Avinashilingam Institute for Home Science and Higher Education for Women
(Deemed to University) Coimbatore-641043.

Master's Degree Examination – November 2018
III Semester

Class : II PG
Major : Physics

Time: 3 hours
Max. Marks: 60

17MPHC14 - Nuclear Physics

Part A **10 x 1/2 = 5**

Choose the correct answer

1. The binding energy of an alpha particle in MeV is _____.

a.7.5 b.28.3 c. 24.3 d.15.9

2.The electric quadrupole moments of magic number nuclei are _____.

a.high b.infinite c. very high d. Very low

3. At low energies, p-p scattering is predominantly due to the _____ forces.

a. Coulomb repulsive b. Coulomb attractive c. electric d.meson

4. According to Yukawa, the nuclear forces between the nucleons act through the exchange of _____.

a. π - meson b.μ-meson c.ν - meson d.positron

5. In any nuclear reaction the reactants and the resultants must always be in conformity with the law of conservation of _____.

a. energy b. mass number c. charge number d. charge number and mass number

6. The probability of occurrence of a particular nuclear reaction is described by _____.

a. Quo drupole moment b. cross section c.compound nucleus d. giant resonance

7. Crystal used for the detection of γ-rays in scintillation counter is _____.

a. zinc sulphide b. anthracene c. napthalene d. NaI containing trace of Thallium

8.An ionization chamber is used for detecting _____.

a. α –particles only b. β – particles only c.γ-rays only d. both α and β particles

9. The elementary particles whose masses less than Pi- mesons are called _____.

a. pions b. baryons c. leptons d. photons

10. Spin of the neutrino is _____.

a.0 b.1/2 c.-1/2 d.1

Part B 5 x 4 = 20

Answer ALL questions

Each answer should not exceed 200 words or one page

11.a. Discuss about binding energy and packing fraction of nucleus.

(Or)

11.b. Write a note on nuclear magnetic moment.

12.a. Discuss in detail about nucleon-nucleon scattering.

(Or)

12.b. Explain the charge symmetry of nuclear forces.

13.a. Explain the following (i) Conservation of energy and parity.

(ii) Conservation of linear and angular momentum.

(Or)

13.b. Explain resonance scattering.

14.a. List the properties of the materials used for semiconductor detector. Give its advantages over gas ionization types.

(Or)

14.b. Discuss briefly about coincidence circuits.

15.a. Discuss about the classification of Fermions.

(Or)

15.b. Write a note on CPT theorem.

Part C 5 x 7 = 35

Answer ALL questions

Each answer should not exceed 600 words or three pages

16.a. Discuss semi empirical mass formula explaining of each term in it and state its limitations

(Or)

16.b. What are magic numbers? Discuss in detail about the evidences for the existence of magic numbers.

17.a. Discuss briefly about ground state of deuteron.

(Or)

17.b. Give a brief account of mesons theory of nuclear forces.

18.a. Describe the types of nuclear reactions with examples.

(Or)

18.b. Describe the compound nucleus theory of nuclear reactions.

19.a. Describe the construction and working of ionization chamber.

(Or)

19.b. (i) Discuss briefly about proportional counter.

(ii)Write short notes on measurement of nuclear lifetimes.

20.a. Discuss briefly about strong and weak interactions in elementary particles.

(Or)

20.b. Discuss about the conservation laws existing in elementary particles.