UKRAINIAN MEDICAL STOMATOLOGICAL ACADEMY

Methodical Instruction N. 9
for the 6th year students’ self – preparation work
(at class and at home)

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<th>The subject under the study</th>
<th>Hygiene and Ecology</th>
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<td>Module No.</td>
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<td>Topic</td>
<td>Legislative fundamentals of sanitary control in hygiene of labour.</td>
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1. The topic basis:
The creation of favorable working conditions, decrease disease of the workers is one of major tasks of public health services and hygienic science. In this connection the increase of quality of preparation of the doctors on physiology and hygiene of work is required. Correctly deciding the questions, connected to it. It is necessary to have clear representation about social and biological essence of work, to know the characteristics of this process, its influence on working.

2. Specific goals:
A=1. 1) To have general knowledge of the topic studied;
A=2. 2) To understand, to remember and to use the knowledge received;
A=2. 3) To learn methods of hygienic estimation of difficulty and straining of work;
A=3. 4) To form the professional experience by reviewing, training and authorizing it.

3. Basic knowledge, experience, skills necessary for studying the topic in connection with other subjects:

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<th>To be able to</th>
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<td>Preclinical disciplines - physiology of physical and intellectual work; - methods of prevention of fatigue.</td>
<td>- determine and estimate parameters of difficulty and straining of work.</td>
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4. Materials for the before – class work and self – preparation work.
4.1. List of main terms, parameters, characteristics, which should be taken by the student in preparation for the lesson:

<table>
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<th>Concept</th>
<th>Definition</th>
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<tr>
<td>Weight of work</td>
<td>is characterized by amount of moved cargoes in kg and capacity (size of work for a unit of time).</td>
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<tr>
<td>Intensity of work</td>
<td>is characterized intellectual, operator work, is estimated under requirements to attention, a nervous - emotional pressure, monotony, etc.</td>
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<tr>
<td>Work ability</td>
<td>ability of the person to long work without decrease qualitative and...</td>
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quantity indicators (with high efficiency of work).

4.2. Theoretical questions to the lesson:
1. Work and labour as physical and philosophical concepts. Labour as social category. Division of labor in society.
2. Articles about labour protection in the Constitution of Ukraine.
4. Occupational hazards’ classification according to State Standard 12.0-003–74 “Dangerous and hazardous industrial agents”.
5. Physical occupational hazards, their classification and significance in the professional pathology.
6. Chemical occupational hazards. Classification of dangerous and hazardous chemical agents of industrial environment, variety of their impact on organism. Occupational poisonings.
8. Psycho-physiological dangerous and hazardous industrial agents, kinds of pathology caused by these agents.
9. Labour physiology and main issues, which it studies. Concept of labour hardness and intensity.
11. Methods and measures of occupational pathology prevention and labour protection in industry.
12. Types of work, their physical and hygienic characteristics. Physical work: its intensity. Mental work and its tension. Peculiarities of operator’s work.
13. Physiological changes in the organism of the worker in the process of his physical and mental work and during operator’s work. Fatigue and overload, their explanation and scientific substantiations of their development.
14. Modern principles and criteria of hygienic assessment of labour and its classifications according to its intensity and tension.
15. Methods of research of functional condition of organism at physical and mental work. Ergographic, physiologic and psycho-physiological tests. Work capacity and fatigue analysis by means of training simulators, tremor meters, dynamometers, chrono-reflex timers etc.

4.3. Practical work (tasks), which are performed at the lesson:
Assessment of working conditions and industrial environment agents on example of situational tasks. According to these tasks and referring to legislative normative documents, the students draw corresponding conclusions on work conditions; define recommendations for improvement of those conditions and suggest other disease-prevention activities.

The contents of the topic:
The text:
For prophylaxis of unfavorable influence industrial condition for workers' organism it is necessary to know that there are the dangerous and harmful factors at the industrial enterprises.
These factors can be of the physical, chemical, biological nature. The wrong regimen of the working day, irrational arrangement of the working place not corresponding to industrial equipment can also have harmful and dangerous influence on the workers' organism.

The harmful production factor is a factor whose influence on the worker under the certain conditions can result in the disease or stable decrease of capacity for work.

The dangerous production factor is a factor whose influence on the workers under the certain conditions can result in a trauma or other sudden sharp worsening of health.

The hardness of work is the characteristic of the working processes reflecting predominant loading on the locomotor apparatus and functional systems ensuring its activity. Intensity of work is the characteristic of the working process reflecting predominant loading on the central nervous system.

Modern hygienic classification of labor is based on these main characteristics. There are four classes of conditions and character of labor.

The first class is characterized by optimum conditions and character of labor. Unfavorable influence of harmful and dangerous production factors on workers' health is excluded.

The second class is characterized by permissible conditions and character of labor. Levels of harmful and dangerous production factors do not exceed the hygienic norms and do not render.

The second class includes permissible levels of harmful and dangerous industrial factors, which do not exceed hygienic standards. They do not render unfavorable action on the workers' health and state of health of their descendants.

The third class is harmful and dangerous factors, which exceed hygienic norms and rules (including psychological factors of labor activity). These factors render stable disturbances of functions of the organism, make worsen of health and decrease of capacity for work.

The third class includes four degrees of industrial conditions and character of labor.

The first degree is conditions and character of labor, which render functional disturbances in the workers' organism. These disturbances disappear, when influence of industrial factors is stopped.

The second degree includes industrial conditions and character of labor, which render stable functional disturbances; as a result general morbidity of workers increases, at the same time early forms of occupational diseases appear.

The third degree is conditions and character of labor, which can cause early stages of professional diseases and increase of general morbidity.

The fourth degree of labor conditions is characterized by high level of general morbidity of industrial workers and high level of professional pathology.

The fourth class is extreme conditions of work. Real danger beginning of serious acute diseases, professional lesions and occupational poisonings happen. These conditions create high risk for workers' life.

Fundamentals of Ukrainian legislation in the field of hygiene and labour protection

Labour protection legislation in Ukraine is regulated by government (High Council (Verkhovna Rada), Cabinet of Ministers, Ministry of Labour and Ministry of Public Health), trade union organizations and other institutions and public organizations.

1. Constitution of Ukraine guarantees: “everybody has right to work …, to safe working conditions. It is forbidden to use the labour of women and adolescents at dangerous for health works” (Article 43); “Everybody who works has the right to rest. This right is guaranteed by half day work for the workers of a number of professions and productions that are determined by the law, and by working time reduction at night …” (Article 45); “Everybody has the right to health protection, medical care and medical insurance” (Article 49) etc.
2. Law of Ukraine “On provision of sanitary and epidemic safety of the population” approved by Rada on 24.02.1994. Also this law states “Citizenry has the right to: … safe for health labour conditions; reparation of damages, inflicted to their health … compulsory medical examinations.” It is envisaged to remove from work those individuals who refuse compulsory medical examinations and vaccinations.

Legislation provides for a single state list-register of dangerous hazards, make of a state sanitary examination of industrial construction projects, production techniques, raw materials, half-finished products, integrated products, prevention of diseases, injuries, poisonings etc. It is envisaged to remove from work those individuals who refuse compulsory medical examinations and vaccinations.

3. Law of Ukraine on labour protection approved by Cabinet of Ministers of Ukraine by № 64 from 1993 provides for creation of proper hygiene and sanitary conditions in industry, prevention of injury causes, occupational diseases and poisonings, reduction of noise, vibration and other harmful effects, waste treatment and extermination etc.

Legislation provides for realization of wide health-improving and preventive measures, compulsory medical examinations, preventive medical examinations, rendering of medical and preventive help, help in prosthetics to disabled workers, sanitary education.

An important place in the labour legislation is occupied by the Labour Code (LC, 1992) that was elaborated by trade union organizations, Ministry of Public Health (MPH), other departments. Lawbook includes a big number of acts about accident prevention, sanitation in the production, labour protection of womankind and adolescents, elderly people; about collective agreements between employers and employees; about internal regulations at the enterprises, provision with individual protectors, working clothes, footwear etc.

Ministry of Public Health has worked out “Principals of Ukrainian legislation on health protection” № 2801 – XII from 1992; “Sanitary code for microclimate of working zones” and “Maximum allowable concentrations (MAC) of harmful substances in the air of the working zone” (State Standard 12.1.085 - 88); “Regulations of commissioning procedure for finished construction projects” (Resolution of the Cabinet of Ministers № 431 from 1992); Sanitary regulations for iron industry enterprises (№ 2527 - 82) and for number of other industries etc.

A special place among documents of sanitary legislation is occupied by legal acts, rules and instructions: “Regulations on procedure of amercement of the enterprises, institutions and organizations for breach of labour protection statutory acts” (Resolution of the Cabinet of Ministers № 754 from 1993); “Procedure of ceasing or withholding investment activity in case of violation of Sanitary legislation” (Order of MHP № 65 from 1995), Order of MPH about suspension of individuals at breach of sanitary legislation (№ 65, 66, 67 from 1995); about criminal liability for rough violations of sanitary legislation etc.

**Dangerous industrial hazards (Abstract from State Standard 12.0.003 - 74)**

According to this standard all dangerous industrial hazards are divided into 4 groups: physical, chemical, biological and psycho-physiological.

**Industrial physical hazards are:**
- movable machines, mechanisms, unprotected movable elements of production equipment, feedstock, materials, goods that move, other mechanical agents;
- hot or cold microclimate of the working zone, high levels of infrared radiation (hot shops in metallurgy industry, boiler shops etc.), hot water or steam;
- increased or decreased barometric pressure and its leaps;
- high noise level, vibration, infra- and ultra-mechanical fluctuations of air or hard surfaces;
- high levels of radio region electromagnetic oscillations, electric magnetic fields of commercial frequency, static electricity;
- high levels of ionizing radiation (X-radiation, gamma-radiation, corpuscular radiation);
- insufficient or excessive illumination of work places, low contrast, high luminosity, its
dazzle, unevenness, pulsation of the light, stroboscopic effect;
- high dust content in the air, fuel and explosive gases (methane in the coal mines).

Group of chemical dangerous industrial hazards includes:
- according to their action on organism - irritant, general toxic, sensibilizing,
carcinogenic, mutagenic and teratogenic;
- according to their penetration route into organism: through respiratory tract, digestive
system, skin (chemical burns);
- according to their tropism: pneumo-, neuro-, hepato-, hemato-, nephro-, dermato- and
polytropic;
- according to level of toxicity: extremely toxic (MAC in the air < 0.1 mg/m$^3$ ), highly
toxic (MAC 0.1 – 1.0 mg/m$^3$), medium toxic (MAC 1.0 – 10.0 mg/m$^3$), low toxic (MAC > 10,0
mg/m$^3$).

Group of biological dangerous industrial hazards includes those biological objects, which
impact on the workers causes diseases, poisonings and injuries:
- zoonotic bacterial, viral, fungal infections (anthrax, foot-and-mouth disease, Bovine
Spongiform Encephalophaty (BSE), tularemia), invasions, allergies (from animal and plant
dust) etc.;
- plant toxins and venoms (like snake hunters) etc.;
- biological production objects: antibiotics, protein-vitaminous concentrates, growth
agents, bioactive preparations etc.

Group of psycho-physiological industrial hazards includes:
- excessive physical activities: static (hold of heavy loads); dynamic (lifting and
displacement of heavy loads and their intensity); hypodynamia, forced body position, overstrain
of some organs;
- neuropsychic overstrains: mental overstrains, overstrains of attention and analyzers,
very rapid change of production processes, information, work monotony, psychological and
emotional overloads (like “chief- subordinate” interrelations).

According to the character and extent of energy expenditure, physical labour is characterized by
its weight and intensity, and mental activity, like operator’s – by its intensity.

According to the State Standard 12.1.005 – 88 “General hygiene and sanitary
requirements for air in the working zone” physical labour is divided into light one (energy
expenditure – below 150 large calories per year), medium complexity (150 – 200 large calories
per year), heavy one (200 – 250 large calories per year), and very heavy labour (> 250 large
calories per year).

According to its tension, mental, operator’s work is divided into: non-tensioned, slightly
tensioned, tensioned, super tensioned.

In accordance to the listed agents of industrial hazards “List of occupational diseases and
instruction for its application” was approved by the Order № 23/36/9 from 2.02.1995 of the
Ministry of Social Policy and Ministry of Labour.

Occupational diseases caused solely by industrial and occupational hazards, their
consequences in the near and distant future as well as consequences of non-occupational
diseases caused by occupational hazards (like arterial hypertonia caused by vibration) were put
on the list.

Acute and chronic occupational diseases and poisonings are recognized.
Acute occupational disease (intoxication) begins suddenly, after only one impact of a relatively high concentration of toxic chemical agents (during one shift) in the air of the working zone or levels or doses of other hazards.

Chronic occupational diseases occur as the result of long-term exposure to low (but exceeding MAC, MAL, MAD) concentrations, levels and doses of occupational and industrial hazards.

According to approved “List…” occupational diseases are divided into 7 groups:

1. diseases caused by chemical agents: acute and chronic intoxications of different tropism (neuro-, hemo-, hepato-, nephro-, poli-, dermatotropic, allergic etc.);
2. diseases caused by industrial particulate pollutants: black-lung diseases, dust bronchitis, rhino-pharyngolaryngitis, allergies;
3. diseases caused by physical agents: ionizing radiations (acute, chronic radiation sickness, local radiation injuries, long-term consequences – malignant tumors); non-ionizing radiations (laser, ultraviolet, infrared); decompression - caisson sickness; acute, chronic overheating; noise, vibratory diseases etc.;
4. diseases caused by overload and overstrain of certain organs and systems: coordination neurosis (at milkmaidens, violin players, linotypers), radiculitis, tendovaginitis, arthrosis, bursitis, thrombophlebitis; laryngitis at singers, teachers, progressive myopia etc.;
5. diseases caused by biological agents: infectious and parasitogenic diseases at stock-breeders, vets, infectiologists, bacterial laboratory assistants etc.;
6. allergic diseases: conjunctivitis, rhinitis, bronchial asthma, dermatitis, eczema, urticaria etc., that occur when one works with corresponding agents of plant or animal origin;
7. neoplasms – malignant tumors when working with carcinogenic substances of physical (ionizing radiations, ultraviolet radiation) and chemical (3, 4-benzpyrene, resins etc.) origin.

Considering listed industrial hazards and occupational diseases and poisonings that they can cause, a task of the physicians – specialists in occupational hygiene, occupational pathologists, and physicians of different specialties of medical departments of industrial plants and patient care and preventive institutions is:
- to study hazards of industrial environment, engineering processes and their compliance with hygienic regulations;
- to study impact of different hazards of industrial environment, (engineering process, air of the working zone, raw materials, half-products, end products, accompany products, wastes and industrial emissions);
- to study state of health of workers, their general occupational disease incidence;
- diagnostics and treatment of occupational diseases and poisonings, prevention and medical examination, sanatorium-and-spa treatment of the workers, participation in the work of Medical and Social Commission of Experts (MSCE), Medical Controlling Commissions (MCC), Medical and Labour Commission of Experts (MLCE) etc., examination commission of occupational pathology, ascertainment of disability etc.

Preventive medical measures must include:
- participation in development of technical and engineering sanitation of working conditions (airing, packaging, automation, mechanization, remote control etc.);
- scientific development of hygienic regulations, different sanitary legislation; Industrial Engineering (IE). (see appendices 1 - 7);
- preventive and running check by sanitary inspectors;
- health education and preventive work in the work collective (teaching sanitary regulations, use of overalls and personal protectors, clinical and preventive nutrition, water consumption schedule).

Methods and means of measurement of industrial hazards and working conditions (microclimate, noise, vibrations, natural and artificial illumination, electromagnetic radiation etc.) were learnt by students in the corresponding hygiene sections, therefore they are just mentioned in this lecture.

Methods and indications of environmental impact on organism and health were learnt by students in the previous sections of hygiene and physiology, pathologic physiology, biochemistry, lectures of clinical chairs, therefore in this lesson they are just listed.

Personal protective equipment of body, respiratory tract, eyes and ears are considered in “Personal hygiene” section.

PROFESSIONAL HARMFUL FACTORS AND OCCUPATIONAL DISEASES.
PREVENTION PROFESSIONAL PATHOLOGY.

Professional harmful factors (PHF) are the factors influencing on working people and capable to cause violations of health - occupational diseases.

Primary tasks of hygiene of work in the relation of PHF;
1. Study sources, conditions of occurrence and parameters of PHF on manufacture.
2. Study action of PHF on organism and its systems in experiment with laboratory animals.
3. Investigation cases occupational diseases on manufacture.

Classification of PHF.
In hygiene of work allocate the following groups PHF:
1) Connected to violations hygienic conditions on manufacture (not optimum microclimate, action harmful professional factors etc.)
2) Connected to the wrong organization of work (excessively intensive, heavy, long work, monotony of work etc.)
3) Connected to lacks of working conditions (the small area of the workplace, the compelled position of a body etc.)

According to State Standard "Dangerous and harmful professional factors. Classification" all PHF are divided on:

Dangerous professional factor - can cause sharp violation of health or death of the person
Harmful professional factor - can cause chronic violation of health - occupational disease.

Classification PHF in State Standard:
1. Psycho-physiologic and physical factors in the organization of work, the lacks of a workplace and the equipment (the psychological and physical overloads, the compelled position of body, overstrain of separate bodies and systems)
2. Physical professional factors (not optimum microclimate, illumination, increased noise level, vibrations, radiation, electromagnetic fields)
3. Chemical professional factors (industrial poisons) - chemical substances, used on manufacture.
4. Biological professional factors (microbes, substances protein nature, allergens)
5. Industrial traumatism (mechanical, thermal, electric traumas).

Diagnostics and prevention professional pathology.

There is order of Ministry of Health of Ukraine N 45 in basis of diagnostics and prevention professional pathology , which contains:
1) The list of manufactures and trades for which preliminary and periodic physical examinations working are obligatory.
2) The order of realization such surveys, structure medical commission for surveys.
3) The list of medical contra-indications for reception at various kinds of manufactures.
4) The list of diagnoses of occupational diseases and poisonings.

Purpose, kinds and the organization physical examinations working.

Preliminary physical examinations are for again acting for work with harmful and dangerous working conditions with the purpose:

a) To admit to work only those which state of health completely meets the requirements of a given trade,
b) To not admit to work the persons having deviations in health which can amplify under influence of working conditions, and also those who can be a source of infectious or parasitic illnesses.

Periodic physical examinations are regular medical inspection working in harmful or dangerous conditions. Periodicity of them is determined by the order N 45. Tasks of these physical examinations;

a) To reveal early attributes of occupational diseases
b) To reveal the general diseases interfering the further work
c) To appoint individual treatment-and-prophylactic actions.

Concept and classification occupational diseases. The occupational disease (poisoning) is disease for which is proved connection with action professional factors. It is given in the order N 45:

1) Names of occupational diseases are 27 diagnoses (phneymoconiosis, noise illness, vibrating illness etc., sharp and chronic poisonings);
2) Dangerous and harmful production factors, that action can result in occurrence of occupational diseases;
3) The list of works and trades at which the given occupational disease meets mainly or as exception.

The basic directions prevention occupational diseases.
1. Law-legislative measures. CLW (the code of laws on work). State Standards, Sanitary rules, etc.
2. Hygienic measures: preventive and current sanitary inspection.
4. Sanitary education of workers about harmful and dangerous professional factors and professional diseases.
5. Technological measures on decrease or elimination of PHF.

Methods of assessment of work intensity and tension

Functional exertion of organism at work time may be characterized from two sides – energetic and informational. The first one prevails at physical and the second one at mental work.

Characteristics of the work that requires intensive mental work during receiving and analyzing information, physiologists call “tension”: body burden at work that requires muscle force and correspondingly energy supply – “intensity”.
As it was mentioned higher, all types of work by their intensity are divided into light, medium complexity, heavy and very heavy, according to their tension – non-tensioned, slightly tensioned, tensioned and super tensioned.

For assessment of level of the work intensity and tension, ergonometric and physiological methods are used.

Ergonometric characteristics of work intensity are characterized by lading weight, work intensity, kind of working posture, value of static load.

Characteristics of working posture and transfer in space are based on observations, measurements of body angle, transfer distance, timing etc.

**Ergonomic indices of labour tension:**
1. Number of objects under simultaneous observation.
2. Duration of concentrated observation or time of activities (in % from overall time of the working day).
3. Density of signals (announcements) per annum.
5. Interchangeability.
6. Tension of analyzers’ functions.
7. Memory volume required.
8. Intellectual tension.
9. Monotony etc.

Main indices of labour intensity are power and static load value as well as intensity (Density of muscular force per time unit).

Main indices of labour intensity definition are those ones of attention, density of processed information signals and emotional stress characteristics. Other criteria are additional.

To find out to which category belongs one work or another, it is necessary to use the most informative main indices, or two additional ones.

It is suggested to consider the level of physiological functions during work as physiological criteria of the level of intensity and tension of the work. Rating scale of intensity and tension of the work provides for determination of pulse rate, energy expenditure, indicator of static force resistance, latent period of sensorimotor reactions, indicator of memory, attention etc. And at the same time physiological factors are determined at the beginning and at the end of the working day.

Based on the change level of researched functions after completing the working day category of the work is determined (in %). Such factors as pulse rate and energy expenditure are evaluate in absolute values.

**Methods of hygienic estimation of difficulty and straining of work for prevention development exhaustion and increase work ability.**

1. Realization corrector test in the beginning lesson on offered tests to define speed of the taken information in bit/s under the formula Hartridg:

   \[ S = \frac{0.5436 \cdot N - 2.807 \cdot n}{T} \]

   Where: S - speed of the studied information (bit/s),
   N - number of the seen marks in the table,
   n - number of the passings and mistakes,
   T - time of viewing of the table (60 sec.).

   Corrector test is fulfilled again at the end of the lesson for comparison of the received data in notebook of the protocols and estimation phase of work ability.
2. **Research muscular work ability.** For definition of physical force the examinee twice with the maximal pressure compresses dynamometer, the greatest meaning accept for initial. At definition of endurance establish time (in sec), during which the examinee can keeps dynamometer at a level of 0.5 maximal forces, up to complete impossibility to continue effort of this intensity.

3. **Method finding of numbers at marked time,** for which researched person names and shows all numbers printed in the table, containing 49 numbers (from 1 up to 25 and from 24 to 1) represented by different colour.

4. **The investigation tremor of hands will be carried out by tromometer.** It is used at precisely works, when fatigue showed in trembling (tremor) of hands. Frequency tremor movements per one second 8-12 fluctuations is estimated as often, 5-8 - average degree, 3-5 - slow.

5. **Investigation of work ability by a chronometric method.** The increase of time spent on concrete operation, testifies the exhaustion. In hygiene and the physiologies of work use a photochronometric investigation of a working day and detailed selective chronometric. Use it for study of influence of labour process on a condition organism and the work ability reveals: duration of separate operations, parity of time spent on performance basic and other operations, congestion of a working day, productivity of work, its change within day. On the basis of the analysis of materials and comparison it with the data of another physiological methods of research grounded the recommendation for rational construction of a working day, change of a rhythm of work.

6. **The verbal-associative experiment.** A method more often is applied at estimation of intellectual work (lecturers, announcers, teachers). The method allows to estimate a functional condition of analyzers of the second alarm system (speech, -acoustical, -impellent). The purpose of research: definition of speed of occurrence in brain associative communications between images of various subjects and concepts. The speed of these communications depends on a functional condition CNS and first of all from a degree of exhaustion.

   The principle of a method consists that it is offered to the examinee person 10 -30 words (names) with an interval 10-20 sec. The examinee should to each word give anyone connected with offered on sense. For example, table - high, cap - big, etc. The researcher fixes in seconds size of the latent period (time from the moment, when the word and answer of the examinee was named) and amount of mistakes admitted in the answer (the answer is not connected on sense). The researches will carry out some times within a working day, the results compare.

7. **The definition stability of attention.** Change of attention during work also is connected to a number of the reasons and, first of all, exhaustion. To the examinee with the help of the special device demonstrate for the certain time consistently number of figures painted in different colours. The examinee is offered to count in mind, how many was such figures. At calculation he should not use a pencil. The researches will be carried out some times within a working day, the results are analyzed. The increase of amount of mistakes speaks about coming exhaustion.

**B. Test tasks to be done:**

1. **What are professional harmful factors related to phycho-physiologic ones?**
   - A. The compelled position of body.
   - B. Increased noise level.
   - C. Chemical substances, used on manufacture.
   - D. Substances of protein nature.
   - E. Electric trauma.

2. **What are periodic physical examinations?**
   - A. Regular medical inspection of working people in harmful or dangerous conditions.
B. Regular medical inspection of pregnancy, children.
C. Regular medical inspection of all working people.
D. Regular medical inspection of students.
E. Regular medical inspection of all people.

3. What is method used for studying serviceability in intellectual work?
A. Definition physical force.
B. Studying a tremor hands.
C. Phototiming.
D. Epidemiological method.
E. Verbal-associative experiment.

4. Beginning of tiredness depends from:
A. Serviceability.
B. Degree of interest work.
C. Level of physical activity.
D. Level of size of energy expenses.
E. Rhythm of work.

5. What is method used for studying serviceability in physical work?
A. Verbal-associative experiment.
B. Corrector test.
C. Epidemiological method.
D. Definition physical force.
E. Definition stability of attention.

6. Work is classified by:
A. Serviseability.
B. Development of exhaustion.
C. Degree of weight and intensity.
D. Development of tiredness.
E. Development of overexhaustion.

7. Degrees of weight of work are:
A. Easy, average, heavy, very heavy.
B. Static work and dynamic work.
C. Physical work, the mechanized work, the automated work, intellectual kinds of work.
D. Work on the conveyor, intellectual kinds of work.
E. Non intensive work, enough intensive, very much intensive work.

8. What are professional harmful factors related to industrial traumatism?
A. The compelled position of body.
B. Increased noise level.
C. Chemical substances, used on manufacture.
D. Substances of protein nature.
E. Electric trauma.

9. Degrees of intensity of work are:
A. Easy, average, heavy, very heavy.
B. Static work and dynamic work.
C. Physical work, the mechanized work, the automated work, intellectual kinds of work.
D. Work on the conveyor, intellectual kinds of work.
E. Non intensive work, enough intensive, very much intensive work.

10. What are kinds of physical examinations of working people?
A. Chemical examinations.
B. Biological examinations.
C. Psycho-physiologic and physical examinations.
D. Preliminary and periodic physical examinations.
E. Chemical and biological examinations.

Situational tasks
1. It is necessary to determine stages of work ability of the schoolboy on parameters of corrector test: in the beginning of lessons - 4.2; at 3 lesson - 5.5; at 5 lesson - 5.3. What other methods it is possible to investigate work ability of the schoolboy by?

2. Give the hygienic assessment of labour intensity and tension of electrical-type instrument female erector: sitting work posture, main operations (frame mounting of details, soldering of catenaries) take 6.5 hours of 7 hour-long working day. Work is in relays: І and ІІ shifts in turn every next week. Hygienic conditions of working zone: air temperature – 22-23°C, relative humidity – 58-65%, air movement – 0.2-0.25 m/sec. Suspended materials’ concentration – 1.5 mg/m³, including 40 % of dust – on account of tin, lead (MAC of such dust is 4 mg/m³).
Noise level in the workshop is 85 decibel, speech intelligibility – within 2 meters, illuminance of workplace – combined, 225 lux (general illuminance of the shopfloor is 80 lux), light
Energy expenditure of female erector during a shift is 1 120 kcal. Heartbeat frequency (pulse) is 85 beats per minute. At ergometry muscle endurance at the beginning of the shift is 16 s and at the end – 19 s. Time of seeking numbers in the table: at the beginning of the shift is 62 kg/sec., at the end – 87 kg/sec. Latent period of simple visual and motor reaction at the beginning of the shift is – 300 msec., at the end – 380 msec. and of complex reaction, thereafter, 420 msec. and 450 msec. Memorization of geometric figures: at the beginning of the shift is 3 of 6, at the end – 2 of 6. 3. General-duties woman in the bakery plant puts hot bread on wooden trays (18 loaves of mold bread on a tray). She carries trays to the distance of 2.5 – 3 meters and stacks them on load racks (on the wheels), bowing down to lower shelves and lifting trays up to upper ones (on the height of 1.8 m). There are 8 shelves on each load rack. Such work takes 5.5 hours of 7 hour-long working day. Content of the done work reaches the load of 120 trays. Weight of each tray is 20 kg. It is a 3 shift work. Change of shifts takes place every next week. Microclimate of the workplace is: air temperature is 27-30ºC all year round, relative humidity is 75-80%, air movement is 0.1-0.15 m/sec., radiant temperature – 32-33ºC. Workshop illuminance is 60 lux, noise level is 72-78 dB. Energy expenditure of female worker per shift is 2 500 kcal, average pulse frequency is 82-85 heartbeats per min., muscle endurance at the beginning of the shift is 20 kg/sec., at the end – 13 kg/sec. Assess intensity and tension of the work of the woman, hygienic conditions of the workplace.

**Literature recommended**

**Main Sources:**

**Additional ones:**

**Information Resources:**
1. www.umsa.edu.ua
2. www.dovkil-zdorov.kiev.ua
3. www.who.int/topics/hygiene