

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth semester B.Tech degree examinations (S) September 2020

Course Code: ME371**Course Name: NUCLEAR ENGINEERING (ELECTIVE)**

Max. Marks: 100

Duration: 3 Hours

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

Marks

- | | | |
|---|--|---|
| 1 | a) Describe nuclear energy and nuclear forces and explain its relevance in chain reaction. | 5 |
| | b) Explain the principle behind radioactive decay with its classification. | 5 |
| 2 | a) Illustrate and explain about neutron cross section show the importance in nuclear reaction. | 5 |
| | b) Describe the interaction of rays with matter. | 5 |
| 3 | a) Illustrate and explain the method of nuclear reaction inside a reactor core. | 5 |
| | b) List down the reactor classification; Explain any one with the help of a neat figure. | 5 |
| 4 | a) Explain the relevance of critical size in a reactor, also describe four factor formula. | 4 |
| | b) Describe nuclear fusion reaction. | 3 |
| | c) Describe various features of reactor control. | 3 |

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

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|---|--|---|
| 5 | a) In BWRs, control rods are placed in the bottom of the reactor, rather than the top as in PWRs. Comment. | 4 |
| | b) Illustrate and explain emergency core cooling system (ECCS). | 6 |
| 6 | a) Describe the desirable properties of moderator and coolant, that should possess while its selection for a reactor system. | 5 |
| | b) With the main components, describe the working of a BWR. | 5 |
| 7 | a) Illustrate and explain PUREX method for extracting uranium. | 5 |
| | b) Describe the UREX method for uranium extraction. | 5 |

- 8 a) Describe the process of formation of “Yellow cake”, state the importance of it. 4
b) Illustrate and explain any two method of separation process for fuel enrichment. 6

PART C

Answer any four full questions, each carries 10 marks.

- 9 a) Describe the heat generation after shutdown of a reactor with its source. 5
b) List down the important properties that are necessary for a good heat transfer coolant in a nuclear reactor. 5
- 10 a) ‘Radiation exposure cause significant mutations on a biological perspective’, explain in relation with radiation dozes and its classification. 5
b) Derive general heat conduction equation in a fuel rod. 5
- 11 a) Describe reactor shielding with its types. 4
b) Illustrate and explain fast breeder reactor with its advantages as well as disadvantages. 6
- 12 a) Enumerate the criteria for selection of site for a nuclear power plant. 5
b) Describe weapons proliferation in concerned with plutonium and uranium bomb. 5
- 13 a) Elucidate the different types of nuclear waste. 3
b) State any three criteria for nuclear plant safety. 3
c) Explain the need for waste management with its objectives. 4
- 14 a) Describe about the disposal of nuclear waste. 5
b) Describe the beneficial role of radiation and explain the long term effects of radiation on humans. 5
