МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
НАЦІОНАЛЬНИЙ ТЕХНІЧНИЙ УНІВЕРСИТЕТ
«ХАРКІВСЬКИЙ ПОЛІТЕХНІЧНИЙ ІНСТИТУТ»

МЕТОДИЧНІ ВКАЗІВКИ

до виконання самостійної роботи

«Контрольні запитання з лекційного матеріалу для виміру якості навчання»

з курсу «Основи екології»

для студентів, що вивчають предмет на іноземній мові

METHODICAL INSTRUCTIONS

for independent work

«Control questions on the lecture material to determine the quality of learning »

on the course «Ecology »

for students who are studying the subject in English

Харків 2018

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INTRODUCTION

Ecology is word of the Greek origin, means " a science about the house " (oikos - the house, logos - science), i.e. it is possible to tell, that it is a science about our house - planet the Earth. It is a science about mutual relation between alive organisms and environment.

The main direction of researches is the study of features of development of interrelations between by organisms, groups by organisms of different ranks, ecological systems and lifeless by part ecological systems, and also research of influence of the natural and anthropogenesis factors on functioning ecological systems and biosphere as a whole.

Questions of the lecture material of the subject «Ecology» for students knowledge self-control, obtained on the lectures, are drived at the methodical indications. Also, the answers on the proposed questions are drived in chaotic order. Its necessary that to invoke of the students thinking about correct answers, answering to the questions.

1 QUESTIONS

Lecture 1

1. What is ecology?

2. How the mutual relation at this time between a nature and man was under construction?

3. What are the global ecological problems?

4. What is the main direction of ecological researches?

5. What are the tasks of ecology?

Lecture 2

1. What is the ecosystem divided into?

2. What are the biocenose and biogeocenose?

3. What is the homeostasis?

4. Ecological factors and their types

5. What is the synergism?

Lecture 3

1. What are the basic types of organisms?

2. What is the Lotka-Walter low?

3. What are the main definitions of Oparin theory of an origin of life?

4. What are the components of sphere of life? (слайд №5)

5. What are the alive substance and bioweight?

Lecture 4

1. Temperature as ecological factor. The main definitions

2. What light parameters are environmentally important?

3. What is the law of minimum?

4. What is the adaptation? Division of adaptation.

Lecture 5

1. What is the influence of magnetic field on the organism?

2. How many natural contaminations are released into the biosphere annually?

3. What are the anthropogenic factors?

4. What are the types of ecological accidents?

5. What are the main characteristics of technical sphere?

Lecture 6

1. The general characteristics of active methods of environment protection

2. What are the main ways of achievement little off cuts of manufacture?

3. What is the ecologization of manufacture?

4. The general characteristics of passive methods of environment protection

5. The types of clearing methods and the main characteristics of mechanical and chemical methods

2 ANSWERS

Find the correct answers to questions

1. The tasks of ecology can conditionally be divided on theoretical and practical (engineering). Successfully decide these tasks the expert should to own the certain knowledge in the field of ecology allowing it to estimate the manufacture from ecological positions, i.e. the expert should have ECOLOGICAL PHILOSOPHY. Therefore activity of the engineer with reference to questions of ecology should include:

• 1. Optimization technological, engineering and project-designers of the decisions outgoing from the minimal damage NE and health of the man;

• 2. Forecasting and estimation of possible negative consequences working, reconstructed and projected enterprises or technological processes for NE, man, flora and fauna, and also village, wood and fish facilities;

• 3. Duly revealing and updating concrete technological processes, inflicting damage NE, menacing to health of the man negatively influencing on natural and anthropogenesis systems.

2. Ecology is word of the Greek origin, means " a science about the house " (oikos - the house, logos - science), i.e. it is possible to tell, that it is a science about our house - planet the Earth. It is a science about mutual relation between alive organisms and environment.

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4. Harmoniously, since the man took from a nature equally so much how many it was necessary for maintenance of a vital level.

In due course began to grow the population of a planet. There was a first demographic explosion. It was finished the period of adaptation of mankind to a nature and the period of its intensive use began.

The man begins to use force of a wind, water, the channels, city are under construction, the various kinds of an industry develop: the metallurgy, glass manufacture, ever more than ground is used for agricultural needs. The mankind began to render to a nature the first damage: in an atmosphere begin to be thrown out oxides of sulfur, nitrogen, oxides of metals.

5. Change of an atmosphere and climate; Change of hydrosphere; Change of soil; Change of an animal and flora; Change in a village and wood facilities; Demographic problems, including problem with manufacture of products of a meal; Urbanization, problem of the occupied of village; Influence of change nature and health of the man; Problem of development of an industry (problem of raw material); Electro power problems (hydroelectric power station, thermal, nuclear); Problem of transport; Development of nature protection education, increase of ecological culture of a society; Problem of wars and ecological accidents connected to them.

6. This question today is still poorly investigated but as it is very urgent and has the large importance, in it actively are engaged in all advanced countries. The substances of the unidirectional action strengthening NEGATIVE action each other refer to as SYNERGIST.

SYNERGISM is reaction organism on the combined action of two or several factors at which total effect usually more than action everyone of a separately taken component

7. MICROECOSYSTEM (trunk rot of a tree),
MEZOECOSYSTEM (wood, pond, bog),
MACROECOSYSTEM (ocean, continent).
Global ECOSYSTEM one is a BIOSPHERE.

8. THE ECOLOGICAL FACTORS - all elements of environment, which influence existence and development organisms and on which organisms react by reactions of the adaptation.

Allocated three groups of the ecological factors are allocated:

Abiotical – Inorganic conditions, factors - physical, chemical and e.t.. Including light, temperature, chemical structure of water.

Biotical of the FORM of INTERACTION BETWEEN organisms. Fit genetics, zoo genetics, micro-bio- genetics

ANTHROPOGENOUS - the forms of activity of the man

9. Bio-cenose - association in common living alive organisms or historically usual set of plants and animals occupying BIOTOP.

Bio-geo-cenose - homogeneous site of a terrestrial surface with the certain structure of alive and lifeless components incorporated in uniform system by an exchange of substances, energy and information.

10. HOMEOSTASIS - condition of internal dynamic balance of NATURAL SYSTEM supported by regular renewal of its basic structures, substantial-power structure and constant functional self-regulating of its components.

HOMEOSTASIS is characteristic and is necessary for all natural systems from space up from organism to atom.

11. The alive substance is a set of bodies alive organisms, occupying the Earth. The quantity of alive substance is expressed through BIOWEIGHT. BIOWEIGHT is expressed in terms of weight or energy amount of alive substance of organisms, come on unit of the area or volume.

12. The alive substance of biosphere is formed by organisms of three basic types.

1. PRODUCERS or it autotrophs - organisms, which create organic substances at the expense of recycling a solar energy, water, carbonic gas and mineral salts. the PLANTS, which on the Earth approximately 350,000 kinds concern to them. Their

weight on calculations Vernadsky makes approximately 2.4 $*10^{12}$ tons. 2. Consumers or heterotrophs - organisms which receive energy at the expense of feed (meal) producers by consumers or others. To them concern a Consumers 1 or herbivores (plant-eating animals), 2 Consumers 2 and higher orders or Carnivores, which eat animals. Quantity of kinds of this group greatest - 1.5 million, and weight makes $2.3*10^{10}$ tons .

3. Decomposers or destructor - organisms which decompose organic substance producers and consumers up to simple elements - waters, carbonic gas and mineral salts. Are be primary decomposers are mushrooms and bacteria, which decompose during a feed the rests of plants and the remains of animals (process of rotting). By mushrooms and bacteria eat (have), in turn, insects, worms, mites etc. Organisms of this type are totaled 75 thousand kinds, and their total weight makes 1.8 10^{8} tons.

13.

- Atmosphere
- Litosphere
- Biosphere
- Hydrosphere
- Cryosphere
- Anthosphere

14. It is a Pair of differential equations allowing modally to calculate competitive mutual relation between two kinds in systems such as "predator - victim", "parasite - owner", "consumer - forage".

15. Among questions, which interest a science, philosophy, religion, and each man, what follows is the question, what such life? How it has appeared on the Earth?

It is traditionally considered, that the first scientific theories about an origin of life develop Oparin and Haldane.

In what the theory of an origin of life on Ground Oparin consists?

Abiogenic synthesis. From lifeless as a result of chemical, physical and other processes the synthesis complex organic of connections and biopolymers began. Accidentally, the complex molecules incorporate in amino acid peptides and those further create primary fibers from which are synthesized primary alive organisms.

LACKS of the THEORY Oparin? There is no fact confirming an opportunity abiogenic of synthesis on the Earth,even elementary alive organism from lifeless connection.

16. Organisms react to change of the factors of an environment adaptation by reactions.

Evolutional produced and hereditarily the fixed features alive ORGANISMS, ensuring normal ability to live in conditions of the dynamical ecological factors refer to as adaptations.

ADAPTATION are subdivided on:

-MORPHOLOGICAL structure organism (skeleton etc.)

-PHYSIOLOGICAL - feature enzyme of a set in a digestive path of animals determined by structure of food.

-BEHAVIOR (ethological) - various forms, creation of refuges with the purpose of maintenance of normal heat exchange, harboring etc.

17.

-Duration of influence (length of day), intensity (in power sizes), qualitative structure radiant of a flow (spectral structure).

-Alive ORGANISMS is very thin react to these parameters, is especial on duration of influence. It is expressed in such general biological phenomenon as PHOTOPERIODISM, which is connected with biorytmology, in particular, to a phenomenon of internal CLOCKS.

-Early was mentioned about biotic the factors. Let's consider some features of this group of the factors.

18. The temperatures in the universe change within the limits of many thousand degrees and in comparison with them the limits of temperatures, at which the existence of the inhabitants of the Earth is registered, are insignificant (from -200 up to +100 ^{o}C). However ability to live alive ORGANISMS proceeds in narrower range of temperatures.

Importance of heat as factor consists first of all that temperature ORGANISMS depends on temperature of an environment, it also renders direct influence on SPEED and CHARACTER of course of all chemical reactions making an exchange of substances. (At increase of temperature on 10 degrees the reaction is accelerated in 2 - 3 times [the law Vant- Gopha]). Source of heat on the Earth is radiant energy of the Sun, and also is warm bowels of the earth of our planet. The temperature conditions of environment (nature) the closest by an image are connected to action of solar light, but are defined not only them. On a temperature mode of district renders essential influence light ABSORPTIVE ABILITY of GROUND, IT IS HEAT - CONDUCTIVITY, HEAT CAPACITY, NIGHT cooling, MOISTURE-CAPACITY, etc.

19. The considered laws of influence of the ecological factors on alive ORGANISMs and character of answer-back reactions last are known as the Law of an optimum. The idea about that existence and endurance ORGANISM is determined by the weakest part in a circuit of his ecological needs (requirements) for the first time was stated in 1840 by the German chemist by Ustasom fon Liebih, formulated the LAW of a MINIMUM: the endurance ORGANISM is defined by the weakest part in a circuit of his ecological requirements, i.e. the vital opportunities LIMIT the ECOLOGICAL FACTORS amount and which quality are close to necessary ORGANISM or Ecosystem to a MINIMUM their further decrease conducts to destruction ORGANISM.

This law is important for ECOLOGICAL FORECASTING, PLANNING and EXAMINATION of the PROJECTS, allows rationally to carry out replacement of scarce substances and influences on less scarce.

20.

1. Presence of the technical equipment, buildings and structures, lines of the communications, power sources and lines of electro transfers;

2. Emissions and dumps on environmental natural environment, cut off of material natural resources, received as a result of processing, substances, materials etc.;

3. Is a source of power pollution of biosphere;

4. TS the adjustable part of biosphere is artificial;

5. Objects TS - stationary both non-stationary, local and moving.

21.

-occurrence e.m.f. in driven conductors;

-formation(education) of forces, at movement of carriers of charges in critical sites that can cause an aggravation of diseases;

-occur paramagnetic and diamagnetic effects, that is defined(determined) by change of character of movement electrons in atoms;

-occurs rotary diffusion, which defines(determines) delay of biochemical reactions in organism

-and others.

22.

1. Natural anomaly (long drought, mass death of cattle etc.), quite often arising on the basis of direct or indirect influence of economic activity of the man on the natural processes which have resulted (brought) in adverse ecological and economic consequences or even destructions of the population of certain region;

2. Failure technogenic of the device (atomic power stations, tanker etc.) resulting (bringing) to catastrophic changes in natural environment and, as a rule, of mass destruction alive organisms.

23.

1) Sea salt 350 - 650 million ton.

2) Soil dust (at the expense of erosion) 200 - 300 million ton.

3) Products eruptions of volcanoes 70 - 80 million ton.

4) Gases in result of wood fires 70 - 75 million ton.

5) Space dust 3 - 3,5 million ton.

24. To the anthropogenic factors concern:

growth of the population;

demographic problems and problems of maintenance by a feed(meal);

pollution of biosphere by emissions, dumps and by the off cuts;

urbanization and formation (education) of megalopolises.

25. There are different methods of clearing: mechanical, chemical, physical, physic-chemical , thermal and biological.

THE MECHANICAL methods are used for clearing air and flows of waters from the firm at them firm and liquid parts. Clearing is carried out under action of forces of weight, inertia, centrifugal, thermal movement, phenomena of wetting etc.

THE CHEMICAL methods or reagents, use for transformation of substances that contain in cut off in substances with the necessary properties. For example, transformation of the dissolved substances into insoluble finishing pH - parameter of sour and alkaline drains to meanings (importance) that allow their dump in reservoirs etc.

26. THE ACTIVE methods directly influence on a source of pollution. Their essence consists in improvement existing and development new technological processes and equipment. The active methods of struggle with pollution of

biosphere are most progressive, because allow maximum to lower weight and concentration material or level of power pollution acting in biosphere and development new technological processes and equipment. Development of active methods of protection requires not only development of new technological processes but also balance them with by development of technology and equipment that prevents emissions or limiting them to allowable levels.

27. THE PASSIVE methods are directed on reduction of concentration and levels of pollution on ways of their distribution in biosphere, that is non-interference to technological processes, and only struggle with pollution, that are formed by application of the following organizationally-technical measures:

- Rational accommodation of sources of pollution;

- Localization of sources of pollution;

- Clearing emissions in biosphere.

28.

- creation of the complex circuits, that allow to take the most of all components of raw material and that provide limit is possible concentration (LPC) in flows, that go away;

- creation of the circuits with complete cycle of water that allow sharply to reduce need (requirement) of the enterprise in freshen to natural water;

- creation of energy-technical of the circuits with recycling of heat, therefore some manufactures turn from energy using to energy made;

- a choice of technological modes that provide output of high quality which can be used more

- the long term in world (global) practice in a measure of development of scientific and technical progress occurs by step by step approach (approximation) to little off cuts to manufacture.

29. «Ecologyzation» of manufacture is a way of improvement existing and creation of new technological processes which more full satisfaction of a principle not infringements of ecological balance.

The basic directions is the development and scientific substantiation of new technological processes, optimization of use resources, their complex and repeated use, and also re-cultivating of broken natural environment.

Conclusions

The methodical indications are developed for the foreign students, whom learning subject «Ecology» in English.

Also, the methodical indications are aimed for more deep learning of the lecture material with help of the self-control method.

The questions and answers, which drived in these methodical indications, are at the limits of the lecture material only.

LIST OF RECOMMENDED LITERATURE

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