

Saitechinfo NEET-JEE Academy

Nuclear Physics - Topic Tree

1. Introduction to Nuclear Physics

- Atomic structure basics
- Nucleus and nuclear forces

2. Nuclear Composition and Properties

- Constituents of the nucleus: protons and neutrons
- Nuclear size and nuclear density
- Nuclear mass and binding energy
- Mass defect and binding energy calculation

3. Radioactivity

- Discovery of radioactivity
- Types of radioactive decay: Alpha, Beta, and Gamma
- Laws of radioactive decay
 - Decay constant
 - Half-life and mean life
- Radioactive series
- Artificial transmutation and radioactive isotopes

4. Nuclear Reactions

- Nuclear fission
 - Fission chain reaction
 - Applications: Nuclear reactors and atomic bombs
- Nuclear fusion
 - Fusion reactions in the sun and stars
 - Applications and challenges of controlled fusion

5. Nuclear Energy

- Einstein's mass-energy equivalence $E = mc^2$
- Energy released in nuclear reactions
- Comparison of fission and fusion in terms of energy output

6. Applications of Nuclear Physics

- Medical applications (radiotherapy)
- Industrial applications (radiography, power generation)
- Research and scientific applications

7. Nuclear Detectors and Instrumentation

- Geiger-Muller counters
- Cloud chambers
- Scintillation counters

8. Environmental and Health Implications of Nuclear Physics

- Nuclear waste management
- Radiation hazards and safety measures
- Nuclear disaster management