M.Sc. DEGREE EXAMINATION,NOVEMBER 2018
II Year III Semester
Core Major -IX
NUCLEAR PHYSICS AND PARTICLE PHYSICS

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. What do you mean by tensor forces?
2. Give significance of nuclear forces.
3. Name the types of nuclear reactions.
4. State conservation laws in nuclear reaction.
5. What are magic numbers in nuclear model? Give its use.
6. Write a note on Schmidt lines.
7. State parity selection rule.
8. What is meant by nuclear isomerism?
9. Name the types of interaction between elementary particles.
10. Write a note on leptons.
11. Give classification of hadrons.
12. State angular momentum selection rule.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Explain meson theory of nuclear forces.
14. Obtain the Q-value equation. Write a note on resonance scattering.
15. Discuss in brief about angular momenta and parities of nuclear ground states.
16. Write the notes on: (i) Neutrino physics, and (ii) Non-conservation of parity.
17. Explain symmetries and conservation laws in elementary particle physics.
18. Explain the charm, bottom and top quarks.
19. Give brief account on collective model of Bohr and Mottelson.

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. Explain the following: (i) Yukawa potential, (ii) Nucleon-nucleon scattering, and (ii) Effective range theory.

21. Discuss the following: (i) Energetics and dynamics of nuclear reactions, and (ii) Direct and compound nucleus reactions.

22. Describe the following: (i) Bohr-Wheeler theory of fission, and (ii) Shell model.

23. (i)Explain the Fermi theory of beta decay,and (ii) Define and explain the following: (a) Comparative half-lives, (b) Allowed and forbidden decays.

24. Write the notes on: (i) Elementary ideas of CP and CPT invariance, (ii) Gell-Mann-Okubo mass formula for octet and decuplet hadrons.

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