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<b>Question Paper Code : 88523</b>
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B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Seventh Semester

Mechanical Engineering

ME 708 — NUCLEAR ENGINEERING

(Regulations 2008)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is called mass defect? Give its significance.
2. Define radio activity.
3. How much power is generated by the fissioning of 1 g of  $U^{235}$  per day?
4. List the different types of nuclear reactor designs.
5. Define the term reprocessing.
6. List the characteristics of spent fuel.
7. Classify the different types of coolant with example.
8. State the disadvantages of sodium fast reactor.
9. What are the different types of nuclear waste materials and give examples?
10. What is the unit of radiation dose and out define the term. What amount of radiation accumulation allowed in a year for human being above 18 years of age?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the working principle of a fast breeder reactor with a neat sketch. (10)  
(ii) Why shielding of a reactor is necessary? Write desirable properties of a good shielding material. (6)

Or

- (b) (i) Discuss the steps involved in the design of fast breeder reactors. (8)  
(ii) Explain the modes of heat transfer in nuclear reactors. (8)
12. (a) Describe mobile atomic reactors and explain the function of submarine thermal atomic reactors, submarine atomic intermediate reactor with sketch. (16)

Or

- (b) Explain the following irradiation effects of thorium  
(i) With Metal and its alloys (8)  
(ii) With Mixed ceramic compounds. (8)
13. (a) Discuss the role of solvent extraction in reprocessing. (16)

Or

- (b) Describe the working of centrifugal solvent extraction equipment. (16)
14. (a) Explain the construction and working principle of the Liquid-Metal fast breeder reactor with a neat sketch. (16)

Or

- (b) Explain the principle of operation of fusion reactors in detail. (16)
15. (a) Explain in detail how the radio active waste materials are disposed off. (16)

Or

- (b) (i) Discuss the problem of health hazard from nuclear radiation. (8)  
(ii) Discuss the maximum possible radiation dose limits and how the tolerance dose is determined. (8)
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