Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 80827

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Seventh Semester

Mechanical Engineering

ME 2034 — NUCLEAR ENGINEERING

(Common to Mechanical and Automation Engineering)

(Regulations 2008)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1.   Define mean life and decay constant.

2.   Define Transmutation.

3.   What are the requirements to sustain the nuclear chain reaction?

4.   What are the advantages of thorium?

5.   Define the term reprocessing.

6.   List the characteristics of spent fuel.

7.   What are the objectives of nuclear shielding?

8.   Define the term fast breeding.

9.   What is the need of pressure suppression system in reactor?

10. List the primary objectives of reactor instrumentation safety system in nuclear power plants.

PART B — (5 × 16 = 80 marks)

11. (a) (i)   What is nuclear isomerism? And explain the three different types of it with neat sketch.   (10)

          (ii) Write short notes on conversion and breeding.   (6)

Or

     (b) Define radioactivity and explain the various possible modes of decay of radionuclide.   (16)

12. (a) (i)   Explain chain reaction.   (8)

         (ii) Explain various nuclear fuel cycles.   (8)

Or

     (b) Describe the production and purification of thorium.   (16)

13. (a) Explain the working principle of a solvent extraction equipment used in nuclear industry. Draw a neat sketch of the equipment.   (16)

Or

     (b) Write short notes on the following process:

         (i)   UREX

         (ii) TRUEX

         (iii) PYRO

         (iv) FLOUREX.   (16)

14. (a) Explain with a neat sketch the boiling water reactor power plant.   (16)

Or

     (b) Explain the construction and working of super critical water reactor. (16)

15. (a) (i)   Explain the components of nuclear safety.   (8)

         (ii) Discuss the criteria for the nuclear and radiation accidents and how do you evaluate the nuclear accidents.   (8)

Or

     (b) (i)   State long term effects and beneficial effects of nuclear radiation. (8)

         (ii) Give account on different types of radioactive wastes.   (8)

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