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МЕТОДИЧНІ ВКАЗІВКИ З ДИСЦИПЛІН «АНГЛІЙСЬКА МОВА
НАУКОВОГО СПІЛКУВАННЯ» ТА «ПРОФЕСІЙНА АНГЛІЙСЬКА МОВА»
ЩОДО ВИКОРИСТАННЯ ПРОФЕСІЙНОЇ ТЕРМІНОЛОГІЇ ЗДОБУВАЧАМИ
ДРУГОГО (МАГІСТЕРСЬКОГО) РІВНЯ НАВЧАЛЬНО-НАУКОВОГО
МОРСЬКОГО ІНЖЕНЕРНО-ТЕХНІЧНОГО ІНСТИТУТУ ДЕННОЇ ТА
ЗАОЧНОЇ ФОРМ НАВЧАННЯ ЗА СПЕЦІАЛЬНІСТЮ G11
«МАШИНОБУДУВАННЯ», СПЕЦІАЛІЗАЦІЯ G11.05 «ТРАНСПОРТНІ
ЗАСОБИ ПОРТОВОЇ ІНФРАСТРУКТУРИ»

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Методичні вказівки ухвалені на засіданні кафедри «Іноземні мови та переклад» ОНМУ

Протокол № від 2 від 11.09.2026 р.

Методичні вказівки ухвалені на засіданні НМК Навчально-наукового морського інженерно-технічного інституту ОНМУ

Протокол № 1 від 17.09.2026 р.

Голова НМК ННМІТІ _____ Олександр КАНІФОЛЬСЬКИЙ

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Методичні вказівки з дисциплін «Англійська мова наукового спілкування» та «Професійна англійська мова» щодо використання професійної термінології здобувачами другого (магістерського) рівня навчально-наукового морського інженерно-технічного інституту : метод. вказ. Одеса: ОНМУ, 2026. 38 с.

Методичні вказівки містять необхідну інформацію щодо роботи з текстами та завданнями за відповідним фахом. Вони можуть бути використані для самостійного опрацювання навчального матеріалу з означених дисциплін. У вказівках представлено завдання для самостійної роботи здобувачів, теми для дискусій, тестові завдання, глосарій та рекомендовану літературу.

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ВСТУП

Сучасне машинобудування є однією з провідних галузей, розвиток якої безпосередньо пов'язаний із технологічними змінами, цифровізацією виробництва, автоматизацією та впровадженням інноваційних інженерних рішень. Професійна діяльність сучасного інженера передбачає не лише ґрунтовну фахову підготовку, а й здатність працювати з інформацією, представленою іноземною мовою, використовувати міжнародні професійні джерела та здійснювати ефективну комунікацію у професійному й науковому середовищі.

Англійська мова посідає важливе місце у професійній підготовці майбутніх фахівців у галузі машинобудування. Значна частина сучасної технічної документації, наукових публікацій, інформації про новітні технології, обладнання, матеріали та виробничі процеси представлена саме англійською мовою. Її знання розширює можливості здобувачів освіти щодо опрацювання фахової інформації, ознайомлення із сучасними досягненнями інженерної науки та використання отриманих знань у подальшій професійній діяльності.

Особливого значення у процесі вивчення професійної англійської мови набуває оволодіння фаховою термінологією. Точне розуміння та доречне використання термінів є необхідною складовою професійної комунікації інженера. Термінологічна лексика забезпечує можливість описувати технічні процеси, характеристики матеріалів та обладнання, принципи функціонування інженерних систем, аналізувати професійну інформацію та висловлювати власні думки з питань, пов'язаних із майбутньою спеціальністю.

Для здобувачів другого (магістерського) рівня важливим є подальший розвиток умінь працювати з англійськими текстами професійного та наукового характеру. Такі тексти сприяють не лише розширенню термінологічного словника, а й формуванню навичок аналізу інформації, обговорення актуальних професійних питань та використання англійської мови в науковому спілкуванні. Вивчення фахової лексики у відповідному контексті дає можливість поєднати мовну підготовку зі знаннями, набутими під час опанування спеціальних дисциплін.

Актуальними для сучасного машинобудування є питання впровадження новітніх технологій, автоматизації та роботизації виробництва, використання штучного інтелекту, розроблення сучасних матеріалів, підвищення енергоефективності та зменшення негативного впливу виробничих процесів на довкілля. Робота з англійськими матеріалами відповідної тематики дозволяє здобувачам засвоювати професійну лексику безпосередньо в контексті майбутньої діяльності та розвивати здатність обговорювати фахові проблеми англійською мовою.

Методичні вказівки з дисциплін «Англійська мова наукового спілкування» та «Професійна англійська мова» призначено для здобувачів другого (магістерського) рівня навчально-наукового морського інженерно-технічного інституту денної та заочної форм навчання за спеціальністю G11 «Машинобудування», спеціалізація G11.05 «Транспортні засоби портової інфраструктури». Матеріали спрямовано на опрацювання професійної термінології, розвиток навичок роботи з англійськими фаховими текстами та вдосконалення професійної й наукової комунікації. Методичні вказівки містять тематичні тексти та завдання до них, тестові завдання, теми для дискусій, глосарій і рекомендовану літературу та можуть використовуватися під час аудиторної і самостійної роботи здобувачів.

UNIT I

Text

Innovation and Sustainability in Modern Engineering

In recent years, both shipbuilding and mechanical engineering have undergone a period of rapid transformation. Engineers are facing new challenges related to energy efficiency, environmental impact, and automation. The development of green technologies is now at the core of every major industrial project.

In shipbuilding, designers have been focusing on reducing fuel consumption and lowering emissions through the use of hybrid propulsion systems, advanced hull coatings, and lightweight composite materials. Smart ships equipped with autonomous navigation systems and real-time monitoring sensors are no longer a futuristic idea but a developing reality.

Similarly, mechanical engineering is being reshaped by the concepts of Industry 4.0 – the integration of digital technologies, robotics, and artificial intelligence into manufacturing processes. Engineers are not only designing machines but also creating systems capable of self-diagnosis and predictive maintenance, which significantly increase productivity and safety.

Both fields share a strong commitment to sustainability and innovation. Future engineers are expected to combine deep technical knowledge with environmental awareness and data-driven decision-making. The ultimate goal is to create technologies that are not only efficient but also responsible toward the planet.

Exercise 1. Answer the questions.

1. What challenges are modern engineers facing?
2. How are shipbuilders trying to reduce fuel consumption and emissions?
3. What technologies are associated with Industry 4.0?
4. How can self-diagnosis and predictive maintenance improve engineering systems?
5. What skills and knowledge are future engineers expected to combine?

Exercise 2. Match the words with their definitions.

1. sustainability
2. predictive maintenance
3. autonomous navigation
4. energy efficiency
5. environmental impact

- a) the effect of human or industrial activity on the environment
- b) the ability to use energy with minimal waste
- c) maintenance based on predicting possible equipment failures
- d) the ability of a vessel to navigate with limited human intervention
- e) the development and use of resources without causing long-term environmental damage

Exercise 3. Complete the sentences using the words from the text.

Words: robotics, emissions, composite materials, self-diagnosis, data-driven

1. Modern industries use _____ to automate manufacturing processes.
2. Engineers are developing technologies that help reduce harmful _____.
3. Lightweight _____ are increasingly used in modern engineering.
4. Smart systems can perform _____ to detect technical problems.
5. Modern engineering decisions are increasingly _____.

Exercise 4. Answer the question in 5–7 sentences.

How can innovation and sustainability influence the future of shipbuilding and mechanical engineering?

UNIT II

Text

The Role of Modern Technologies in Mechanical Engineering

Mechanical engineering is one of the oldest and most important branches of engineering. In recent years, rapid technological development has significantly changed the way mechanical engineers work. Modern technologies such as computer-aided design (CAD), 3D printing, artificial intelligence (AI), and advanced materials are transforming the industry and opening new opportunities for innovation.

One of the most important tools in modern mechanical engineering is CAD software. It allows engineers to design complex parts and systems with high precision and efficiency. With simulation tools integrated into CAD systems, engineers can test and optimize their designs before physical production.

Another revolutionary technology is 3D printing. This method enables the creation of prototypes and final products directly from digital models. It reduces production time, costs, and material waste. In mechanical engineering, 3D printing is widely used for prototyping, creating complex parts, and even producing tools.

Artificial intelligence and machine learning are also beginning to play a crucial role in this field. AI can be used to predict equipment failures, optimize manufacturing processes, and improve product design. Smart systems help engineers make better decisions based on large amounts of data.

Furthermore, the development of new materials, such as composites and smart materials, expands the possibilities of design and manufacturing. These materials often have better strength-to-weight ratios, corrosion resistance, and other desirable properties that improve product performance.

In conclusion, modern technologies are driving the evolution of mechanical engineering. Future engineers must be ready to adapt to these changes, continue learning, and apply innovative tools in their professional activities.

Exercise 1. Answer the questions.

1. How have modern technologies changed mechanical engineering?
2. What advantages does CAD software provide to mechanical engineers?
3. How is 3D printing used in mechanical engineering?
4. What tasks can artificial intelligence perform in modern engineering?

5. How do advanced materials improve product performance?

Exercise 2. Match the words with their definitions.

1. computer-aided design (CAD)
2. 3D printing
3. artificial intelligence
4. prototype
5. smart materials

- a) a preliminary model used to test a design
- b) materials that can respond to changes in their environment
- c) the use of computer software to create and modify engineering designs
- d) technology that enables computer systems to perform tasks requiring intelligent decision-making
- e) a manufacturing process that creates physical objects from digital models

Exercise 3. Complete the sentences using the words from the text.

Words: simulation, prototypes, equipment failures, composites, manufacturing processes

1. Engineers use _____ tools to test designs before physical production.
2. 3D printing allows engineers to create _____ quickly and efficiently.
3. Artificial intelligence can help predict _____. UNIT III
4. Modern _____ often have a high strength-to-weight ratio.
5. AI can be used to optimize _____.

Exercise 4. Answer the question in 5–7 sentences.

How can modern technologies influence the future development of mechanical engineering?

UNIT III

Text

Environmental Issues in Engineering Practice

Engineering equipment is widely used in industry, construction and transport. At the same time, its operation can have a negative impact on the environment. Pollution, noise and waste are the main problems connected with technical systems.

Air pollution often appears when machines burn fuel. Exhaust gases from engines contain harmful substances that affect air quality. Water pollution can happen when oil or fuel leaks from equipment into rivers or seas. Soil pollution is also possible in industrial areas.

Noise is another serious issue. Heavy machines and engines create high sound levels that can harm both people and nature. That is why engineers try to design quieter systems and use sound protection methods.

Waste from industrial processes must be controlled. Old parts, oil and technical materials should be collected and processed properly. Recycling helps to reduce environmental damage.

Engineers also develop solutions to reduce ecological problems. They design cleaner engines, improve fuel efficiency and use new technologies that are less harmful to nature.

Modern engineering also focuses on the efficient use of energy and natural resources. Energy-efficient equipment can reduce fuel consumption and decrease harmful emissions. Engineers increasingly consider the environmental impact of materials throughout their life cycle, from production and operation to recycling or disposal.

Environmental responsibility is becoming an important part of professional engineering practice. Engineers must consider not only the technical performance and economic efficiency of equipment but also its long-term effects on the environment. The development of sustainable technologies can help industries combine technological progress with environmental protection.

Exercise 1. Answer the questions.

1. What environmental problems are connected with engineering equipment?
2. How can machines and engines cause air and water pollution?

3. Why is noise considered an environmental problem?
4. How can recycling reduce environmental damage?
5. Why should engineers consider the long-term environmental effects of equipment?

Exercise 2. Match the words with their definitions.

1. air pollution
2. fuel efficiency
3. recycling
4. harmful emissions
5. environmental impact

- a) the process of collecting and processing materials so that they can be used again
- b) the effect that human activity or technology has on the environment
- c) the contamination of the atmosphere by harmful substances
- d) the ability to use fuel effectively with minimum waste
- e) substances released into the atmosphere that can damage the environment

Exercise 3. Complete the sentences using the words from the text.

Words: waste, noise, natural resources, cleaner engines, sustainable technologies

1. Industrial processes can produce _____ that must be properly controlled.
2. Heavy machines and engines can create high levels of _____.
3. Modern engineering focuses on the efficient use of energy and _____.
4. Engineers design _____ to reduce environmental pollution.
5. The development of _____ can combine technological progress with environmental protection.

Exercise 4. Answer the question in 5–7 sentences.

How can engineers reduce the negative environmental impact of modern equipment?

UNIT IV

Text

Automation and Robotics in Mechanical Engineering

Automation and robotics have become essential components of modern mechanical engineering. They are widely used in manufacturing to improve productivity, precision and safety. Automated systems can perform repetitive or physically demanding operations while engineers supervise processes, analyze data and make technical decisions.

Industrial robots are commonly used for welding, assembly, painting and material handling. Their ability to perform operations with high accuracy makes them particularly valuable in mass production. Modern robotic systems can also be equipped with sensors that allow them to monitor operating conditions and respond to changes in the production environment.

Another important development is the integration of robotics with computer-controlled manufacturing systems. Engineers use specialized software to program machines, control production processes and collect information about equipment performance. Such systems can identify deviations from normal operating conditions and help engineers detect technical problems before serious failures occur.

Automation also contributes to workplace safety. Robots can perform tasks in environments involving high temperatures, heavy loads or hazardous materials. At the same time, engineers remain responsible for the installation, maintenance and safe operation of automated equipment. This requires knowledge of mechanics, electronics, control systems and computer technologies.

The development of artificial intelligence is expanding the capabilities of industrial automation. Intelligent systems can process large amounts of production data, optimize operating parameters and support predictive maintenance. As a result, manufacturing processes can become more efficient and equipment downtime can be reduced.

For future mechanical engineers, knowledge of automation and robotics is becoming an important professional competence. Engineers need to understand how automated systems operate and how they can be integrated into modern production.

The effective combination of engineering knowledge and digital technologies will continue to influence the development of mechanical engineering.

Exercise 1. Answer the questions.

1. Why are automation and robotics widely used in modern manufacturing?
2. What operations can industrial robots perform?
3. How do computer-controlled systems help engineers monitor equipment?
4. How can automation improve workplace safety?
5. What professional knowledge is required to work with automated equipment?

Exercise 2. Match the words with their definitions.

1. automation
2. industrial robot
3. sensor
4. equipment downtime
5. predictive maintenance

- a) a device that detects changes in operating conditions
- b) a period when equipment is not operating
- c) the use of technology to perform processes with limited human intervention
- d) maintenance based on information used to predict possible equipment failures
- e) a programmable machine designed to perform industrial operations

Exercise 3. Complete the sentences using the words from the text.

Words: sensors, productivity, hazardous materials, operating parameters, technical problems

1. Automation can increase _____ in manufacturing.
2. Modern robotic systems use _____ to monitor operating conditions.
3. Robots can perform operations involving _____.
4. Intelligent systems can optimize _____ during production.
5. Monitoring systems help engineers detect _____ before serious failures occur.

Exercise 4. Answer the question in 5–7 sentences.

How can automation and robotics influence the future of mechanical engineering?

UNIT V

Text

Advanced Materials in Mechanical Engineering

The development of advanced materials plays an important role in modern mechanical engineering. Engineers need materials that can withstand high temperatures, mechanical loads, corrosion and long periods of operation. The correct choice of material directly influences the reliability, efficiency and service life of machines and engineering structures.

Traditional materials such as steel, aluminium and cast iron remain widely used in mechanical engineering. However, modern industries increasingly require materials with improved properties. High-strength alloys, composites and smart materials allow engineers to create components that are lighter, stronger and more resistant to demanding operating conditions.

Composite materials combine two or more different materials to achieve specific mechanical properties. They can provide high strength while reducing the total weight of a component. For this reason, composites are increasingly used in transport systems, industrial equipment and other engineering applications where weight reduction is important.

Smart materials represent another significant area of development. Some of these materials can respond to changes in temperature, pressure or mechanical stress. Their properties make them useful in sensors, control systems and structures that need to adapt to changing operating conditions.

Modern engineers also consider the environmental impact of materials. The selection of recyclable materials, reduction of material waste and development of

longer-lasting components can make manufacturing more sustainable. Engineers therefore evaluate not only mechanical properties and production costs but also the entire life cycle of a material.

Knowledge of materials science is essential for future mechanical engineers. Understanding how materials behave under different conditions helps engineers select appropriate materials, prevent component failures and improve the performance of machines. The continued development of advanced materials will create new possibilities for safer, lighter and more efficient engineering systems.

Exercise 1. Answer the questions.

1. Why is the choice of material important in mechanical engineering?
2. What properties are required from modern engineering materials?
3. Why are composite materials used in engineering applications?
4. How can smart materials respond to changing operating conditions?
5. Why do engineers consider the entire life cycle of a material?

Exercise 2. Match the words with their definitions.

1. composite material
 2. corrosion
 3. mechanical load
 4. smart material
 5. service life
- a) the period during which a component or machine can operate effectively
 - b) a material capable of responding to changes in its environment
 - c) the gradual deterioration of a material caused by chemical or environmental effects
 - d) a material produced by combining different materials to obtain specific properties
 - e) a force or stress acting on a component or structure

Exercise 3. Complete the sentences using the words from the text.

Words: alloys, recyclable, mechanical properties, component failures, weight reduction

1. High-strength _____ are widely used in modern engineering.
2. Composite materials are useful when _____ is important.
3. Engineers study the _____ of materials before selecting them.
4. Knowledge of material behaviour can help prevent _____.
5. The use of _____ materials can make manufacturing more sustainable.

Exercise 4. Answer the question in 5–7 sentences.

How can advanced materials influence the future development of mechanical engineering?

TOPICS FOR DISCUSSION

1. The Role of Innovation in Modern Mechanical Engineering.
2. Sustainable Development and Environmental Responsibility in Engineering.
3. Modern Technologies in Mechanical Engineering.
4. Automation and Robotics in Modern Manufacturing.
5. The Role of Artificial Intelligence in Engineering.
6. Advanced Materials and Their Applications in Mechanical Engineering.
7. Energy Efficiency in Modern Engineering Systems.
8. Digital Technologies in Engineering Practice.
9. Environmental Challenges in Mechanical Engineering.
10. The Future of Mechanical Engineering.

TESTS

TASK I

Choose the correct answer

1. What is one of the main goals of sustainable engineering?
 - a) Increasing material waste
 - b) Reducing environmental impact
 - c) Increasing fuel consumption
 - d) Avoiding technological development

2. Which technology allows engineers to create and modify digital models of mechanical components?
 - a) CAD
 - b) Recycling
 - c) Welding
 - d) Casting

3. What is one of the main advantages of 3D printing?
 - a) It increases material waste.
 - b) It eliminates digital modelling.
 - c) It allows engineers to create prototypes directly from digital models.
 - d) It prevents the production of complex parts.

4. How can artificial intelligence be used in mechanical engineering?
 - a) To predict equipment failures
 - b) To increase harmful emissions

- c) To replace all engineering materials
 - d) To prevent data analysis
5. What can cause air pollution during the operation of engineering equipment?
- a) Recycling
 - b) Exhaust gases
 - c) Digital models
 - d) Sensors
6. Why is recycling important in engineering practice?
- a) It increases industrial waste.
 - b) It reduces environmental damage.
 - c) It increases noise levels.
 - d) It reduces equipment reliability.
7. What is a common application of industrial robots?
- a) Welding
 - b) Fuel production
 - c) Natural resource extraction
 - d) Environmental pollution
8. What is the function of sensors in automated systems?
- a) To increase equipment weight
 - b) To monitor operating conditions
 - c) To produce industrial waste
 - d) To reduce data collection
9. Why are composite materials widely used in modern engineering?
- a) They always increase the weight of components.
 - b) They can provide high strength with reduced weight.

- c) They cannot withstand mechanical loads.
- d) They are used only for decorative purposes.

10. What is meant by the service life of an engineering component?

- a) The period during which it can operate effectively
- b) The time required to design it
- c) The number of engineers who operate it
- d) The cost of producing it

TASK II

Choose the correct answer.

1. What is predictive maintenance used for?
 - a) To increase production waste
 - b) To replace engineering design
 - c) To predict possible equipment failures
 - d) To increase equipment downtime
2. Which materials are created by combining two or more different materials?
 - a) Composite materials
 - b) Traditional fuels
 - c) Industrial lubricants
 - d) Exhaust materials
3. What is one advantage of energy-efficient equipment?
 - a) Higher fuel consumption
 - b) Increased material waste
 - c) Higher emission levels
 - d) Reduced energy consumption
4. Which technology allows physical objects to be produced from digital models?
 - a) Artificial intelligence
 - b) 3D printing
 - c) Predictive maintenance
 - d) Recycling
5. Why are simulation tools used in engineering?
 - a) To test and optimize designs before physical production

- b) To increase the weight of components
 - c) To produce harmful emissions
 - d) To replace all manufacturing processes
6. What is one important benefit of automation in manufacturing?
- a) Increased equipment failures
 - b) Reduced accuracy
 - c) Improved productivity
 - d) Increased material waste
7. What can smart materials respond to?
- a) Only changes in colour
 - b) Changes in temperature, pressure or mechanical stress
 - c) Only production costs
 - d) Changes in company management
8. Why do engineers develop cleaner engines?
- a) To increase noise levels
 - b) To use more natural resources
 - c) To increase exhaust gases
 - d) To reduce environmental pollution
9. What can robotic systems use to monitor operating conditions?
- a) Sensors
 - b) Fuels
 - c) Coatings
 - d) Waste materials
10. Why is materials science important for mechanical engineers?
- a) It eliminates the need for engineering calculations.
 - b) It replaces manufacturing technologies.
 - c) It helps engineers understand material behaviour under different conditions.
 - d) It prevents engineers from using advanced materials.

TASK III

Choose the correct answer.

1. What is one of the main purposes of Industry 4.0?
 - a) To reduce the use of digital technologies
 - b) To integrate digital technologies into manufacturing processes
 - c) To eliminate automated systems
 - d) To increase manual operations

2. What can autonomous navigation systems allow a vessel to do?
 - a) Increase fuel consumption
 - b) Produce composite materials
 - c) Navigate with limited human intervention
 - d) Increase harmful emissions

3. Why are lightweight materials important in engineering?
 - a) They can reduce the total weight of engineering components
 - b) They always increase production costs
 - c) They prevent the use of modern technologies
 - d) They reduce the reliability of machines

4. What can artificial intelligence do with large amounts of production data?
 - a) Eliminate all technical equipment
 - b) Increase material waste

- c) Prevent equipment monitoring
 - d) Process data and support engineering decisions
5. What is one possible source of water pollution in engineering practice?
- a) Digital modelling
 - b) Oil or fuel leaks
 - c) Computer-controlled systems
 - d) Predictive maintenance
6. Why do engineers use sound protection methods?
- a) To increase equipment weight
 - b) To improve fuel consumption
 - c) To reduce the negative effects of noise
 - d) To increase mechanical loads
7. What is one responsibility of engineers working with automated equipment?
- a) Installing and maintaining automated systems
 - b) Increasing industrial pollution
 - c) Avoiding equipment monitoring
 - d) Reducing workplace safety
8. What does equipment downtime mean?
- a) A period of increased production
 - b) A method of material recycling
 - c) A type of digital modelling
 - d) A period when equipment is not operating
9. What property is important for materials used in demanding operating conditions?
- a) Low resistance to mechanical loads

- b) Resistance to corrosion
- c) Short service life
- d) High material waste

10. Why do engineers consider the life cycle of a material?

- a) To increase the amount of industrial waste
- b) To avoid evaluating material properties
- c) To consider its environmental impact from production to disposal
- d) To reduce the use of recyclable materials

TASK IV

Choose the correct answer.

1. What is one advantage of computer-controlled manufacturing systems?

- a) They increase material waste
- b) They allow engineers to control production processes
- c) They prevent equipment monitoring
- d) They reduce production accuracy

2. What can engineers use to improve the reliability of mechanical equipment?

- a) Predictive maintenance
- b) Increased material waste
- c) Higher noise levels
- d) Increased fuel consumption

3. Why are high-strength alloys used in mechanical engineering?

- a) They always have a short service life
- b) They cannot withstand mechanical loads
- c) They can provide high strength under demanding operating conditions
- d) They increase corrosion

4. What is one function of industrial automation?

- a) To increase manual operations
- b) To reduce equipment reliability
- c) To increase production waste
- d) To improve the efficiency of manufacturing processes

5. Why is corrosion resistance important for engineering materials?

- a) It helps components operate effectively for a longer period
- b) It increases material deterioration
- c) It reduces component reliability
- d) It increases maintenance problems

6. What can engineers achieve by using digital technologies in manufacturing?

- a) Higher levels of industrial waste
- b) Better control and analysis of production processes
- c) Lower accuracy of engineering systems
- d) More frequent equipment failures

7. How can robots improve safety in industrial environments?

- a) By increasing exposure to hazardous conditions
- b) By increasing manual handling of heavy loads
- c) By performing dangerous or physically demanding operations
- d) By reducing equipment monitoring

8. What is one purpose of equipment monitoring?

- a) To increase mechanical loads
- b) To increase production costs
- c) To prevent data collection
- d) To identify changes in operating conditions

9. Why do engineers evaluate the mechanical properties of materials?

- a) To select materials suitable for specific operating conditions
- b) To increase component failures
- c) To reduce equipment service life
- d) To increase material waste

10. What can improve energy efficiency in mechanical engineering?
- a) Increasing unnecessary energy consumption
 - b) Using more efficient equipment and technologies
 - c) Increasing harmful emissions
 - d) Reducing equipment reliability

TASK V

Choose the correct answer

1. What is one important requirement for modern mechanical engineering systems?

- a) Increased material waste
- b) High reliability and efficiency
- c) Higher levels of pollution
- d) Reduced equipment safety

2. How can engineers reduce equipment downtime?

- a) By increasing mechanical loads
- b) By reducing equipment monitoring
- c) By using predictive maintenance
- d) By increasing production waste

3. What is one benefit of using advanced materials in mechanical engineering?

- a) Improved performance of engineering components
- b) Increased corrosion
- c) Shorter service life
- d) Reduced resistance to mechanical loads

4. Why are digital models important in modern engineering?

- a) They increase industrial emissions.
- b) They prevent engineers from testing designs
- c) They reduce the accuracy of engineering calculations
- d) They allow engineers to develop and analyse designs before production

5. What can help engineers detect changes in equipment performance?

- a) Increased fuel consumption
- b) Monitoring systems
- c) Industrial waste
- d) Mechanical overload

6. Why is fuel efficiency important in engineering equipment?

- a) It helps reduce fuel consumption and environmental impact
- b) It increases harmful emissions
- c) It increases energy waste
- d) It reduces equipment reliability

7. What is one advantage of smart manufacturing systems?

- a) They prevent the collection of production data
- b) They increase the number of equipment failures
- c) They can analyse information and support production control
- d) They eliminate the need for technical monitoring

8. Why do engineers develop longer-lasting components?

- a) To increase material consumption
- b) To increase production costs
- c) To reduce equipment reliability
- d) To extend service life and reduce waste

9. What is one purpose of engineering simulation?

- a) To increase the weight of mechanical components
- b) To evaluate system behaviour before physical production
- c) To increase harmful emissions
- d) To reduce the accuracy of engineering designs

10. What professional competence is increasingly important for future mechanical engineers?

- a) The ability to combine engineering knowledge with modern digital technologies
- b) The ability to avoid automated systems
- c) The ability to increase material waste
- d) The ability to reduce technological development

GLOSSARY

A

Advanced materials – передові матеріали
Artificial intelligence (AI) – штучний інтелект
Automated system – автоматизована система
Automation – автоматизація

B

Bearing – підшипник
Bending – згинання
Bolt – болт
Braking system – гальмівна система
Breakdown – поломка
Brittleness – крихкість

C

CAD (Computer-Aided Design) – автоматизоване проєктування
Composite materials – композитні матеріали
Computer-controlled system – система з комп'ютерним керуванням
Corrosion – корозія
Corrosion resistance – корозійна стійкість

D

Data analysis – аналіз даних
Data-driven decision-making – прийняття рішень на основі даних
Digital model – цифрова модель
Digital technologies – цифрові технології

E

Energy efficiency – енергоефективність
Engineering equipment – інженерне обладнання
Engineering system – інженерна система
Environmental impact – вплив на довкілля

Equipment downtime – час простою обладнання

Equipment failure – відмова обладнання

F

Fuel consumption – споживання палива

Fuel efficiency – паливна ефективність

Harmful emissions – шкідливі викиди

High-strength alloy – високоміцний сплав

Industrial equipment – промислове обладнання

G

Gear – зубчасте колесо

Gearbox – коробка передач

Grinding – шліфування

H

Hardness – твердість

Heat treatment – термічна обробка

Hydraulic system – гідравлічна система

I

Industrial robot – промисловий робот

Industry 4.0 – Індустрія 4.0

Innovation – інновація

Intelligent system – інтелектуальна система

J

Joint – з'єднання

Journal bearing – підшипник ковзання

Jig – кондуктор

K

Kinematics – кінематика

Kinetic energy – кінетична енергія

Knurling – накатування

Key – шпонка

Keyway – шпонковий паз

L

Lathe – токарний верстат

Life cycle – життєвий цикл

Load — навантаження

Load capacity — вантажопідйомність

Lubricant — мастильний матеріал

Lubrication — змащування

Lubrication system — система змащування

Laser cutting — лазерне різання

Linear motion — лінійний рух

Linkage — важільний механізм

Load-bearing component — несучий елемент

M

Machine learning – машинне навчання

Manufacturing – виробництво

Manufacturing process – виробничий процес

Material handling – переміщення матеріалів

Materials science – матеріалознавство

Mechanical engineering – машинобудування

Mechanical load – механічне навантаження

Mechanical properties – механічні властивості

Monitoring system – система моніторингу

N

Natural resources – природні ресурси

Noise – шум

Noise reduction – зниження рівня шуму

Nominal load – номінальне навантаження

Non-destructive testing – неруйнівний контроль

Numerical control – числове програмне керування

Nut – гайка

Nozzle – сопло

Normal stress – нормальне напруження

Notch – надріз

Notch sensitivity – чутливість до надрізу

Nanomaterials – наноматеріали

O

Operating conditions – умови експлуатації

Operating parameters – робочі параметри

P

Predictive maintenance – прогнозне технічне обслуговування

Production process – виробничий процес

Productivity – продуктивність

Prototype – прототип

Q

Quality – якість

Quality assurance – забезпечення якості

Quality control – контроль якості

Quality management – управління якістю

Quality standards – стандарти якості

Quenching – гартування

Quick-release mechanism – швидкорознімний механізм

R

Recycling – перероблення

Reliability – надійність

Robotics – робототехніка

S

Safety – безпека

Self-diagnosis – самодіагностика

Sensor – датчик

Service life – строк служби

Simulation – моделювання

Smart materials – розумні матеріали

Smart manufacturing – розумне виробництво

Sustainable development – сталий розвиток

Sustainable technologies – сталі технології

T

Technical problem – технічна проблема

Technological development – технологічний розвиток

Three-dimensional (3D) printing – тривимірний (3D) друк

U

Ultrasonic testing – ультразвуковий контроль

Ultimate strength – гранична міцність

Uniform load – рівномірне навантаження

Universal joint – карданний шарнір

Upgrading – модернізація

V

Valve — клапан

Vibration – вібрація

Vibration analysis – аналіз вібрацій

Vibration control – контроль вібрацій

Viscosity – в'язкість

Voltage – напруга

W

Waste – відходи

Weight reduction – зменшення маси

Workplace safety – безпека на робочому місці

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