



**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
(AUTONOMOUS)**

(Approved by AICTE, New Delhi & Affiliated to JNTUA, Anantapuramu)
(Accredited by NBA & Accredited by NAAC with 'A' Grade)
(An ISO 9001:2008 Certified Institution)

Siddharth Nagar, Narayanavanam Road, PUTTUR-517 583

QUESTION BANK

**Subject with Code: Nuclear Engineering (18ME3112)
Sem : I-Sem**

**Course & Branch: M. Tech(TE)
Regulation: R18**

UNIT-I

- 1 (a) Explain the nuclear fission process with a neat sketch (6M)
- (b) Distinguish between nuclear fission and fusion (6M)
- 2 What is the need for enrichment of uranium? Describe the most efficient and elaborated methods suited to produce highly enriched U^{235} . (12M)
- 3 (a) What is chain reaction? What is the difference between controlled and uncontrolled chain reaction? (6M)
- (b) Which types of neutrons are most suitable for chain reaction? Why. (6M)
- 4 (a) Explain the process of breeding with an example? (6M)
- (b) How to convert nuclear fuels into fertile materials? (6M)
- 5 (a) Define the term radioactivity. Explain it with an example (6M)
- (b) What is the importance of half-life period of radioactive material in nuclear power generation? (6M)
- 6 Explain the following terms in detail (12M)
- (i) Breeding ratio (ii) Fertile Material (iii) Chain reaction
- 7 Name different methods of power producing process in Nuclear Power Plant and explain them in detail? (12M)
- 8 (a) How to control the nuclear power generation? (6M)
- (b) Explain in brief how uranium material is produced from thorium?. (6M)
- 9 (a) Amount of energy released in fusion higher than fission. Justify (6M)
- (b) Explain the process of conversion of fissile materials into fertile materials (6M)
- 10 (a) what is neutron scattering and neutron absorption? (6M)
- (b) Discuss radioactive decay chain (6M)

UNIT-II

- 1 (a) Write the salient equations of Neutron diffusion theory (6M)
- (b) The slow Neutrons are more useful rather than faster one in power generation. Justify (6M)
- 2 (a) Elastic Collisions are the important source for the nuclear power. Justify (6M)
- (b) What do you know about Neutron transport? Explain (6M)
- 3 Mention the importance of Fick's law in diffusion of Neutron (12M)
- 4 Mention various parameters considered in neutron transport calculations (12M)
- 5 Mention the importance of diffusion theory of approximation (12M)
- 6 (a) How do you make the neutrons slow (6M)
- (b) Explain about Elastic Collision. (6M)
- 7 Mention the various assumptions and boundary conditions used for the derivation of diffusion equation (12M)
- 8 Write an equation for Neutron transport and explain the terms in it (12M)
- 9 (a) What do you understand by diffusion theory of approximation (6M)
- (b) Distinguish between Elastic and inelastic collisions of atoms (6M)
- 10 (a) Explain the diffusion equations for point source and planer source (6M)
- (b) Why Fick's Law is more important in nuclear power generation (6M)

UNIT-III

- 1 Name and Explain various critical parameters in thermal reactors (12M)
- 2 How do you find the solution for multi group diffusion equations (12M)
- 3 Mention the difference between multi group differential equations for single and multi regions (12M)
- 4 Find solution for diffusion equations for a particular region (12M)
- 5 Classify the reactors used in nuclear power plant and explain anyone with a neat sketch (12M)
- 6 (a) Describe the working of PWR with a neat sketch (6M)
- (b) What are the merits and demerits of PWR (6M)
- 7 (a) Name various parts of a Reactor and also mention the uses of each part (6M)
- (b) How BWR differs from PWR
- 8 (a) Mention the special features of Fast breeder reactor (6M)
- (b) With a neat sketch explain the working of Sodium-Graphite reactor (6M)

- 9 Describe the working of Gas Cooled reactor with a neat sketch and also mention its merits and demerits (12M)
- 10 (a) Explain the working of reactor mostly used in India with a neat sketch (6M)
- (b) What are the various features of Homogeneous reactor which makes it special (6M)

UNIT-IV

- 1 Radioactive materials are more dangerous to human beings. Justify (12M)
- 2 Mention the significance of point kinematic equations in the nuclear power (12M)
- 3 How do you dispose radioactive materials without damaging environment (12M)
- 4 Write an equation for simple point Kinematics and mention the importance of each term in that. (12M)
- 5 Define the following terms (12M)
- (i) In hour unit of reactivity (ii) Dollar Unit of Reactivity
- 6 Write the factors which affects the reactivity (12M)
- 7 Mention the importance of point kinematics and the factors which affect them (12M)
- 8 What is the importance of Radiation Hazards and shielding (12M)
- 9 What do you understand by Fission Product poison and reactivity coefficients (12M)
- 10 What is a reactivity addition? Explain solution of it for any simple case? (12M)

UNIT-V

- 1 How the temperature is distributed in reactor core (12M)
- 2 What is the need of radiation protection and also mention its standards (12M)
- 3 What is the critical heat flux in reactor core (12M)
- 4 Mention the various safety precautions of Reactor core in nuclear power plant (12M)
- 5 Write equations for temperature distribution in reactor core (12M)
- 6 Write various equations and its solutions for heat transfer in reactor core (12M)
- 7 Heat flux plays very important role in reactor core. Justify (12M)
- 8 What are various units used for reactivity exposure and explain them in detail (12M)
- 9 Why reactor safety is important and mention its safety precautions (12M)
- 10 How reactors are useful in defense. Explain (12M)