

First Year B.Sc (MRT) Degree Examinations August 2017**Atomic and Nuclear Physics****Time: 3 Hours****Total Marks: 100**

- Answer all Questions.
- Draw Diagrams wherever necessary.

Essay: (2x20=40)

1. State and explain the assumption of Bohr's theory, postulates and evaluate with respect to merits and demerits
2. What is radioactivity. Mention the types of decay in detail and explain radioactive decay law by deriving the formula.

Short notes: (8x5=40)

3. What is electron emission. Explain the various types of electron emission.
4. Define and explain binding energy. How does binding energy per nucleon vary with mass number. What is the significance.
5. Derive an expression for an half-life of radioactive substance in terms of decay. Describe the relation between mean life and decay constant. Add a note on the SI unit of activity.
6. What is photo electric effect and state its laws, derive the Einstein photoelectric equation
7. Explain the limitation of Bohr's atom model
8. A radioactive substance has half-life of 5 years. Calculate the fraction of atoms of this substance would decay in 15 years.
9. Explain the process of electron capture in β decay.
10. Distinguish between isotope and isobar with an example. What is isotone.

Answer briefly: (10x2=20)

11. What is Zeeman effect.
12. What is the activity of a radioactive substance.
13. What are the properties of nuclear forces.
14. What is atomic mass unit. Express it in Kg.
15. What is the role of a moderator in a nuclear reactor.
16. Why does electron revolving around the nucleus. Write its energy.
17. The half-life of radium is 1600 yr. After how many years 1 kg of sample reduce to 50 gm. Calculate using formula.
18. Define specific binding energy. Sketch the graph between binding energy per nucleon and mass number.
19. What are the drawback of the Rutherford atomic model.
20. The Ir-192 radioactive material with 10Ci calculate the strength after 12 month.