

SIXTH SEMESTER B.TECH. DEGREE EXAMINATION

2013 Scheme- Model Question Paper

13.606.11 Nuclear Engineering (MP)

Time: 3 hours

Max. Marks: 100

PART-A

Answer all questions. Each question carries 2 marks.

1. Explain Compton Effect.
2. What do you mean by Bremsstrahlung radiation? How are they produced?
3. Explain why elements with atomic numbers 84 (Polonium) to 92 (Uranium) are radioactive
4. Explain mass defect and binding energy
5. List out the two methods for power control in boiling water reactor
6. Why borated water/boric acid is not used for power control in boiling water reactor
7. Sketch closed nuclear fuel cycle
8. Sketch Reactor Water Cleanup System (RWCS)
9. Explain Linear No-Threshold Risk Model
10. Explain Biological half life and Effective half life

PART B

Answer any one full question from each module. Each question carries 20 marks

Module I

11. Explain any five ways in which neutrons interact with matter
12. Derive the expression for the number of radioactive nuclides left after time, t (law of radioactive decay). Define decay constant, λ , half life, $t_{1/2}$ and average life T_{av} . Prove that $t_{1/2} = 0.693 T_{av}$

Module -2

13. Explain the working of a boiling water reactor with a schematic sketch
14. What are the desirable properties of a nuclear fuel? Compare the properties of Uranium in its various forms as a nuclear fuel

Module -3

15. Explain why U-235 enrichment is required? Explain why conversion process is to be carried out before enrichment of U-235. Explain any two methods in which U-235 can be enriched. Also compare the above enrichment processes.
16. Explain solvent extraction using PUREX method

Module 4

17. Derive the expression for temperature distribution in a flat slab where heat generation varies exponentially with distance. Identify any one part of the nuclear reactor where the above expression can be used. Also explain why heat generation varies exponentially with distance in the above identified part

18. What is meant by a fast breeder reactor? Why liquid sodium is used as a coolant in Fast breeder reactors? With the help of a neat sketch explain how heat is transferred from core to water in case Loop type Sodium Fast Reactors (SFR) and Pool type Sodium Fast Reactors (SFR)