

**M.Sc DEGREE EXAMINATION, APRIL 2018**  
**II YEAR - III SEMESTER**  
**Core Major -IX - NUCLEAR PHYSICS AND PARTICLE**  
**PHYSICS**

**Time : 3 Hours**

**Max.marks :75**

**Section A** ( $10 \times 2 = 20marks$ )

Answer any **TEN** questions

1. Define differential scattering.
2. What is Isospin?
3. Why the nucleon -nucleon forces are spin dependent?
4. What is meant by endothermic?
5. Give the relativistic relationship between momentum and kinetic energy.
6. What are stripping and pickup reactions?
7. Mention the important difference between dynamics of liquid matter and nuclear matter.
8. Define Schmidt lines.
9. List the methods of measuring the gamma energies.
10. Give the properties of neutrino.
11. State the principle of associated production.
12. What is mean life?

**Section B** ( $5 \times 5 = 25marks$ )

Answer any **FIVE** questions

13. Outline the meson theory of nuclear forces.
14. Compute the excitation energy of the compound nucleus.
15. Discuss the energetics and dynamics of nuclear reactions.
16. Explain the rotational states of collective model.
17. Explain the non conservation of parity in  $\beta$  decay.
18. Explain the conservation law and their validity.
19. Briefly explain CP and CPT invariance in elementary particle theory .

**P.T.O.**

**Section C** ( $3 \times 10 = 30marks$ )

Answer any **THREE** questions

20. Using the square well type of nuclear potential explain the deuteron problem and establish the relationship between depth and width of the well and deuteron binding energy.
21. Derive Brite-Wigner dispersion formula for  $l=0$  neutrons.
22. Describe the single particle shell model and explain the use of l.s coupling to predict the magic numbers.
23. Write short notes on Internal conversion and nuclear isomerism.
24. Describe in detail the Quark theory.