**EPARTMENT OF MECHANICAL ENGINEERING**

**ME2034 NUCLEAR ENGINEERING**

**SEVENTH SEM MECHANICAL STUDENTS**

**UNIT – I**

**NUCLEAR PHYSICS**

**2 MARKS**

1. What are the advantages of nuclear power?
2. List down the disadvantages of nuclear power?
3. What is atom?
4. How does empirical approach differ from intuitive approach?
5. What is called nucleus?
6. What is the atomic number and mass number?
7. What is an isotope?
8. Write down the Einstein energy equation.
9. List down some isotopes used in fusion reaction?
10. List down the factors considered for stable and unstable nucleus?
11. What is nuclear binding energy?
12. Define the term one electron volt.
13. What is radio activity?
14. List down the types of radioactive decay.
15. Define the term half-life
16. Mention the types of nuclear interactions.

 18. What are the reactions held by a neutron in the nucleus?

 19. Mention the two types of scattering cross section.

 20. What is called plum pudding?

16 MARKS

1. Write short notes on Ruther ford model of an atom

2. Discus the elementary treatment of an atom

3. What is nuclear binding energy? How it is measured

4. Define half life? Mean life and decay constant?

5. Write a brief note on neutron interaction and cross section

6. Discuss radioactive decay chain

7. Explain the concept of elastic scattering and discuss how in elastic scattering differs elastic scattering.

8. Derive mass energy equivalence equation and explain the term mass defect and its significance.

9. Explain and discuss on various nuclear models.

10. Differentiate neutron Scattering and neutron absorption.

UINT-2

NUCLEAR REACTION AND REACTION MATERIALS

1. Name primary and secondary nuclear fuels used in nuclear power

2. What are called fissile isotopes?

3. How can we define fertile fuels?

4. What is nuclear fission?

 5. What are the conditions satisfied to sustain nuclear fission process?

6. How is nuclear energy calculated?

7. What is called cosmium? .

8. Define the term photo fission.

9. What is nuclear fusion?

10. Give the steps of proton-proton chain of fusion reaction?

11. Mention the types of hydrogen fusion.

12. Define chain reaction.

13. Define multiplication factor or reproduction factor.

14. What are the requirements to sustain the nuclear chain reaction?

15. Iist down the requirements of a moderator.

16. What is neutron generation?

17. Defne the term critical mass?

18. Name few common enrichment techniques employed in nuclear fuel cycle.

19. State the role of fuel fabrication in nuclear fuel cycle.

20. Name the methods used to concentrate and purify uranium.

**16 MARKS**

1. Explain the nuclear fuel
2. What is chain reaction**?** How it is measured? What is the difference between controlled and uncontrolled chain reaction?
3. Write short notes on
* Nuclear fuel cycle and its characteristics
* Uranium production and purification

 4. Explain clearly

* Nuclear fuel cycle with neat sketch
* Spent fuel characteristics

5. Draw and explain the solvent extraction equipment.

6. (i) Explain in brief how uranium material is produced and purified.

(ii) Write short notes on the purification of thorium and beryllium materials

 7. Explain the process of uranium production and purification.

 8. What is the need for enrichment of uranium? Describe the most efficient and elaborated methods suited to produce highly enriched U235.

 9. (i) Describe and distinguish between nuclear fission and fusion

 (ii) Explain the conditions require to produce a continuous fission reaction.

10. Explain the nuclear fission process with help of neat sketch.