

**SITUATIONAL TASKS
ON THE EXAM "HYGIENE AND ECOLOGY"**

**for preparation of specialists of the second (master's) level of
higher education
branch of knowledge 22 "Healthcare"
speciality 221 "Dentistry"**

Situational task

In a boarding-school during conducting of inspection after the personal hygiene rules observance it was exposed, that 10% of students of the 11th year of study wore linen worn next to the skin made of nylon, the second layer of clothes - of lavsan, leather shoes with narrowed socks, height of heels 5-7 cm.

1. Which layer of clothes does not correspond to the hygienical requirements?
2. Give hygienical recommendations in relation to quality of fabrics of the worn next to the skin linen?
3. What negative consequences can follow the use of the given shoes?

Situational task

While working with the radioactive cobalt (γ – constant radionuclide 13.2, its activity is equal to 5 mKi at 1 metre distance within 20 hours per week), the workman is exposed to radiation.

1. Calculate the external irradiation dose per a week, for a year.
2. Count up the permissible time of work of a worker throughout a year.

Situational task

A hospital consists of a main building in which surgical and therapeutic department are located, and a few smaller departments are intended for infectious, maternity and children's departments. The therapeutic department consists of two ward sections for 40 beds. A ward section consists of one 1-bed, two 2-bed, four 4-bed and three 6-bed wards, and also of the manipulation and procedure room (5-7 m²). The area for one bed in all wards is 5 m². Windows of 60 % of wards are faced towards the north.

Determine the systems of hospital building, give hygienic assessment to ward section planning, windows orientation of wards, correspondence of the hospital planning to sanitary requirements.

Situational task

Give hygienic estimation of day's regime for pupil 4-th class: walk with fresh air - 2 hours, preparation of homework - 3 hours, vision of TV - 2 hours, playing – 2 hours, beginning of sleep at 22 p.m., end of sleep at 7 a.m.

Situational task

Drinking water contains 20,5 mg/dm³ nitrates, 0,2 mg/ dm³ fluorine, iron 0,2 mg/ dm³, general hardness – 7 mmol/dm³, common microbe number 110 CFU/sm³, general coliform – 10 CFU/sm³. From data of situation task do a sanitary-hygienic conclusion about a danger for the population of the protracted consumption of the given water.

Situational task

The acquisition of the erythematic dose of UV-radiation from a lamp LE – 30 is provided during 2 min, at the distance of 0,5 m from the source. Calculate, what should be the duration of the radiation for the receipt of prophylactic dose at a distance 4 m from a source.

Situational task

For sanitation of the air in a school class (area 50 m², height 3,5 m) in the period flu a standard mercury-quartz lamp was used during 1 h. Occupied air before and after the irradiations carried out by Krotov's device (speed of air aspiration 20 l/min for 10 min) on meat-peptone agar with subsequent thermostat during 24 h. Give a hygienic estimation of efficiency of sanitation, if 65 colonies germinated to sanitation, and after - 12.

Situational task

In hospital surgical department air oxidizing is $8 \text{ mg O}_2/\text{m}^3$, the concentration of CO_2 - 0.007%, the total microbial contamination in the normal range (1500 in m^3). Give sanitary and hygienic conclusions about the quality of air environment wards.

Situational task

When hygiene inspection therapeutic dental office found that the transitional season microclimate space characterized by temperatures 17°C , the radiation temperature of the walls 15°C , relative humidity 70%, air velocity 0.25 m/s. Thermocline vertical $\pm 2.5^\circ\text{C}$, Horizontal $\pm 3^\circ\text{C}$, the daily fluctuations of temperature 6°C . The concentration of carbon dioxide in the air during the test cabinet 1.2%.

1. To assess microclimate parameters in the dental office.
2. Which changes in the body may cause personnel stay in rooms?
3. Give advice to improve hygienic indices of microclimate.

Situational task

Give hygienic estimation of day's regime for pupil 4-th class: walk with fresh air - 2 hours, preparation of homework - 3 hours, vision of TV - 2 hours, playing - 2 hours, beginning of sleep at 22 p.m., end of sleep at 7 a.m.

Situational task

The basic premise dental laboratory area of 40 m^2 contains 12 tables dental technicians, equipped with gas burners. Ventilation space in soldering and casting provided by natural ventilation.

1. Give hygienic evaluation criteria arrangement premise dental laboratory.
2. Give suggestions to improve ventilation.

Situational task

Female - 32 years, body weight 60 kg, height 1.68 m, physical activity group III. Identify the average daily energy and individual needs in basic food substances (proteins, fats, carbohydrates, minerals, vitamins).

Situational task

For the drinkable water-supply is used the water which contains $15 \text{ mg}/\text{dm}^3$ nitrates, $3,5 \text{ mg}/\text{dm}^3$ fluorine, copper $0,9 \text{ mg}/\text{dm}^3$, general hardness $-5 \text{ mmol}/\text{dm}^3$, taste - 4 marks, intestinal helminth - 3 in 50 m^3 . E.coli - $50 \text{ CFU}/100 \text{ m}^3$. From data of situation task do a sanitary-hygienic conclusion about a danger for the population of the protracted consumption of the given water.

Situational task

Assess physical development of girl 12 years old by scale regression. Anthropometric data: body length 158 cm, weight - 45, 5 kg, sight chest - 70.9 cm. Height scale regression indicates that at the height of 158 cm body weight should be 47.9 kg, the sight of the chest - 75.2 cm. Shares sigma regression coefficients for body weight and shape of the thorax respectively equal to 5.93 and 5.09.

Situational task

Male - 20 years, weight 70 kg, height 1.70 m, physical activity group I. Identify the average daily energy and individual needs in basic food substances (proteins, fats, carbohydrates, minerals, vitamins).

Situational task

During examination of people living in arid tropic region the following symptoms was found: dark yellow teeth pigmentation, diffuse osteoporosis of bone apparatus, ossification of cartilages, ossification of joints, functional disorders of the CNS.

1. What does this condition cause?
2. What preventive measures of water quality improvement do you suggest?

Situational task

Among the population of settlement the pigmentation enamels of teeth are exposed, which shows up appearance of yellow-brown spots, there are the cases of generalization osteosclerosis. Origin of these symptoms of connected with consumption of water from an artesian mining hole. It is set at laboratory

research of test of water: iron – 0,004 mg/dm³, fluorine – 5 mg/dm³, nitrates – 47 mg/dm³, lead – 0,001 mg/dm³, sodium – 15 mg/dm³, sulfates – 200 mg/dm³.

1. Table of contents in water of what chemical to the element its difference from Standards № 400, 2010?
2. Before what disease can bring the use of such water over?
3. What prophylactic measures need to be conducted.

Situational task

In the M. town was discovered the pigmental enamel of teeth, which shows up chalk-similar or yellow-brown spots, general osteosclerosis with the calciphycation of intra-vertebral ligaments. These symptoms correlate with the consumption of water from an artesian sources. After laboratory research the tests of water are set: iron – 0,004 mg/dm³, fluorine – 5 mg/dm³, nitrates – 47 mg/dm³, lead – 0,001 mg/dm³, sodium – 15 mg/dm³, sulfates – 200 mg/dm³.

1. Content of what chemical element does not answer State sanitary rules and norms № 400, 2010?
2. What disease can cause the use of such water?
3. What prophylactic measures need to be conducted.

Situational task

Class room for high school students of secondary school has an area of 40 m². In classroom 34 students enrolled. The room is 6,2 m length and 6.45 m width. Give hygienic assessment of compliance planning a class for students.

Situational task

School for 489 students located within the neighbourhoods. Territory enclosed with lattice. In the section is sports court, training, and research economic zones. The area of landscaping is 25% of the area. The distance from the building to the red line of 28 m. Ways to approach students cross of main streets roadway. Training facilities are located on one longitudinal wall of the corridor, and the other side towards to sun. Dedicate educational sections for students 1-4 classes, 5-9 classes, 10-11 classes. Evaluate plan and a set of school premises – give recommendations.

Situational task

Pupils of the III class, in 3% of pupils marked myopia, 2% - the first stage of scoliosis. During the checking of class were found: class area is 32 m², pupils are 35. There are 4 rows of desks, 25% of desks do not meet the pupils length, the first desk at 1 m from the board, the light from the windows falls on the left, LC – 1/8, DF -1.18%. Give hygienic conclusion of equipment of the classroom, give recommendations to optimize studying conditions.

Situational task

The land area of a district hospital for 150 beds makes 225 000 m². 17% of the territory is occupied by buildings, 58% - by greenery (parks, gardens). The hospital area has four entrances. Wards buildings are located at the distance of 20 m from the nearest habitation. Distances between wards buildings constitute no more than 20 m. Give hygienical estimation to this hospital area, its planning and correspondence of the hospital planning to sanitary requirements, offer sanitary measures.

Situational task

Operating-room is situated on floor of surgical department in blind alley with sluice near entrance and consist of septic ana aseptic operating-room. X-ray cabinet of dentistry policlinic is situated in basement-premises of dwelling house. To give hygienic estimation of planning of hospital's separate department, to propose health-improvement measures.

Situational task

The data of soil analysis, selected from the territory of the school playground: the coli-titer - 0.01, titer anaerobes - 0,001, the number of eggs of worms - 70 in 1 kg, the natural level of radiation activity in

the soil exceeded 2 times, the lead content is at 30 LPC. Make a conclusion about the state of the soil contamination.

Situational task

Analysis of soil showed the presence of pesticides in it: karbofos 13 mg/kg (LPC = 2 mg/kg), dilor 6.5 mg / kg (LPC =0.5 mg/kg). Make a conclusion about the degree of soil contamination by pesticides.

Situational task

In dental-technical laboratory concentration of mercury, metilmetacrilat and CO are more than LPC in air of work zone, temperature of air 26⁰C– 28⁰C, humidity 30 %, on work desk of dental technicer drawing don't work, noise is more than LPL.

1. Which diseases dental-technician can have?
2. Which LPC of that chemicals, microclimate indexes is and LPL of noise must be in that laboratory?
3. Which general and individual prevention against influence of production harmfuls to organism and sanitation.

Situational task

For the drinkable water-supply is used the water which contains 65 mg/dm³ nitrates, 2,5 mg/ dm³ fluorine, copper 1,3 mg/ dm³, general hardness –5 mmol/dm³, taste – 3 marks, intestinal helmint – 5 in 50 m³, E.coli – 40 CFU/100 sm³. From data of situation task do a sanitary-hygienic conclusion about a danger for the population of the protracted consumption of the given water.

Situational task

By the sanitary-epidemiological station in the summer received an urgent message about the mass illness of children in sanatoria. The disease started 3-4 hours after dinner. In 110 children were headaches, nausea, vomiting, severe pain into epigastric and the abdominal pain, diarrhea. Body temperature was normal or low-grade, a few children 38,0-38,5 ° C. As a result sanitary and epidemiological investigation found that for a celebratory dinner before the kids prepare cakes custard, which kept the morning into refrigerator, and from morning to afternoon - at the confectionery shop. Established that after midnight were disconnected the flow of electric current to the resort for 4 hours. At the medical examination cooks found that cook had catarrhal symptoms of upper respiratory tract.

1. What do you think food poisoning occurred in this case?
2. Name the reasons that led to of food poisoning.
3. Name the the principles of prevention of food poisoning microbial etiology.

Situational task

The patient had clinical features present: insomnia, depression, irritability, dry and cyanosis, dry tongue, bright red, painful, cracked nipples, hypotrophy, flaky skin. Laboratory data: content in the blood: Vitamin C - 30 mmol /l, pyridoxine - 0.4 mmol /l, niacin - 4 mmol /l in the daily urine: N-methyl nicotine amide - 9mmol, Vitamin C - 75 mmol.

1. Lack of vitamins, which have caused the emergence of the symptoms.
2. Give recommendations for alimentary prevention of this condition of the patient.

Situational task

A girl 12 year old has physical development "below average", frequent acute respiratory diseases, heart disease is formed, rheumatism in remission stage. Test dosed physical activity: heart rate, respiratory rate and blood pressure came to normal within 12 minutes after the test. Which group of health should include a girl?

Situational task

Dentist feels headache, weakness after working in polymerizing-room of dental laboratory. Carboxyhaemoglobin was determined in dentist's blood. Give a hygienical estimation of the quality of air environment of the room. Give recommendations for prevention.

Situational task

Man gets 70 grams of protein with a daily diet. The ratio between proteins, fats and carbohydrates is 1:1:5. How much fats (g) and carbohydrates (g) in the diet of man?

Situational task

In the M. town was discovered the pigmental enamel of teeth, which shows up chalk-similar or yellow-brown spots, general osteosclerosis with the calciphycation of intra-vertebral ligaments. These symptoms correlate with the consumption of water from an artesian sources. After laboratory research the tests of water are set: iron – 0,004 mg/dm³, fluorine – 5 mg/dm³, nitrates – 47 mg/dm³, lead – 0,001 mg/dm³, sodium – 15 mg/dm³, sulfates – 200 mg/dm³.

1. Content of what chemical element does not answer State sanitary rules and norms № 400, 2010?
2. What disease can cause the use of such water?
3. What prophylactic measures need to be conducted.

Situational task

In dental-technical laboratory concentration of mercury, metilmetacrilat and CO are more than LPC in air of work zone, temperature of air 26⁰C– 28⁰C, humidity 30 %, on work desk of dental technicer drawing don't work, noise is more than LPL.

1. Which diseases dental-technician can have?
2. Which LPC of that chemicals, microclimate indexes is and LPL of noise must be in that laboratory?
3. Which general and individual prevention against influence of production harmfuls to organism and sanitation.

Situational task

Surgeon of dentistry clinic stands 80% of work time, 40% from them he is situated in statical fixal pose. Every 1,5-2 hours of work and after every operation he has 10-15-min. of break. In operating-room temperature 24-25⁰C in summer, 17-18⁰C in winter, humidity 55%, speed of air 0,15 m/sec. In air of operating-room content CO₂ -1,1‰. To define character of work regime and work condition action on surgeon's health and propose sanitation measures.

Situational task

5 persons diagnosed with the disease in 12 hours after eating cooked meat, salad from cucumbers and the canned homemade mushrooms. Clinical symptoms: weakness, vomiting, diarrhoea, body temperature is normal, after 6 h. appeared dry mouth, difficulty swallowing, hoarse voice, drooping eyelids. Which of food poisoning typically has these clinical signs? What could cause of food poisoning? List the prevention of this disease.

Situational task

Surgeon of hospital stands 80% of work time, 40% from them he is situated in statical fixal pose. Every 1,5-2 hours of work and after every operation he has 10-15-min of break. In operating-room temperature 24-25⁰C in summer, 17-18⁰C in winter, humidity 55%, speed of air 0,15 m/s. In air of operating-room content CO₂ -1,1‰. General artificial illumination - 300 lk, illumination of operating field – 3000 lk.

To define character of unfaurable action of work regime and resting, work condition to surgeon's health and to propose sanitation measures. To give hygienic estimation of hospital's sanitary regime, to propose sanitation measures.

Situational task

Operating-room has: 2 operating-tables, square 30 m², height 3 m, 1 window 2,5 x 2 m to north-east, artificial ventilation with air-exchange 1,5 time per hour. Does operating-room correspond to hygienic norms?

Situational task

Allowable daily intake of nitrates is 5 mg/kg. With daily food rations a child with body mass 20 kg received 300 mg of nitrate (acceptable daily income for an adult).

1. Calculate the actual daily dose of nitrate that got a child.
2. What disease can cause excessive revenues nitrates and nitrites into the body of the child.

3. What are the most basic principles of prevention of food poisoning that may be caused by chemical substances?

Situational task

The land area of a district hospital for 150 beds makes 2.25 hectares. 17% of the territory is occupied by buildings, 58% - by greenery (parks, gardens). The hospital area has four entrances. Wards buildings are located at the distance of 20 m from the nearest habitation. Distances between wards buildings constitute no more than 20 m. Give hygienical estimation to this hospital area, its planning and correspondence of the hospital planning to sanitary requirements, offer sanitary measures.

Situational task

In the air casting dental laboratory number silicon containing dust with the size 5 micron to several times higher than normal, CO₂ is 2%, mercury - 0,001 mg/ m³ (MPC - 0.01 mg/m³), lead - 0,001 mg/m³ (MPC - 0,01 mg/m³), oxidation - 8 mg/m³, total microbial contamination - 3500 m³, the number of hemolytic Staphylococcus - 24 in m³.

1. According to the situational task give hygienic evaluation of air working environment.
2. Specify the disease may develop.
3. Provide hygienic evaluation of the results.

Situational task

Parents and two children 6 and 8 years old were hospitalized with infectious diseases. Clinical picture: general weakness, dizziness, vomiting, pain into the stomach, pale skin, weak pulse, bradycardia. After providing medical condition has improved parents, children remained in serious condition. On the second day into children yellowed sclera, skin face and body, there was severe headache. After appropriate treatment within 20 days of the children recovered. Since history was that the disease started after 8 hours after consumption of fresh mushrooms, which was bought in the market. Mushrooms roasted in butter without any additional pretreatment.

1. Give a conclusion about the nature of disease and cause.
2. What actions doctors have to be done in this situation?
3. Name the prevention of similar illnesses.

Situational task

An adult carries 18 respiratory movements during 1 min with a volume of 0.5 liters each. Calculate hour exhale air volume and content of carbon dioxide, if the average percentage of CO₂ in exhaled air is 4.18%.

Situational task

Dentist feels headache, weakness after working in polymerizing-room of dental laboratory. Carboxyhaemoglobin was determined in dentist's blood. Give a hygienical estimation of the quality of air environment of the room. Give recommendations for prevention.

Situational task

In the M. town was discovered the pigmental enamel of teeth, which shows up chalk-similar or yellow-brown spots, general osteosclerosis with the calcification of intra-vertebral ligaments. These symptoms correlate with the consumption of water from an artesian sources. After laboratory research the tests of water are set: iron – 0,004 mg/dm³, fluorine – 5 mg/dm³, nitrates – 47 mg/dm³, lead – 0,001 mg/dm³, sodium – 15 mg/dm³, sulfates – 200 mg/dm³.

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