

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**FIFTH SEMESTER B. TECH DEGREE EXAMINATION(R&S), DECEMBER 2019**

**Course Code: ME371**

**Course Name: NUCLEAR ENGINEERING**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer any three full questions, each carries 10 marks.*

Marks

- |   |  |     |
|---|--|-----|
| 1 | a) Explain the concept of chain reaction with suitable example.                              | (4) |
|   | b) Define Binding Energy and compare nuclear fission and nuclear fusion                      | (6) |
| 2 | a) Identify the basic challenges in a fusion reactor.  | (4) |
|   | b) Explain the interaction of Alpha, Beta and Gamma radiation with matter                    | (6) |
| 3 | a) Explain the working of a reactor system in which nuclear fusion is the working principle. | (4) |
|   | b) Explain the components of a typical nuclear reactor.                                      | (6) |
| 4 | a) What is Criticality in Nuclear Power Plant and its important Limiting Cases?              | (4) |
|   | b) How the nuclear reactors are classified?  | (6) |

**PART B**

*Answer any three full questions, each carries 10 marks.*

- |   |   |     |
|---|---|-----|
| 5 | a) Explain the varieties of coolants used in Nuclear reactors.  | (4) |
|   | b) Discuss the various Safety features added to a Boiling Water Reactor.  | (6) |
| 6 | a) List down the requirements of a moderator.   | (4) |
|   | b) Explain the working of a Boiling Water Reactor (BWR) with neat sketch. Mention its advantages and disadvantages. | (6) |
| 7 | a) Write short note on few common enrichment techniques employed in nuclear fuel cycle.                             | (4) |
|   | b) Illustrate and explain the solvent extraction method used for uranium extraction.                                | (6) |
| 8 | a) Comment on the need for fuel reprocessing and list out the methods employed.                                     | (4) |
|   | b) Explain the Fluorex process for the Spent Fuel processing of uranium with diagram.                               | (6) |

**PART C**

*Answer any four full questions, each carries 10 marks.*

- 9 a) What is a radiation dose? How radiation dose quantities are described. (4)  
b) Why shielding of a reactor is necessary? Write desirable properties of a good shielding material. (6)
- 10 a) What are the different types of heat losses from nuclear reactor? (4)  
b) Derive an expression for heat conduction in cylindrical fuel rod with heat generation. (6)
- 11 a) What are the health effects of exposure to ionizing radiation? (4)  
b) Explain the term decay heat and list down any four sources of decay heat. (6)
- 12 a) Explain the environmental impacts due to radioactive waste disposal. (4)  
b) Discuss the process of radioactive solid waste management system. (6)
- 13 a) Briefly explain how are radioactive wastes produced? (4)  
b) Classify the nuclear waste on the basis of intensity of radiation and mention the range of each. (6)
- 14 a) What are the three factors of radiation protection for working personnel & Public? (4)  
b) Explain in detail Vulnerability of nuclear plants to attack. (6)

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