Акционерное общество «Всероссийский научно-исследовательский институт гидротехники имени Б.Е. Веденеева»

Примерные задания

к вступительному экзамену по английскому языку для поступающих в аспирантуру по специальности «Гидротехническое строительство, гидравлика и инженерная гидрология»

Общие вопросы:

1. Изучающее чтение и перевод текста с иностранного языка на русский.
2. Пересказ текста по страноведению.

Индивидуальные вопросы:

3. Беседа по теме *My scientific interests.*
4. Беседа по теме *The international and national programs for support of young scientists.*
5. Беседа по теме *Prospects of my scientific career.*
6. Беседа по теме *Universities as scientific centers.*
7. Беседа по теме *Role of foreign languages in the international communication and science.*

Приложения к билетам

THE CIVIL WAR

Lincoln lost the senatorial race, but in 1860 he and Douglas faced each other again — as the Republican and Democratic candidates for president. By now the tension between North and South was extreme. In 1859, John Brown, as abolitionist zealot, had tried to begin a slave rebellion in Virginia by attacking an army munitions depot. Brown was quickly captured, tried and hanged, whereupon many Northerners hailed him as a martyr. Southern whites, however, now believed that the North was preparing to end slaverous bloody warfare. Douglas urged Southern Democrats to remain in the Union, but they nominated their own presidental candidate and threatened to secede if the Republicans were victorious.

Every Southern and border state voted against Lincoln, but the North supported him and he won the election. A few weeks later, South Carolina voted to leave the Union. It was soon joined by Mississippi, Florida, Alabama, Georgia, Louisiana, Texas, Virginia, Arkansas, Tennessee and North Carolina. These 11 states proclaimed themselves an independent nation — the Confederate States of America — and the American Civil War began.

Southerners proclaimed that they were fighting not just for slavery; after all, most Confederate soldiers were too poor to own slaves. The South was waging a war for independence — a second American Revolution. The Confederates usually had the advantage of fighting on their

home territory, and their morale was excellent. They had superb soldiers, cavalrymen and generals, but they were greatly outnumbered by Union (Northern) forces.

Lincoln's first priority was to keep the United States one country; freedom for black people was a secondary objective. But Lincoln realized that by making the war a battle against slavery he could win support for the Union at home and abroad.

THE 1848 RUSH FOR GOLD

The discovery of gold had been made in 1848 by James W. Marshall, who was building a mill on Sutter's Creek, about a hundred miles from San Francisco. He tried to keep his discovery a secret, but within a week, everybody in San Francisco knew about it. A few days later, almost all of San Francisco's 800 inhabitants left for Sutter's Mill. The news spread rapidly to the East, and then to Europe and Asia.

Stories of quick and easy money made men forget their jobs, their friends, and their families. Thousands of men quit their jobs, sold their businesses, said good-bye to their families, and joined in the rush for California.

The cheapest way to the West was by land. It look longer and was far more dangerous than other ways, but it was the most popular route for the average man. By land, it was more than three thousand miles from the East to California. High mountains, broad rivers, thick forests, and hot deserts lay between the two coasts. But greed overcame the fear of danger, and men left their homes with no regrets.

Nine out of every ten persons who went to California were men. A few courageous women went too. One of the women was a ninety-year-old grandmother, who made the long trip by foot and on horseback, and arrived in perfect health. People from all walks of life who went west quickly learned that travel in the wilderness is not easy. Some were killed by Indians, others starved, and many turned back when they had no more food. Yet thousands reached California safely, following the trails of the mountain men.

A very few became rich. Some of the earliest miners made thousands of dollars a month. A few averaged a few hundred dollars a week for many months. One or two men mined as much as $5,000 in a single day. But by 1850, the ordinary miner could expect only about $15 a day for his labors.

THE GREAT DEPRESSION

On October 24, 1929, — "Black Thursday" — a wave of panic selling of stocks swept the New York Stock Exchange. Once started, the collapse of share and other security prices could not be halted. By 1932, thousands of banks and over 100,000 businesses had failed. Industrial production was cut in half, farm income had fallen by more than half, wages had decreased 60%, new investment was down 90% and one out of every four workers was unemployed.

The Republican president, Herbert Hoover, asked employers not to cut wages, and he tried to reduce interest rates and support farm prices. In 1932, he approved the creation of the Reconstruction Finance Corporation, which loaned money to troubled banks.

But these measures were inadequate to deal with the economic collapse, and Hoover resisted proposals for federally funded relief and work projects. He believed that he could end the Depression by balancing the national budget and by restoring business confidence. He assured the public that recovery was "just around the corner," but the economy continued to decline. To masses of unemployed workers, Hoover seemed uncaring and unable to help them. In the 1932

election, he was resoundingly defeated by Democrat Franklin D. Roosevelt, who promised "a New Deal for the American people."

Roosevelt's New Deal programs did not end the Depression. Although the economy improved as a result of this program of government intervention, full recovery was finally brought about by the defense build-up prior to America's entering the Second World War. Many Americans, young and old, still feel great affection for Franklin D. Roosevelt, the president who remembered "the forgotten man at the bottom of the economic pyramid."

PEARL HARBOR ATTACK

The surprise aerial attack on the US naval base at Pearl Harbor, Hawaii, by the Japanese, which took place on December 7, 1941, precipitated the entry of the US into World War II. The Attack climaxed a decade of worsening relations between the US and an increasingly expansionist and militaristic Japan.

Admiral Isoroku Yamamoto, the commander in chief of Japan's combined fleet, had planned the attack against the US Pacific Fleet with great care. Once the fleet was out of action, Japan's road to Southeast Asia and the Pacific Islands would be open. On November 23 a Japanese fleet, including 6 aircraft carriers, 2 battleships, 3 cruisers and 11 destroyers, sailed to a point 440 km North of Hawaii. From there, about 360 planes were launched.

The assault began at 7:55 AM (local time). The anchored ships in the harbor made perfect targets, and since it was Sunday morning (a time chosen by the Japanese for maximum surprise) they were not fully manned. The Japanese torpedo planes, especially, hit the US battleships with deadly effect. The "Arizona", "California" and "West Virginia" were sunk, and the "Oklahoma" capsized. A second wave of planes swept over Pearl Harbor about 45 minutes later, inflicting heavy damage on battleships "Maryland", "Nevada", "Tennessee" and "Pennsylvania". Ten other ships were sunk or severely damaged, and more than 150 aircrafts were destroyed. Military casualties totalled more than 3,000, including over 2,000 killed. The Japanese lost only 29 planes and 5 midget submarines.

The Pearl Harbor attack severely crippled US naval and air strength in the Pacific. The "date which will live in infamy", as US President Franklin Roosevelt termed it, united the US public and swept away any earlier support for neutrality. On December 8, Congress declared war on Japan with only one dissenting vote.

List of topics for exam

1. Мои научные интересы и научная деятельность. Моя кафедра.
2. Перспективы моей научной карьеры.
3. Университеты как научные центры. Ведущие научные школы в моей области знаний.
4. Наука в исторической перспективе (появление и развитие моей научной области).
5. Современное состояние науки в моей области знаний.
6. Роль иностранного языка в международном сотрудничестве и решении научных проблем.
7. Международные и российские программы поддержки молодых ученых.
8. Вопросы научной этики и гражданской ответственности ученых.

1 My scientific interests and scientific works. My department.

I am a hydraulic engineer, a graduate of the Civil Engineering Institute of Peter the Great St. Petersburg Polytechnic University.

Currently, hydrotechnical construction is aimed at a set of works intended for the use of water resources, as well as preventing harmful consequences that can be caused by water (for example, floods, soil washout, etc.). Hydraulic engineering is engaged in the creation of such objects as shipping canals, dams, sea and river ports, treatment facilities, reservoirs, etc.

In the construction of hydraulic structures, a number of different construction and installation works are usually required. This means a great deal of responsibility on the hydraulic engineer. This specialist must exercise strict control over the construction of hydraulic structures and the operation of ready-made structures. Hydraulic engineers should be able to analyze design solutions for construction work on hydraulic structures, predict possible problems, and carry out the necessary preventive measures.

My scientific interests and the dissertation are devoted to……

2 Prospects of my scientific career

I think ***science is important*** for most people living in modern world for a number of reasons. In particular, science is important for mutual understanding, as it involves cooperation among scientists and scholars and sharing knowledge.

Making a decision about a potential scientific career can be a daunting and time consuming endeavor. My future scientific career, as I can see it at present, should be connected with hydrotechnical construction.

Therefore, ***my dissertation is devoted to*** the ……..

During my postgraduate course I would like to take part in different conferences and symposia, make presentations and write articles. Soon after ***defending my dissertation*** and getting my Ph.D., I am going to find an ***appropriate job*** in a Russian or maybe a foreign company. I intend to apply my scientific knowledge and to help people support their policies and programs. I would like to take part in some ***international projects*** in order to use the results of my PhD research to the fullest extent. I am also willing to work in collaboration with my foreign colleagues and partners from different countries. To my mind, conducting ***joint research*** is very beneficial for science and is a really good opportunity for my scientific career development.

I also think that teaching is quite a good way of scientific career development. Proceeding with my research into the sphere of hydrotechnical construction, I'll do my best to obtain my ***doctoral degree*** in the same sphere and after defending my rehabilitation dissertation I could possibly become a full professor at my university.

3 Universities as the scientific centers. The leading scientific schools in my sphere of interests

In most countries universities have developed as educational and scientific centers. People enter universities in order to broaden their knowledge in a certain sphere of science of their choice. They are determined to have a career and to feel independent in their professional and social life. Besides, any university is also a scientific center as most professors are well-known scientists who keep in touch with production sector of economy to develop their sphere of science. The ***activities of a university as a scientific centre*** include scientific research; organization of conferences; publication of scientific studies; consulting; training; implementation of scientific projects. Given all the features mentioned, modern successful university can be regarded as a scientific center.

The Peter the Great St. Petersburg ***Polytechnic University*** is a good example of a scientific center numbering 23 scientific directions. The university maintains close relations with Russia's Academy of science and over 100 foreign universities. Among the scientists who studied and worked in the Polytechnical University are the ***Nobel Prize winners:*** Nikolay Semionov for research into the mechanism of chemical reactions; Piotr Kapitsa for basic inventions and discoveries in the area of low-temperature physics; Zhores Alfiorov for basic work on information and communication technology; developing semiconductor heterostructures used in high-speed and optoelectronics.

The ***leading scientific school*** in my sphere of interests in Russia is the Great Active Laboratory. It is the unity of people who develop control management in economic and social systems. The leading scientists of this Lab, Dmitry Novikov and Vladimir Burkov, are well-known in our field. We are also trying to ***establish mutually beneficial contacts*** with analogous research Labs at Helsinki and Warsaw universities.

4 Наука в исторической перспективе (появление и развитие моей научной области).
Science in retrospect (stages of my scientific sphere development)

I am a hydraulic engineer. Hydrotechnical engineering is a major branch of science and technology concerned with the study of water resources and their use for various purposes. There is a wide range of responsibilities of hydraulic engineer depending on specialisation. For instance, dam maintenance and repair, building canals, numerical modelling of structures, etc.

My dissertation is devoted to (name the problem) … . The choice of this subject is motivated by the fact that there is always something to be improved in my field. For example, it would be a breakthrough to get rid of the assumptions, which were considered earlier to obtain the results that are more accurate.

For better understanding of the current problems, it is highly important to be familiar with the history and development of my field. The development of hydraulic engineering in Russia is connected up with Vedeneev VNIIG, which was founded in 1921 to work out amelioration and water management problems. Specialists of the Institute took an active part in the implementation of the GOELRO plan which covered the construction of Volhovskaia, Dneprovskaia, Svirskih, and others hydroelectric plants. After reorganization and incorporation with a number of organizations in 1931 the Institute became one of the leading research centers in hydraulic power engineering and construction.

Since the sixties of the last century the Institute has been taking part in the development of the standard and methodological documentation (SNiP, GOST, VSN, guidelines, recommendations and other standard documents) concerning the main directions of the Institute's activities.

At the end of the 1980's the Institute started to work on the validation of offshore structure designs including platforms and terminals for oil and gas production. The structures have to resist loads from ice field shearing, waves, wind, currents and seismic impacts during construction and operation.

The industry is developing rapidly regarding the technological growth. Thus, more sophisticated methods can be used to obtain more accurate results. In my research, I am approaching the solution of …. (name the problem) drawing on the consideration of international experience and recent inventions in my scientific field.

Literature:

http://www.vniig.rushydro.ru/en/institute/history/

5 State of science development in my field of knowledge

The current state of science at my institute.

Vedeneev VNIIG is one of the key research institutes in the innovative development program of RusHydro Joint Stock Company. The main directions of its innovative activity are the following:

new designs of spillway structures;

hybrid modeling of hydraulic processes in hydropower;

organization of an experimental basis for wave effects;

development of new compositions and technologies for the construction of dams from soil materials;

mathematical model development of the dam-foundation system for the Sayano-Shushenskaya Hydropower plant (HPP) in the COSMOS and ANSYS software complexes;

development of the protective flood structure monitoring in St. Petersburg;

development of special technical conditions for Sakhalin-1 project, and so on.

The main innovative processes in the research and development (R&D) include activities in the field of IT technologies: the ANSYS, PLAXIS, MODFLOW software systems using a new computing system (computing cluster) on Hydro Power Blade System.

Vedeneev VNIIG maintains 54 patents for inventions, 37 patents for utility models used in many energy and construction projects, which indicates the significant scientific potential of the institute. Vedeneev VNIIG has 11 certificates for computer programs officially registered with ROSPATENT and 2 certificates for databases, many of which are constantly used for research and development work contracts with third-party organizations.

International cooperation is one of the principal activities for the Institute. Our Institute participates in research support of design and construction of a number of the projects abroad. Being members of international research organizations, our specialists actively work in the field of experience exchange with foreign partners.

6 The role of foreign languages in the international communications and science

The role of foreign languages is increasing as it is absolutely necessary for good specialists and, of course, for postgraduate students to know foreign languages. To my mind, ***language is the main medium for communication*** and we can't imagine our life without it.

Some people learn foreign languages because they need them in their work, others travel abroad and communicate in a foreign language. Nowadays ***English is considered to be the main language*** of communication, science and technology. English language is used in about 100 countries all around the world. Today if you don't know English, you are in danger of being excluded from what's going on – in education, at work and especially in the world of technological advances. It is the language of progressive science and technology, trade and cultural relations, commerce and business. It is the universal language of international aviation, shipping, navigation, sport, diplomacy.

As for me I speak good English and also have basic knowledge of German and French. There are some interesting works in English devoted to the subject of my dissertation, which I intend to use to make my research more profound and comprehensive.

It is worth mentioning some statistics concerning the ***significance of the English language***. English is the most widely learned second language in the world; 80% of all information stored electronically is in English, it is the main language used throughout the world in the Internet; one half of the world's scientific literature is written in English.

Foreign languages play an important role in ***International collaboration and in solving challenging scientific problems***. Due to foreign languages we can communicate with our colleagues and business partners, take part in international conferences and scientific projects. The most striking example of the international scientific project is our collaboration with the US in space research.

Learning foreign languages is a long process and it takes a lot of time and patience. But the knowledge of a foreign language is absolutely necessary for every educated person.

7 The international and national programs for support of young scientists

In my opinion, international collaboration is very important in solving scientific problems. Today there are ***a lot of programs supporting young scientists***. There are different kinds of such programs: Russian and foreign ones, business, government and international varieties.

International organizations, governments and private funds develop different programs to encourage scientific research of young scientists. There are a lot of ***examples of international programs supporting young scientists.*** For instance, the International Forum of young scientists, the World Academy of young scientists, the UNESCO programs. Most of the funds supporting young scientists specialize in a specific science field (e.g. Austrian Program – Lieben Prize – specializes in the sphere of technology and nanotechnology).

There are also many ***Russian programs*** supporting young scientists; President, Government, Subject of Government Grants, Funds (of the fundamental research, of the humanitarian research, venture, Bortik's, Potanin's awards), federal programs, etc. Grants are given to researchers in different fields of science on a competitive basis. There are similar programs on regional and non-governmental basis (e.g. Potanin's fund). Potanin's fund develops versatile programs to encourage scientific research of young scientists, postgraduate students among them. Usually information about a grant is available on different sites via the Internet. It can also be accessed at foreign embassies and consulates.

At our university, for example, it is possible to become «The Student of the Year» and «The Post-graduate of the Year» and get corresponding prizes. In conclusion, we can summarize that nowadays a young scientist has plenty of opportunities of receiving support while fulfilling his/her research.

8 Aspects of scientific ethics and liability of scientists

Today scientific ***ethics is a number of moral rules or a set of moral principles*** and every scientist should follow these rules to be successfully engaged in scientific effort. The history knows many examples when discovery for the purpose of improvement of people's life and science development, led to fatal consequences. For example, possibility to use ***energy of nuclear reaction*** has opened a new energy source for people, but at the same time it turned out to be a very powerful and destructive nuclear weapon. Another example is physicians, who have taken the Hippocratic Oath to save life and alleviate suffering. Now they face a dilemma of whether to use medical devices that can prolong life at the cost of increasing suffering, or to follow patients' requests to be allowed to die without any extraordinary life saving precautions or even to be provided with medications or devices to end life.

There are quite a few ethical problems in science nowadays, for example:

- ♦Nuclear (biological, chemical) weapons
- ♦Animal testing
- ♦Using embryos in experiments with stem cells
- ♦Hydrogen bomb
- ♦Euthanasia, i.e. practice of deliberately killing people who don't want to live any more.

One of the latest examples of scientific ethics was given by Grigori Perel'man. On 18 March 2010, it was announced that he had met the criteria to receive the first Clay Millennium Prize Problems award of US $1,000,000 for resolution of the Poincaré conjecture but on July 1st, 2010, he turned down this one million dollar prize saying that he believes his contribution in proving the Poincare conjecture was no greater than that of U.S. mathematician Richard Hamilton, who first suggested the program for the solution.

All scientists should follow high ethical standards, and a code of ethics based on relevant norms enshrined in international human rights instruments. The social ***responsibility of scientists*** requires that they maintain high standards of scientific integrity and quality control, share their knowledge, communicate with the public and educate the younger generation.