

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

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

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| 1 | a) Illustrate the role of binding energy in the stability of nucleus. | (6) |
| | b) Elucidate the origin of radioactivity and explain the radioactive law. | (4) |
| 2 | Fission reactors are employed for power production. Name and describe the model used for explaining the fission process. | (10) |
| 3 | Derive the neutron diffusion equation for a point source | (10) |
| 4 | Sketch the neutron life cycle for a reactor of finite size with effective multiplication factor equal to 1.28 and initial neutron population of 1000 neutrons assuming reasonable values for the factors involved. Explain the factors involved in the formulation. | (10) |

PART B

Answer any three full questions, each carries 10 marks.

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| 5 | Illustrate the safety systems that are incorporated in the BWR for heat removal during reactor core isolation and during normal shutdown. | (10) |
| 6 | Explain the construction and working of a boiling water reactor plant. | (10) |
| 7 | a) In light water reactor the amount of fissile material in the fuel should be greater than that in the natural uranium fuel. Name the process employed for attaining this. Detail out the methods implemented in the nuclear industry for the same. | (5) |
| | b) Solvent extraction process is used in the nuclear industry. Describe the role in the industry. Demonstrate any two extraction processes. | (5) |
| 8 | a) Enumerate the requirements of materials which are to be used as cladding in nuclear reactors. | (4) |
| | b) Explain the radiation damage mechanisms of the reactor material. | (6) |

PART C

Answer any four full questions, each carries 10 marks.

- 9 Describe the heat transfer mechanism in the fast reactor system. (10)
- 10 a) Compare absorbed dose with equivalent dose. (4)
b) Discuss the radiation shielding employed for nuclear radiations. (6)
- 11 Discuss the design concept employed for safeguarding the employees and general public of the nuclear power plant. (10)
- 12 a) Radiation effects are classified into deterministic and stochastic effects. Give a detailed outline of the effects. (6)
b) Describe the functions of safety systems in a nuclear power plant (4)
- 13 Demonstrate the methods for conditioning, treatment and disposal of nuclear wastes. (10)
- 14 a) Write short notes on redundancy and diversity features of safety systems. (6)
b) List out an accident management programme for a nuclear accident. (4)
