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(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2021-22 ONLY)

SUBJECT CODE 21 PPS 412

REG.NO. :

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : MAY – 2023

M.Sc. – PHYSICS **MAXIMUM MARKS: 70**

IV SEMESTER **TIME : 3 HOURS**

NUCLEAR AND PARTICLE PHYSICS

SECTION – A (10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.

MULTIPLE CHOICE QUESTIONS. (K1)

1. The other name for Tensor force is ---------force.

   (a) Symmetric (b) central (c) non-central (d) non-symmetric

2. _____.model is a hybrid of liquid drop model and distorted Shell Model

   (a) collective (b) unified (c) Optical (d) Fermi-Gas

3. When a nucleus emits beta -particle, its charge changes by one unit while its-------- practically remains unchanged.

   (a) volume (b) density (c) mass (d) weight

4. If a nucleus receives sufficient amount of _____energy by way of bombardment through energetic particles, it may undergo fission..

   (a) excitation (b) composite (c) ground state (d) average

5. CPT means Charge Conjugation, Parity and_____

   (a) Time (b) Temperature (c) Time reversal (d) Triplet

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES. (K2)

6. What is the significance of attaching a positive or negative sign with the scattering length?

7. By the theory of shell Model, in an odd nucleus how many nucleons left unpaired?

8. When two Gamma- rays are emitted in rapid succession by the same nucleus, what happens to their directions?

9. Give an example for Controlled Chain Reaction.

10. For a particle and an anti-particle which is not the same?

SECTION – B (5 X 4 = 20 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

(K3)

11. (a) List any four Properties of Deuteron..

(OR)

(b) What are Exchange Forces? How is high energy n-p scattering interpreted in terms of these forces?

12. (a) Give a brief account of single particle Shell Model which predicts the Magic Numbers.

.(OR)

(b) Show that the actual nucleons may be considered as undergoing collective oscillations, rather than executing massive circular movements as in rigid body rotation.

13. (a) Write a note on Parity in Beta- Decay.

(OR)

(b) Discuss the importance of Internal Conversion.

14. (a) Classify Neutrons according to their energies.

(OR)

(b) Obtain Four factor Formula.

15. (a) Give a brief note on Coloured Quarks

(OR)

(b) Get Gell-Mann-Okubo mass formula for Baryons.

SECTION - C (4 X 10 = 40 MARKS)

ANSWER ANY FOUR OUT OF SIX QUESTIONS

(16th QUESTION IS COMPULSORY AND ANSWER ANY THREE QUESTIONS (FROM Qn. No : 17 to 21) (K4 (Or) K5)

16. Explain in detail the Yukawa Theory of Nuclear Forces.

17. Write about Liquid drop model of the Nucleus and attain the semi empirical mass formula..

18. Discuss the predictions of Angular Momenta of nuclear ground states by Shell Model.

19. Describe the Bohr Wheeler Theory of nuclear fission..

20. What are elementary particles? With a table, give the general classification of Elementary Particles and give their details.

21. What is known as Alpha Decay? Explain the Gamow's Theory of Alpha Decay and arrive an expression for decay time.