

Introduction to Reactor System

K.S. Rajan

Professor, School of Chemical & Biotechnology

SASTRA University

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1 Quiz

1.1 Questions

1. Which of the following neutron reactions is predominantly responsible for moderation of fast neutrons?
a) Elastic scattering b) inelastic scattering c) neutron capture d) none of the above
2. Which of the following neutron reactions is responsible for nuclear transmutation?
a) Elastic scattering b) inelastic scattering c) neutron capture d) none of the above
3. From table 1 (in the lecture), identify the fissile isotopes.
4. From table 1 (in the lecture), identify the fertile isotopes.
5. What is the approximate number of neutrons produced per fission event occurring in ^{235}U ?
6. Which among the following is not a fuel in a nuclear reactor?
a) U-235 b) Pu-239 c) U-233 d) Th-232
7. What is the isotopic abundance of U-235 in natural uranium fuel?
8. Which among the following is not a moderator in a nuclear reactor?
a) Water b) Heavy water c) Graphite d) Boron
9. Which among the following is the most abundant isotope in India?
a) U-235 b) Th-232 c) U-233 d) Pu-239
10. Which of the following reactor types is the one at Madras Atomic Power Station?
a) PHWR b) LWR c) Fast breeder reactor d) Advanced heavy water reactor
11. Which of the following reactor types is the one built at Koodangulam?
a) PHWR b) LWR c) Fast breeder reactor d) Advanced heavy water reactor
12. Name the fuel matrix used in Fast Breeder Test Reactor in Kalpakkam.

13. What is the uniqueness of KAMINI reactor?
14. What is the contribution of nuclear energy (in %) towards meeting the electricity requirement of the country?

1.2 Answers

1. (a) Elastic scattering
2. (c) Neutron capture
3. U-235, Pu-239, U-233, Pu-241 (they have higher σ_f/σ_r ratio)
4. U-238
5. Three
6. (d) Th-232 is not a fuel. It captures neutron and undergoes nuclear transmutation to U-233. Hence Th-232 is a fertile material, not a fissile (fuel) material
7. 0.7 %
8. (d) Boron
9. (b) Th-232
10. (a) PHWR
11. (b) LWR
12. U+Pu carbide fuel
13. Only operating reactor in the world with U-233 as fuel
14. 3 %