

Questions for Credit-test

A card contains 3 questions from Part A, 5 tests from Part B, 1 task from Part C.

The examination is run in writing, duration -1 our.

Part A

1. Note the objectives of the general radiation safety measures
2. What are the quantitative indicators of the population lifetime excessive radiation risk of oncological diseases for particular living site, district or a subject of the Russian Federation used for?
3. Name quantitative indicators of the population lifetime excessive radiation risk of cancer diseases
4. Define ecological risk assessment?
5. What is the difference between human health risk assessment and ecological risk assessment?
6. What is radiation risk assessment?
7. Name the four basic steps in the risk assessment process in proper sequence.
8. What is the basic list of site characteristics required for RA ?
9. Define the exposure assessment
10. Define Linear No-Threshold Risk Model. Give diagram
11. Define Linear Threshold Risk Model. Give diagram
12. Point out the difference between the somatic and genetic effects of radiation
13. Chemical toxicity of uranium and impact of radioactive uranium on human health
14. The unplanned automatic trip rate and worker radiation exposure as an indicators of improvement in nuclear safety. Their development from 1990 to nowadays.

Part B

TESTS

1. Identify each type of radiation as ionizing (mark with I) or nonionizing (mark with NI).

A. sound _____ G. infrared _____

B. light _____ H. radio waves _____

C. alpha _____ I. microwaves _____

D. neutron _____ J. x-ray _____

E. gamma _____ K. beta _____

F. low frequency _____

power line

2. True or False:

The average person is exposed to about 360 millirem of ionizing radiation per year. More than 80% of this dose comes from natural sources.

3. True or False:

Ionizing radiation refers to the ability of higher energy radiation to create electrically charged particles called ions in the material it penetrates including human tissue.

4. Radioactive atoms

A. give off surplus energy by emitting radiation.

B. are unstable.

C. change or decay until they become stable.

D. all of the above.

5. Sources of ionizing radiation that contribute to the dose received each year by a man are:

(enter True or False next to each entry)

A. medical x-rays _____

B. cosmic rays from the sky above _____

C. the earth below us _____

D. food we eat _____

E. our own bones _____

F. modern luminous watch dials _____

6. Which of the following consumer items can contribute to radiation exposure?

A. cigarettes

D. natural gas cooking

B. camping lantern mantles

E. dental ware (crowns, dentures)

C. fertilizer

F. All of the above

7. Caution should be used by workers handling highly radioactive materials.

Choose the method(s) workers can minimize their exposure to radiation dosage.

A. Minimize the time spent near the radioactive material.

B. Maximize the distance between the radioactive material and the worker.

C. Use shielding between the radioactive material and the worker whenever possible.

D. All of the above.

E. None of the above.

8. Radon, the radioactive gas that contributes more than half the yearly dose to the person, has a half-life of approximately four days. How long does it take a sample containing radon to decay to one-eighth ($1/8$) of its original level of radioactivity?

A. 2 days D. 12 days

B. 4 days E. 16 days

C. 8 days

9. True or False:

Giant spiders, mutant crabs, and other fearsome creatures are the product of the special effects of a movie industry — not radiation. In other words, the effects of radiation are not unique. There are no detrimental health effects caused by radiation that cannot also be caused by one or more physical, chemical, or biological agents.

10. What is a safe radiation dose?

A. Depends on the age of the individual.

B. Depends on the time over which the dose exposure was received.

C. A poorly phrased question that has no answer.

D. Depends on the frequency of the radiation.

11. The following table ranks the risks of a number of activities. The risk is ranked from high to low on the basis of the estimated number of days of life expectancy lost for that activity. Compared to the activities listed in the table, where does the risk associated with receiving a radiation dose of 1000 millirem every year for 30 years fit?

Higher Risk	Smoking 20 cigarettes per day
	Overweight by 20%
	All accidents combined
↑ increasing risk	Auto accidents
	Drowning
	Medical diagnostic x-rays
Lower Risk	All catastrophes (earthquake, etc.)

A. Greater than the risk of being overweight by 20%.

B. Greater than the risk due to auto accidents.

C. Slightly less than the risk of drowning.

D. Less than the risk associated with x-rays used in medical diagnostics.

12. MI **2.1.10.3014 – 12** include the evaluation of individual radiation risks and assessment of radiation risks for the following situation (choose the correct answer)

- irradiation of the patients, the staff and the population when ionizing radiation sources are used in medicine with the purpose of diagnostics and treatment;
- irradiation, connected with the influence of natural SIR;
- long-term irradiation of the body in small doses by man-made ionizing radiation sources (sir) with constant or changing in time the average annual radiation dose for population living on the territories with the increased level of radioactive pollution
- irradiation of the staff under constant personal dosimetry monitoring;

- irradiation in large doses and/or with a high dose rate;
- irregular exposure due to intakes of radionuclides nonuniformly spread in a human body (isotopes of iodine, etc.).

Part C.

1. Evaluate the lifetime risk of cancer morbidity of the population in the city «N» due to the impact of external and internal exposure in the course of 2001, caused by the consequences of the accident at the Chernobyl nuclear power plant.

The average individual annual effective dose of external and internal man-caused radiation in the inhabitants of the town «N» in 2001 amounted to 0,66 mSv

Calculate the number of MN, which arise in the course of the life for the same reason. The risk coefficient for the group of population irradiated in the course of one year is equal to 0,08

Give full answer as it was readed in lecture.

2. Evaluate the lifetime risk of cancer incidence for children living in the year of 2001 in the city «N», due to the impact of external technogenic radiation in the course of 2001, caused by the consequences of the accident at the Chernobyl nuclear power plant. What is the number MN can be caused by this exposure?

The average individual annual effective dose of external and internal man-caused radiation in the inhabitants of the town. «N» in 2001 amounted to 0,66 mSv.

The risk coefficient for the group «the Children of 0-14 years » irradiated in the course of one year is equal to 0,17

Give full answer as it was readed in lecture.