SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.
M.Sc.Physics - END SEMESTER EXAMINATIONS - NOV' 2024
SEMESTER - III

20PPHCT3009 - Nuclear and Particle Physics

Total Duration : 2 Hrs. 30 Mins. Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. Describe the nucleon-nucleon interaction at short and long distances.
2. Derive the Yukawa potential from the exchange of a meson between two nucleons.
3. Explain how energy, momentum, and angular momentum are conserved in nuclear reactions with specific examples.
4. Discuss the difference between elastic and inelastic scattering and how cross sections are used to distinguish between the two processes.
5. Explain the shell model of the nucleus and how it accounts for the observed energy levels of nucleons.
6. Describe the Schmidt model and the significance of Schmidt lines in predicting magnetic moments.
7. Derive the expression for the total decay rate in beta decay.
8. Discuss how these symmetries relate to the classification of particles and interactions.

Section C

I - Answer any **TWO** questions $(2 \times 10 = 20$ Marks)

9. Discuss how isospin symmetry simplifies the understanding of nuclear forces and how charge independence and charge symmetry are related to isospin.
10. Derive the Breit-Wigner one-level formula for resonance scattering and explain each term in the formula.
11. Illustrate the main features of the Bohr-Wheeler theory of fission and explain its physical basis.
12. Appraise the angular momentum and parity selection rules that govern the transitions between isomeric states.

II - Compulsory question $(1 \times 10 = 10$ Marks)

13. Elaborate the classification of hadrons in terms of SU(3) multiplets and their physical significance.

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