**Final exam on Hygiene. Instructions for students**

**The final rate for the "Hygiene" in semester V is calculated taking into account the following scores:**

- lectures and practical class attendance in the range of 0-10 points,

- averaged score for all practical classes in the range of 0-10 points,

- averaged score for Modules 1-5 in the range of 0-100 points, multiplied by a factor of 0.35,

- examination score in the range of 0-100 points, multiplied by a factor of 0.45.

**Written Exam**

The written exam includes 5 questions. You will be given 60 minutes and 10 minutes for oral conversation.

You can get up to 100 points (20 points for each question).

Hygiene – Written Exam Questions

From Module 1

1. Aim and scope of Public Health and Hygiene.
2. Health definitions in the frame of different concepts (biological, ecological, psychosocial, holistic). WHO's health definition.
3. 4 groups of health determinants.
4. Primary, secondary and tertiary prevention: definition, examples.
5. Health indicators. DALYs calculation. Global Burden of Disease project.
6. The concept of planetary boundaries.
7. Climate change and its health effects.
8. Atmosphere: composition, importance for human life. Climate and weather. Climate and its public health impact.
9. Sources of [air pollution](http://e.kazangmu.ru/moodle/mod/glossary/showentry.php?eid=2538&displayformat=dictionary): classification and characterization. Primary and secondary air pollutants.
10. Particulate matters (PM) in the outdoor air: sources, size fractions, exposure limits, health effects, preventive measures.
11. Industrial [smog](http://e.kazangmu.ru/moodle/mod/glossary/showentry.php?eid=2563&displayformat=dictionary), [acid rain](http://e.kazangmu.ru/moodle/mod/glossary/showentry.php?eid=2537&displayformat=dictionary)s, [photochemical smog](http://e.kazangmu.ru/moodle/mod/glossary/showentry.php?eid=2553&displayformat=dictionary). Role of man-made and natural factors.
12. Non-carcinogenic and carcinogenic health effects of outdoor [air pollution](http://e.kazangmu.ru/moodle/mod/glossary/showentry.php?eid=2538&displayformat=dictionary).
13. Policies to control outdoor [air pollution](http://e.kazangmu.ru/moodle/mod/glossary/showentry.php?eid=2538&displayformat=dictionary) at governmental, society and individual levels.
14. The role of water in human life. Daily average fluid intake for adults and children. Household water use in different countries. Water and human rights.
15. Water cycle. Distribution of the Earth’s water. Safe and unsafe water sources. Water contaminants classification.
16. Microbiological water quality and human health. Bradley classification of water-related diseases.
17. Inorganic water contaminants of natural origin.
18. Chemical water contaminants of man-made origin.
19. Aesthetic/organoleptic characteristics of water.
20. Improved and non-improved water supply.
21. Conventional water treatment processes. Household water treatment processes.
22. Hygienic characteristic of bottled water.
23. Nutrients in drinking water.
24. Solid [waste](http://e.kazangmu.ru/moodle/mod/glossary/showentry.php?eid=8225&displayformat=dictionary): definition and categorization. [Waste](http://www.kgmu.kcn.ru:40404/moodle/mod/glossary/showentry.php?eid=8225&displayformat=dictionary) generation. The role of population growth and urbanization trends in [waste](http://www.kgmu.kcn.ru:40404/moodle/mod/glossary/showentry.php?eid=8225&displayformat=dictionary) generation.
25. 3R in solid [waste](http://e.kazangmu.ru/moodle/mod/glossary/showentry.php?eid=8225&displayformat=dictionary) treatment.
26. [Waste](http://e.kazangmu.ru/moodle/mod/glossary/showentry.php?eid=8225&displayformat=dictionary) treatment: [Incineration](http://e.kazangmu.ru/moodle/mod/glossary/showentry.php?eid=8219&displayformat=dictionary). Environmental impacts of [incineration](http://e.kazangmu.ru/moodle/mod/glossary/showentry.php?eid=8219&displayformat=dictionary).
27. [Landfill](http://www.kgmu.kcn.ru:40404/moodle/mod/glossary/showentry.php?eid=8220&displayformat=dictionary) [waste](http://www.kgmu.kcn.ru:40404/moodle/mod/glossary/showentry.php?eid=8225&displayformat=dictionary) disposal.
28. Treatment of organic [waste](http://www.kgmu.kcn.ru:40404/moodle/mod/glossary/showentry.php?eid=8225&displayformat=dictionary): [Composting](http://www.kgmu.kcn.ru:40404/moodle/mod/glossary/showentry.php?eid=8216&displayformat=dictionary) and anaerobic digestion.
29. E-[waste](http://www.kgmu.kcn.ru:40404/moodle/mod/glossary/showentry.php?eid=8225&displayformat=dictionary).
30. [Hazardous waste](http://www.kgmu.kcn.ru:40404/moodle/mod/glossary/showentry.php?eid=8218&displayformat=dictionary).

From Module 2

1. Indoor particulate matter as a hygienic problem: sources, health effects, preventive measures.
2. Solid fuels and indoor air pollution. the scale of the problem in different countries. Health effects. Preventive measures.
3. Environmental tobacco smoke as a hygienic problem. Antismoking policy in your country.
4. Asbestos and indoor air quality: sources, health effects, preventive measures.
5. Bacteria and viruses and indoor air quality: sources, health effects, preventive measures. Mold in buildings: sources, health effects, preventive measures.
6. Radon in buildings: sources, health effects, preventive measures.
7. CO, VOCs, formaldehyde and pesticides in buildings: sources, health effects, preventive measures.
8. Sick building syndrome. Factors related to increased prevalence of sick building syndrome.
9. Indoor climate. Air humidity in buildings.
10. Ventilation and air-conditioning in buildings.
11. Light physics. Luminous intensity, luminance, illuminance: definitions, units.
12. Sunlight and health. UVR in sunlight and its health effects.
13. Lighting in buildings: daylight.
14. Lighting in buildings: artificial lighting.
15. Lighting pollution as a hygienic problem.
16. Requirements to place for hospital location.
17. Requirements to hospital building equipment.
18. General requirement to hospital housekeeping. Cleaning in hospitals. Disinfection and sterilization in hospitals.
19. Hospital zoning.
20. Nosocomial infections: definition, examples of sources. Routes of transmission of nosocomial infections. Nosocomial infection precautions.
21. Hand hygiene in hospitals.
22. Measures for improving infection control in hospitals.
23. Health care waste management.

From Module 3

1. Age groups classifications in children and adolescents.
2. Fetal growth. Risk factors of growth retardation. Growth retardation in developing countries.
3. Child growth indicators and their interpretation. Health and social consequences of impaired growth.
4. Systems by which a child or a group of children can be compared to the reference population: Z-scores (standard deviation [SD] scores). Measurements, interpretation, strengths and weaknesses, clinical applications.
5. Indices of reproductive development.
6. School readiness: definition. School readiness tests.
7. Children and adolescent’s obesity as a public health problem.
8. Interventions aimed at promoting healthy growth and development.
9. Health problems in different age groups of children and adolescents.
10. Adolescents and reproductive health.
11. Adolescents and mental health.
12. Groups of health in children and adolescents.
13. Health services for adolescents.
14. Children health services.
15. The basic sanitary-and-hygienic requirements to construction and maintenance of schools.
16. Hygienic requirements to school location.
17. Hygienic requirements to school schedule.
18. School ergonomics and its influence on health.
19. Hygienic principles of correct organization of sport education in schools.
20. Hygienic requirements to technical devices in schools.

From Module 4

1. The Human Right to Food. World hunger. Food and human health impacts. Food and environmental impacts.
2. Food nutrients. Classification. Functions.
3. Balance of energy as a key principle of healthy diet. Energy intake, energy expenditure, energy storage. Energy balance in different conditions.
4. Components of energy requirements. Basal metabolic rate. Direct and indirect methods of measurements of energy expenditure.
5. Proteins: chemical structure, the basic biological functions. Protein nutritional quality. Major sources of food proteins. Differences in amino acid composition of animal and vegetable proteins.
6. Protein requirements for various age and physiological groups. National nutritional recommendations.
7. The manifestations of malnutrition in children: disorders of physical development, marasmus, kwashiorkor. Protein-energy malnutrition in adults.
8. Fats as food ingredients: Classification. Major sources of fats in the diet.
9. Fatty acids and their classification. Health effects of different fatty acids.
10. The essential and partly essential PUFAs. Omega-3 and Omega-6 fatty acids. Foods high in PUFAs, Health effects.
11. Trans isomers of unsaturated fatty acids. Health effects.
12. National nutritional recommendations for fats.
13. Dietary carbohydrates. Classification. Chemical structure. Functions. Dietary sources of carbohydrates.
14. Simple sugars. Health effects. Food substitutes of simple sugars. The problem of lactose intolerance.
15. Dietary fibers. Sources of dietary fiber. The biological role of dietary fiber
16. National nutritional recommendations for carbohydrates.
17. Vitamin C: chemical structure, functions in the body, food sources (animal, vegetable, bacteria, fortified foods), what happens to the vitamin during cooking and storage, vitamin deficiency. Daily requirements.
18. Vitamin A: functions in the body, food sources (animal, vegetable, bacteria, fortified foods), what happens to the vitamin during cooking and storage, vitamin deficiency. The possibility of toxic effects (hypervitaminosis). Daily requirements.
19. Vitamin D: functions in the body, food sources (animal, vegetable, bacteria, fortified foods), what happens to the vitamin during cooking and storage, vitamin deficiency. The possibility of toxic effects (hypervitaminosis). Daily requirements.
20. Vitamins B1, B2, B6: functions in the body, food sources (animal, vegetable, bacteria, fortified foods), what happens to the vitamin during cooking and storage, vitamin deficiency. Daily requirements.
21. Calcium: the physiological functions, regulation of metabolism in the body, daily requirements, calcium deficiency, biological markers of calcium deficiency, excess calcium in the diet and its consequences. Dietary sources of calcium.
22. Sodium: physiological functions, daily requirements. Excess sodium in food and its effects. Dietary sources of sodium.
23. Iodine: physiological functions, daily requirements, causes of iodine deficiency, biological markers of iodine deficiency. Dietary sources of iodine. Prevention of iodine deficiency at population level.
24. Iron: physiological functions, daily requirements, iron deficiency, biological markers of iron deficiency. Dietary sources of iron.
25. Anthropometry as a method for nutritional status assessment.
26. Methods to study body composition. Biomarkers of metabolism (energy, proteins, carbohydrates, lipids, minerals, vitamines) as a method to study nutritional status.
27. Nutrition and diseases of the cardiovascular system.
28. Nutrition and cancer.
29. Food allergies. Food intolerance. Hereditary diseases associated with food factors.
30. Global burden of alimentary related non-communicable diseases. Alimentary-related diseases in developing countries. Alimentary-related diseases in developed countries.
31. Foodborne infections. Preventive measures.
32. Foodborne toxicoinfections. Preventive measures.
33. Foodborne intoxications of microbial origin. Preventive measures.
34. Chemicals in food. Health effects. Preventive measures.
35. Food hygiene: a general approach.
36. Milk Hygiene.
37. Meat Hygiene.
38. Fish Hygiene.
39. Egg Hygiene.
40. Food additives

From Module 5

1. Classification of occupational health hazards.
2. Classification of occupational safety hazards.
3. Occupational illnesses. Definition. Examples.
4. Work-related illnesses. Definition. Examples.
5. Problems with detection of occupational illnesses.
6. Occupational health services in your country.
7. Occupational health problems in developing countries.
8. Job stress related disorders.
9. Job stressors.
10. Bulling (mobbing) at workplaces. Prevention.
11. Burnout at workplaces. Prevention.
12. Robert Karazek’s demand-control model of job stress.
13. J. Siegrist’s effort-reward stress model.
14. Job stress: Preventive approaches at workplaces.
15. Health problems that can be prevented using ergonomic approaches.
16. Physical work physiology. Dynamic and static work.
17. Ergonomic approaches to workstation design: sitting posture.
18. Ergonomic approaches to workstation design of computer workers.
19. Ergonomic approaches to workstation design: standing posture.
20. Ergonomic approaches to workstation design: material handling.
21. Ergonomic approaches to workstation design: hand tools.
22. Noise sources at workplaces. Noise reference levels.
23. Noise and health.
24. Risk factors for noise induced hearing lost.
25. Noise prevention programs at work places.
26. Hand-arm vibration at work places. Sources and health effects.
27. Hand-arm vibration syndrome (HAVS) prevention.
28. Whole-body vibration at work places. Sources and health effects.
29. Whole-body vibration syndrome (WBVS) prevention.
30. Biological hazards at work places.
31. Biological hazards at work places: Preventive approaches.
32. Chemicals at work places. Sources. Routes of exposure.
33. Chemical hazards at work places: Preventive approaches.
34. Health hazards at dentist’s work place. Preventive approaches.
35. Health hazards at radiologist’s work place. Preventive approaches.
36. Health hazards at surgeon’s work place. Preventive approaches.
37. Health hazards at hospital lab staff work places. Preventive approaches.
38. Health hazards at nurse’s work place. Preventive approaches.
39. Health hazards at pathologist’s work place. Preventive approaches.
40. Health hazards at general practitioner’s work place. Preventive approaches.

Examination questions with answers (examples)

1. ***Sources of air pollution: classification and characterization. Primary and secondary air pollutants.***

Air pollution in rural areas: burning agricultural land, forest fires, dust storms, deforestation through slash and burn method.

Air pollution in urban settings: mobile sources (vehicles), stationary sources (industrial emissions), natural sources (soil erosion).

Primary air pollutants: harmful substances that are emitted directly from various sources: sulfur oxides (SOx), carbon monoxide (CO), carbon dioxide (CO2), nitrogen oxides (NOx), volatile organic compounds (VOCs) such as benzene, toluene, xylene and benzo(a)pyrene, lead is a noteworthy air contaminant in countries where it is added to gasoline, particulate matters (PM).

Industrial smog: a mixture of suspended particulates, sulfur dioxide, and droplets of sulfuric acid; biggest source of industrial smog is burning coal; more of a problem in developing countries than developed because the wealthier countries can afford the equipment to clean the smoke stacks.

Emission of sulfur oxide and nitrogen oxides causes acid rains: The main emitter of sulfer oxides: utilities burning coal. The main emitter of nitrogen oxides: transport car exhaust and utilities burning coal.

These pollutants are further transformed by processes in the atmosphere. For example, ground level ozone is a secondary pollutant produced by the interaction of sunlight with nitrogen dioxide and volatile organic compounds. Temperature and humidity are also important. Secondary air pollutants: harmful substances that form when primary pollutants react with each other or with water vapor.

Photochemical smog produces ozone: VOCs + Nox (N0, N02) in the presence of sunlight, heat = ozone and other secondary pollutants.

1. ***Nosocomial infections: definition, examples of sources. Routes of transmission of nosocomial infections. Nosocomial infection precautions.***

Nosocomial Infections: Also called hospital-acquired infections (HAI) or hospital-associated infections. Infections not present in the patient at the time of admission but developed during the course of the patient’s stay in the hospital. Infections are caused by microorganisms that may come from the patient’s own body, the environment, contaminated hospital equipment, health workers, or other patients. The risk of HAI is heightened for patients with altered or weakened immunity.

Routes of Transmission of Nosocomial Infections: Contact transmission. Direct contact (e.g., surgeon with infected wound in the finger performing a wound dressing). Indirect contact (e.g., secretion from one patient transferred to another through hands in contact with contaminated waste). Fecal-oral transmission via food. Bloodborne transmission - e.g., needle-stick injury – hepatitis B and C, HIV/AIDS. Vector transmission - e.g., insects or other pests in contact with excreta or secretions from infected patients and transmitted to other patients. Droplet transmission (droplets from sneezing, coughing or vomiting are expelled to surfaces or to the air and fall typically within 2 meters of the source) - Direct droplet transmission (droplets reach mucous membranes or are inhaled by others), Indirect droplet-to-contact transmission (droplets contaminate surfaces/hands and are transmitted to mucous membranes or other sites) – cold virus, respiratory syncytial virus. Airborne transmission (small contaminated particles as aerosols carried by air currents >2 meters from source) - e.g., Varicella zoster suspended in air and spread by inhalation, Staphylococcus aureus depositing in wounds.

Standard Precautions: Basic level of infection control to be used in the care of all patients. Key components – Hand hygiene – Use of PPE (gloves, face protection, gown) – Safe injection practices – Respiratory hygiene and cough etiquette – Safe handling of contaminated equipment and surfaces in the patient environment – Environmental cleaning – Handling and processing of used linens – Proper waste management.

Transmission-Based Precautions: Additional precautions used when routes of transmission are not completely interrupted by Standard Precautions. Three categories of transmission-based precautions 1. Contact Precautions – e.g. for E. coli O157:H7, Shigella spp. Hepatitis A virus, C. difficile, abscess draining, head lice 2. Droplet Precautions – e.g., for Neisseria meningitidis, seasonal flu, pertussis, mumps, Yersinia pestis pneumonic plague, rubella 3. Airborne Precautions – e.g., for M. tuberculosis, rubeola virus. Combined precautions, e.g. – Airborne and contact precautions for varicella zoster, methicillin-resistant S. aureus (MRSA), severe acute respiratory syndrome virus (SARS-CoV), avian influenza – Contact and droplet precautions for respiratory syncytial virus.

1. ***Hygienic principles of correct organization of sport education.***

Hygienic principles of correct organization of sport education: providing of the optimal motive mode; complex differentiated application of different forms of physical education and hardening in accordance with age, sex, state of health and functional preparedness of children; creation of favorable terms of environment during engaging in a physical culture and sport.

Groups of sport education: main group - children and teenagers without some deviations in a state of health; preparatory group - children and teenagers with a weak health; special group - children and teenagers with considerable deviations in a state of health

1. ***Dietary carbohydrates. Classification. Chemical structure. Functions. Dietary sources of carbohydrates.***

What Are Carbohydrates: Macronutrient. Primary energy source. Carbon, hydrogen, oxygen. Sources: fruits, vegetables, and grains.

2 classes: Simple carbs. Complex carbs.

Simple Carbohydrates: Monosaccharides (1 sugar molecule) - Glucose, fructose, galactose. Disaccharides (2 sugar molecules) - Lactose, maltose, sucrose.

Complex carbohydrates: Starch. Fibers. Glycogene.

Why Do We Need Carbohydrates? Energy - 4 kcal/g. Brain & red blood cells. Exercise - Alternative fuel: fat & protein.

How much carbs: 60-65% of food energy.

1. ***Classification of occupational health hazards.***

CHEMICAL HAZARDS: There are approximately 80,000 chemicals in commercial use, 15,000 of which are frequently produced or used. It is estimated that approximately 1,000 new chemicals are added to commercial each year.

PHYSICAL HAZARDS: excessive noise, vibration, extremes of temperature, extremes of pressure, light, non-ionizing radiation, ionizing radiation.

BIOLOGICAL HAZARD: HIV, hepatitis C and B viruses, the tubercle bacillus, and many other bacteria, viruses, and other microorganisms that may be transmitted through air, water, food, or direct contact

BIOMECHANICAL HAZARDS: heavy lifting, repetitive, awkward, or forceful movements, work posture that result in musculoskeletal disorders, such as carpal tunnel syndrome and many cases of low back pain.

PSYCHOSOCIAL STRESS: high stress work environment resulting from excessive work demands on workers and low control by worker, physical or psychological violence at work called bulling or mobbing

Assessment criteria / assessment scale for each question:

*"Excellent" (14-15 points)* – The student gave full clear answers.

*"Good" (11-13 points)* – The student gave fairly complete answers, but there may be shortcomings in the systematization or generalization of the material, inaccuracies in the conclusions.

*"Satisfactory" (6-10 points)* – The student has difficulties in the presentation and systematization of the material, the conclusions are poorly reasoned, the content of theoretical errors.

*"Unsatisfactory" (5 points and less)* – The student cannot answer the question.

Kazan State Medical University

Department of Hygiene, Occupational Health

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2022

HYGIENE EXAM QUESTIONS

Ticket № (an example)

1. Aim and scope of Public Health and Hygiene.
2. Lighting in buildings: artificial lighting.
3. Adolescents and mental health.
4. Milk Hygiene.
5. Job stress: Preventive approaches at workplaces.