

Fundamentals of Nuclear Energy

Nuclear Energy · Answer Key · 25 Questions

1. Which element is the primary fuel used in most conventional nuclear power reactors?

- A) Uranium**
- B) Plutonium
- C) Thorium
- D) Radium

2. What physical process do nuclear power plants use to generate heat?

- A) Nuclear fusion
- B) Chemical combustion
- C) Nuclear fission**
- D) Geothermal extraction

3. In a nuclear reactor, what is the purpose of control rods?

- A) To heat the water
- B) To absorb neutrons and regulate the reaction rate**
- C) To provide structural support
- D) To convert electricity into light

4. What is the role of the 'moderator' inside a nuclear reactor?

- A) To increase the temperature
- B) To slow down neutrons**
- C) To accelerate the chain reaction
- D) To store spent fuel

5. Which part of a nuclear power plant is responsible for generating electricity using steam?

- A) The core
- B) The cooling tower
- C) The turbine**
- D) The containment dome

6. What is the main environmental benefit often cited for nuclear power compared to fossil fuels?

- A) Zero greenhouse gas emissions during operation**
- B) It is cheaper to build
- C) It requires less water
- D) It can be built anywhere

7. What material is most commonly used as a coolant in nuclear reactors?

- A) Liquid helium
- B) Mercury
- C) Water**
- D) Liquid nitrogen

8. What is the term for the byproduct of nuclear power generation that requires careful long-term storage?

- A) Nuclear waste**
- B) Biomass
- C) Coal ash
- D) Hydrocarbon residue

9. Which subatomic particle is released during nuclear fission and triggers further fission events in a chain reaction?

- A) Proton
- B) Electron
- C) Neutron**
- D) Positron

10. Where is the majority of the heat produced in a nuclear power plant?

- A) In the turbine
- B) In the reactor core**
- C) In the cooling towers
- D) In the electric generator

11. What is the function of the containment structure in a nuclear power station?

- A) To generate steam
- B) To prevent the release of radioactive materials**
- C) To house the administrative staff
- D) To store the fuel rods

12. Nuclear power plants produce electricity using which of the following energy transformations?

- A) Nuclear to chemical to electrical
- B) Nuclear to thermal to mechanical to electrical**
- C) Chemical to thermal to electrical
- D) Solar to thermal to electrical

13. What is the term for a reactor configuration where the chain reaction is kept at a steady, constant level?

- A) Criticality**
- B) Meltdown
- C) Fission instability
- D) Exothermic collapse

14. Which heavy metal is sometimes produced from uranium in a reactor and can also be used as a nuclear fuel?

- A) Lead
- B) Plutonium**
- C) Gold
- D) Iron

15. What is the primary substance that absorbs heat from the fuel rods to create steam?

- A) Oil
- B) Natural gas
- C) Water**
- D) Molten salt

16. Approximately what percentage of global electricity is currently produced by nuclear power?

- A) 5-10%
- B) 10-15%**
- C) 25-30%
- D) 40-50%

17. Which country currently operates the largest number of nuclear power reactors?

- A) France
- B) United States**
- C) Japan
- D) China

18. What happens to the kinetic energy of neutrons during the moderation process?

- A) It increases
- B) It decreases**
- C) It remains constant
- D) It converts into light

19. What type of radioactive decay is involved in the fission of Uranium-235?

- A) Alpha decay
- B) Beta decay
- C) Gamma decay

D) Neutron-induced fission

20. Which of these is a common isotope used in nuclear fuel?

- A) Uranium-238
- B) Uranium-235**
- C) Carbon-14
- D) Hydrogen-3

21. What component of a power plant releases excess heat into the atmosphere, often seen as white clouds?

- A) Reactor vessel
- B) Cooling tower**
- C) Control rod assembly
- D) Transformer

22. What is the process called when two light atomic nuclei combine to form a heavier nucleus, releasing energy?

- A) Fission
- B) Fusion**
- C) Radioactive decay
- D) Ionization

23. Which agency is the international body that promotes safe, secure, and peaceful nuclear technologies?

- A) UNICEF
- B) WHO
- C) IAEA**
- D) NATO

24. What is the typical lifespan of a modern nuclear power plant before decommissioning or license renewal?

- A) 10-20 years
- B) 30-40 years
- C) 60-80 years**
- D) 5-10 years

25. How is high-level nuclear waste primarily stored after it is removed from the reactor?

A) It is buried in the ocean

B) In cooling pools followed by dry casks

C) It is burned in incinerators

D) It is recycled into household batteries