Continuing Education Course #620
Nuclear Power
Basics

1. Which unit is NOT an SI or SI derived unit of radiation?
- a. becquerel
- b. gray
- c. rem
- d. sievert

2. What is the electron rest mass?
- a. 1.6022×10^{-19} C
- b. 1.6727×10^{-27} kg
- c. 1.6750×10^{-27} kg
- d. 9.1095×10^{-31} kg

3. The wavelength of a certain IR photon is 1 mm.

What is most nearly the energy of this photon?
- a. 200×10^{-12} J
- b. 200×10^{-24} J
- c. 300×10^{-24} J
- d. 660×10^{-24} J

4. The symbol for uranium is ${}^{238}_{92}\mathrm{U}$.

What is the number of electrons in this form of non-ionized uranium?
- a. 92
- b. 146
- c. 238
- d. 330

5. The following table shows the isotopes of uranium.

Isotope	Abundance [%]	Atomic Weight
${}^{234}\mathrm{U}$	0.0054	234.04
${}^{235}\mathrm{U}$	0.72	235.04
${}^{238}\mathrm{U}$	99.27	238.05

What is the atomic weight of naturally occurring uranium?

- a. 234.04
- b. 235.04
- c. 238.02
- d. 238.05

6. The electron density _____ with the atomic number Z.

- a. decreases
- b. increases
- c. stays the same
- d. varies

7. The Q-value for a fission or fusion reaction that liberates energy has what general value?

- a. $Q > 0$
- b. $Q < 0$
- c. $Q = 0$
- d. $Q << 0$

8. Which of the following is NOT a property of binding energy?

- a. BE >0
- b. For A > 60, BE Increases
- c. 2.2 MeV ≤ BE ≤ 1900 MeV
- d. For A < 20, BE has Large Variation in A

9. If "mass" is given as a value of energy, such as MeV, what is the assumed value of the speed of light?

- a. 1
- b. c^2
- c. 9.84×10^8 ft/sec
- d. $2.9979(3.00) \times 10^8$ m/s

10. What element is missing in the following fusion reaction?

$${}_1^2\mathrm{H} + {}_1^3\mathrm{H} \rightarrow X + {}_0^1\mathrm{n}$$

- a. ${}_2^4\mathrm{He}$
- b. ${}_2^5\mathrm{He}$
- c. ${}_1^4\mathrm{He}$
- d. ${}_2^4\mathrm{H}$

11. At what neutron energy can one ignore relativistic effects?

- a. 1 MeV
- b. 5 MeV
- c. 10 MeV
- d. 20MeV

12. Thermal neutrons are considered to have a velocity of 2200 m/s. To what energy does this correspond?

○ a. 25.3×10^{-9} MeV
○ b. 25.3×10^{-6} MeV
○ c. 25.3×10^{-3} MeV
○ d. 25.3 MeV

13. What is most nearly the binding energy per nucleon, BE/A, of U-235 in MeV?
○ a. 7.6
○ b. 7.8
○ c. 17.8
○ d. 1780

14. What is the half-life or radon given a decay constant of 0.18/day?
○ a. 0.180 days
○ b. 0.693 days
○ c. 1.80 days
○ d. 3.85 days

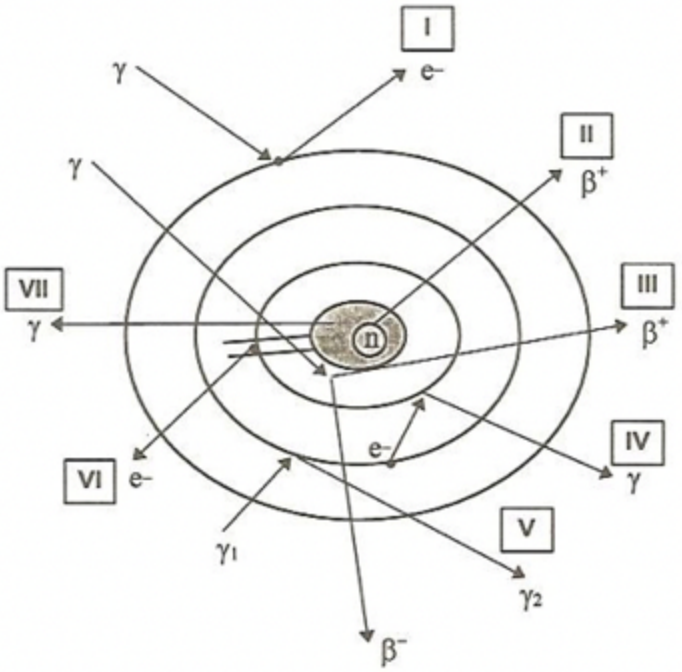
15. A radioactive item is calculated to have an activity of 3 Ci. What is the activity in becquerel, Bq?
○ a. 2.7×10^{-11}
○ b. 3
○ c. 113×10^{9}
○ d. 3.7×10^{10}

16. The unit closely related to absorbed dose called a Kerma focuses on the impact of _____ radiation.
○ a. electrons
○ b. photons
○ c. protons
○ d. uncharged

17. Protection standards depend upon the _____ imparted, the location of the deposition, and the _____ effects in the region of deposition.
○ a. energy / biological
○ b. energy / organ
○ c. dose / shielding
○ d. rem / quality factor

18. What is the EPA limit for the Whole Body for radiation workers?
○ a. 25 mrem/yr
○ b. 75 mrem/yr
○ c. 100 mrem/yr
○ d. 5 rem/yr

19. Consider the representation of a generic atom interaction with gamma radiation.



Which process requires a minimum of 1.02 MeV?

- a. II
- b. III
- c. VI
- d. VII

20. Approximately how much energy is released in the conversion/annihilation of 1 lb of mass?

- a. 400 kw-hr
- b. 4000 kw-hr
- c. 11 000 000 kw-hr
- d. 11 000 000 000 kw-hr