governed by its vehicle dynamics, which refers to the study of forces and moments acting on a vehicle as it moves. Key areas within vehicle dynamics include:

Suspension: How a car's suspension system absorbs shocks and impacts, ensuring optimal tire contact with the road or track.

Tire Performance: Tires are the only point of contact between the car and the track, making their performance critical for handling, grip, and safety.

Aerodynamics: The shape of the car and its components, like wings and spoilers, influence airflow and downforce, which affects the car's stability and speed.

Powertrain Engineering The powertrain includes all the components that deliver power to the wheels. In autosports, powertrain efficiency and performance are central to achieving high speeds. Key components include:

Engine: The heart of any race car, the engine's size, type (e.g., internal combustion, electric, hybrid), and configuration (e.g., V6, V8) significantly affect performance.

Transmission: The gearbox helps transmit the engine's power to the wheels, and understanding gear ratios and transmission types (manual vs. automatic) is essential for race engineers.

Fuel Systems: Motorsport vehicles require specialized fuel systems to ensure maximum performance while adhering to regulations on fuel types and quantities.

Safety Engineering: Safety is paramount in motorsports, and engineers play a vital role in designing vehicles that protect drivers in the event of a crash. Key safety innovations include:

Crash Structures: These are designed to absorb impact energy, protecting the driver in a collision.

Safety Harnesses and Seats: High-quality seats and harnesses are developed to keep the driver securely in place during high G-force maneuvers.

Fire Suppression Systems: In the event of an engine fire, race cars are equipped with fire suppression systems to reduce the risk of injury.

Materials and Manufacturing Autosports vehicles often require materials that provide a combination of strength, lightness, and durability. Understanding the materials used in motorsports is crucial:

Carbon Fiber: A lightweight yet strong material used extensively in race car bodies and components.

Titanium and Aluminum: These metals are often used in parts like suspension components and engine parts due to their high strength-to-weight ratios.

3D Printing: In recent years, additive manufacturing (3D printing) has found its way into motorsport engineering, allowing for rapid prototyping and custom part development.

Electronics and Data Systems: Modern race cars are equipped with sophisticated electronic systems that monitor and control various aspects of performance. This includes: **Telemetry:** Data collection systems that provide real-time information about the car's performance, allowing teams to make on-the-fly adjustments during a race.

Control Systems: ECU (Electronic Control Unit) systems that manage things like engine timing, fuel injection, and power distribution in hybrid or electric race cars.

Driver Assistance Systems: These systems, including traction control and stability control, help ensure maximum performance while keeping the car manageable under extreme conditions.

Race Strategy and Engineering While the engineering of a race car is crucial, the application of engineering knowledge to race strategy is equally important. Engineers often work closely with race teams to plan and execute race strategies. This can include: **Pit Stop Optimization:** Engineers must work with the pit crew to minimize the time spent during pit stops, where quick tire changes, refueling, and repairs are made.

Fuel and Tire Management: Choosing the right strategy for tire usage and fuel consumption is critical to the outcome of a race. Engineers help determine the ideal times for pit stops and tire changes based on these factors.

Telemetry and Strategy: Engineers use real-time data to adapt to changing track conditions, driver performance, and competitor strategies.

The Importance of Teamwork in Autosports Engineering

Autosports engineering is not just about individual skills; it is about collaboration. Teams of engineers, designers, mechanics, and strategists work together to ensure that a race car is optimized for performance. As a first-year student, you will begin to develop the collaborative skills necessary to succeed in this environment. Effective communication, problem-solving, and a strong understanding of each other's roles will be crucial to your success.

In your first year of studying autosports engineering, you will be introduced to fundamental engineering principles, many of which you will later apply specifically to motorsport applications. Some of the key topics you will study include:

Mathematics: You will learn about the mathematical principles that underpin engineering calculations, such as algebra, calculus, and differential equations.

Physics: Physics forms the basis of understanding forces, motion, and energy. You will explore topics such as mechanics, thermodynamics, and fluid dynamics, which are essential to vehicle performance.

Materials Science: An introduction to the properties of materials and how they are used in different engineering applications.

Computer-Aided Design (CAD): You will learn how to use CAD software to design parts and components, which is a crucial skill in motorsport engineering.

Introductory Mechanical Engineering: Basic mechanics principles, including statics, dynamics, and material behavior under stress.

Careers in Autosports Engineering

The field of autosports engineering offers a wide range of career opportunities. As a graduate, you could work in various sectors of motorsport, such as: Formula 1 Teams: Working in the development of cut.

Exercise 1. Read and memorize using the dictionary:

underpin
gateway
fast-paced industry
paramount
competitive motorsports
handling
durability
adhering
Suspension
Tire Performance
grip
spoilers
airflow and downforce
Powertrain Engineering
Transmission
gearbox
gear ratios and transmission types
while adhering to regulations on
a crash
Crash Structures
in a collision
Harnesses and Seats
high G-force maneuvers
Fire Suppression Systems
the risk of injury
Carbon Fiber
high strength-to-weight ratios
Telemetry
to make on-the-fly adjustments
ECU (Electronic Control Unit) systems Системы ECU
Driver Assistance Systems
traction control
Race Strategy and Engineering
Pit Stop Optimization
collaboration.

Exercise 2. Answer the questions:

1. What does autosports or motorsport engineering combine?
2. What is Autosports Engineering?
3. What must engineers in this field be able to balance?
4. What key concepts in Autosports Engineering do you know?
5. What does the powertrain include?
6. Where are powertrain efficiency and performance central to achieving high speeds?
7. What are the key components in Powertrain Engineering?

8. Safety is paramount in motorsports, isn't it? Yes, it is.
9. What key safety innovations do you know?
10. What types of materials are often required for cars used in motorsport?

Exercise 3. Match the left part with the right.

1. Titanium and Aluminum	a) are equipped with sophisticated electronic systems
2. In recent years, additive manufacturing (3D printing)	b) are often used in parts like suspension components and engine parts due to their high strength-to-weight ratios.
3. Modern race cars	c) is not just about individual skills, it is about collaboration.
4. Data collection systems	d) has found its way into motorsport engineering,
5. Control Systems	e) provide real-time information about the car's performance.
6. Driver Assistance Systems,	f) to plan and execute race strategies.
7. Engineers often work closely with race teams	g) to minimize the time spent during pit stops.
8. Engineers must work with the pit crew	h) work together to ensure that a race car is optimized for performance.
9. Autosports engineering	i) including traction control and stability control, help ensure maximum performance while keeping the car manageable under extreme conditions.
10. Teams of engineers, designers, mechanics, and strategists	j) manage things like engine timing, fuel injection, and power distribution in hybrid or electric race cars.

Exercise 4. Ask questions to the given answers:

1. Question: _____?

Answer: Effective communication, problem-solving, and a strong understanding of each other's roles will be crucial to your success.

2. Question: _____?

Answer: Physics forms the basis of understanding forces, motion, and energy.

3. Question: _____?

Answer: The field of autosports engineering offers a wide range of career opportunities.

4. Question: _____?

Answer: Autosports vehicles often require materials that provide a combination of strength, lightness, and durability.

Exercise 5. Give the words that have similar meanings (synonyms).

exciting, design, concepts, underpin, combine, build, fascinating, paramount, include, shape intriguing, principal, encompass, mould, inspiring, draft, ideas, support, unite, produce.

Exercise 6. Open brackets using the right words:

Key Concepts in Autosports Engineering.

Vehicle Dynamics The performance of a race car is (**primarily**| **basically**) governed by its vehicle dynamics, which refers to the study of (**forces** | **troops**) and moments acting on a vehicle as it moves. Key (**areas** | **points**) within vehicle dynamics include:

Suspension: How a car's suspension system absorbs shocks and impacts, (**ensuring** | **offering**) optimal tire contact with the road or track.

Tire Performance: Tires are the only point of (**contact** | **communication**) between the car and the track, making their (performance| achievement) critical for handling, grip, and safety.

Aerodynamics: The shape of the car and its (**components**| **elements**), like wings and spoilers, influence airflow and downforce, which (**affects**| **blocks**) the car's stability and speed.

Powertrain Engineering The powertrain (**includes**| **involves**) all the components that deliver power to the wheels. In autosports, powertrain efficiency and performance are (**central** | **middle**) to achieving high speeds.

Exercise 7. Fill in the gap with an appropriate word and translate this part of the text into your native language: skills, strategists, succeed, understanding, principles, key, mathematical, motion, fluid, software, statics.

Autosports engineering is not just about individual _____1_____; it is about collaboration. Teams of engineers, designers, mechanics, and _____2_____ work together to ensure that a race car is optimized for performance. As a first-year student, you will begin to develop the collaborative skills necessary to _____3_____ in this environment. Effective communication, problem-solving, and a strong _____4_____ of each other's roles will be crucial to your success.

In your first year of studying autosports engineering, you will be introduced to fundamental engineering _____5_____, many of which you will later apply specifically to motorsport applications. Some of the _____6_____ topics you will study include:

Mathematics: You will learn about the _____7_____ principles that underpin engineering calculations, such as algebra, calculus, and differential equations.

Physics: Physics forms the basis of understanding forces, _____8_____, and energy. You will explore topics such as mechanics, thermodynamics, and _____9_____ dynamics, which are essential to vehicle performance.

Materials Science: An introduction to the properties of _____10_____ and how they are used in different engineering applications.

Computer-Aided Design (CAD): You will learn how to use CAD _____11_____ to design parts and components, which is a crucial skill in motorsport engineering.

Introductory Mechanical Engineering: Basic mechanics principles, including _____12_____, dynamics, and material behavior under stress.

Exercise 8. Match English words and word-groups with their definitions.

1. A pit crew	a) is a specialized field focusing on designing, developing, testing, and manufacturing high-performance vehicles and components for racing,
2. Autosports engineering often called motorsport engineering,	b) is a specialized team of mechanics and support staff who perform rapid maintenance, like changing tires and refueling, on a race vehicle during a race
3. Vehicle Dynamics	c) is the system of springs and shock absorbers by which a vehicle is supported on its wheels.
4. Suspension	d) is the engineering study of a vehicle's motion and performance, analyzing how forces from tires, gravity, and aerodynamics affect its acceleration, braking, steering, and ride comfort to ensure stability, safety, and handling in various conditions.
5. Performance tires	e) is the specialized field focused on designing, developing, and optimizing all components that generate and deliver power to propel a vehicle, including the engine/motor, the transmission, the driveshafts, and the control systems, to enhance performance, efficiency, and emissions.
6. Aerodynamics	f) is a specialized field applying engineering principles to identify, evaluate, and control hazards in systems, products, and processes, ensuring they operate with acceptable risk levels to prevent accidents, injuries, or damage to people, property, or the environment.
7. Powertrain Engineering	g) are designed to give owners of sports cars and other vehicles increased handling response and traction, particularly in wet and dry
8. Safety Engineering	h) is the way objects move through air

Exercise 9. Pick out all international words from the text.

Exercise 10. Compose a story on one of the topics (up to 100 words):

1. Autosports engineering
2. Key Concepts in Autosports Engineering

Literature:

1. Міністерство Освіти і Науки України Харківський Національний Автомобільно-Дорожній Університет Н. В. Саєнко English for Automotive Engineers Навчальний Посібник з Англійської Мови Для Студентів Автомобільних Спеціальностей Харків ХНАДУ 2023.
2. Вінницький Національний Аграрний Університет English Методичні Вказівки до Самостійної Роботи з Дисципліни «Іноземна Мова» Для Студентів Факультету Механізації Сільського Господарства Денної Та Заочної Форм Навчання Вінниця – 2018.
3. Національна Академія Державної Прикордонної Служби України Імені Б. Хмельницького кафедра Перекладу Англійська Мова: Транспортні Засоби Англійська мова: транспортні засоби : навчальний посібник / Н. В. Берестецька, С. Б. Головня, О. В. Мисечко, В. С. Полюк. – Хмельницький : Видавництво НАДПСУ, 2015. – 428 с.
4. Міністерство Освіти і Науки України Тернопільський Національний Технічний Університет імені Івана Пулюя Кафедра Української та Іноземних Мов English Навчальний Посібник з Англійської Мови для Студентів I-II Курсів Спеціальності «Автомобілі І Автомобільне Господарство» / Ж. В. Баб'як, О. І. Боднар, Л. А. Джиджора, Л. Й. Петришина. – Тернопіль, ТНТУ ім. І. Пулюя, 2013. – С. 92 Тернопіль 2013 .
5. English for technical students = Англійська мова для студентів технічних ВНЗ : навч. посіб. з англ. мови / О. Я. Лазарева, О. О. Ковтун, С. С. Мельник. – Харків : Підручник НТУ «ХП», 2012. – 240 с.
6. Кондрашова О. В. Англійська мова для технічних спеціальностей : навч.-метод. посіб. : у 2 ч. / О. В. Кондрашова, Л. І. Чижова, В. В. Сіора ; МВС України, Харків. нац. ун-т внутр. справ, Кременчуц. льотний коледж. – 2-ге вид., перероб. і допов. – Харків : ХНУВС, 2023. – Ч. 2. – 148 с.
7. Шестопал, О. В. Англійська мова для студентів-автомобілістів : навчальний посіб-ник / Шестопал О. В., Сенченко В. О., Слободянюк А. А. – Вінниця : ВНТУ, 2018. – 75 с.
8. Oxford English Dictionary
9. Merriam-Webster Dictionary Definition of machine
10. Merriam-Webster Dictionary Definition of mechanical
11. Reuleaux, F., 1876 The Kinematics of Machinery, (trans. and annotated by A. B. W. Kennedy), reprinted by Dover, New York (1963)
12. J. J. Uicker, G. R. Pennock, and J. E. Shigley, 2003, Theory of Machines and Mechanisms, Oxford University Press, New York.
13. "Internal combustion engine", Concise Encyclopedia of Science and Technology, Third Edition, Sybil P. Parker, ed. McGraw-Hill, Inc., 2015, p. 998.
14. Materials Science and Engineering: A Volume 286, Issue 2, 15 July 2000, Pages 333–341.

15. Методичні вказівки до практичних занять з англійської мови за спеціальністю 6.0701.06 “Автомобільний транспорт” для студентів II курсу / Укл.: Н.П. Томасевич, М.Г.Томенко, В.Є. Кострова. Одеса – 2008., ОНПУ 39 с.
16. Методичні вказівки до практичних занять з англійської мови за спеціальністю 274 Автомобільний транспорт, Галузь знань: 27 Транспорт для здобувачів 1-го курсу Інституту цифрових технологій дизайну та транспорту (ІЦТДТ). / Авт.: Т.І. Борисенко, І.Ф.Дуванська, М.Г. Томенко, - Одеса: НУОП, 2024- с.70.
17. Kavanagh Marie. English for the Automobile Industry / Kavanagh Marie; Oxford Business English, Express Series. – 2011. – 80 p.