

Avinashilingam Institute for Home Science and Higher Education for Women
Coimbatore – 641 043

Master's Degree Examination – November 2017
III Semester

Class: II M.Sc.
Major: Physics

Time: 3 hrs
Max. Marks: 60

12MPHC14- Nuclear Physics
Part – A
Choose the correct answer

10x0.5=5 Marks

1. The energy equivalent of mass defect is a measure of _____ of the atom.
a) proton b) neutron c) binding energy d) atomic mass
2. Volume binding energy is often called
a) exchange energy b) surface binding energy
c) asymmetry energy d) parity
3. Parity of deuteron is
a) odd b) even c) zero d) one
4. Protons undergo _____ scattering simultaneously with nuclear scattering
a) Coulomb b) Compton c) inphase d) out of phase
5. Mean life time is proportional to
a) λ b) $1/\lambda$ c) λ^2 d) λ^3
6. If Q is negative, the reaction is said to be
a) exoergic b) endoergic c) both a and b d) None of the above
7. Ionization chamber works in the region of _____ pulse size.
a) increased b) decreased c) pulsated d) constant
8. A solid state detector behaves like an ideal pulse type _____
a) GM counter b) Ionization chamber
c) Cerenkov counter d) Scintillation counter
9. Neutrino has _____ rest mass.
a) zero b) $300 m_e$ c) $200 m_e$ d) $100 m_e$
10. Baryons are constructed from
a) 1 quark and 2 antiquarks b) 3 antiquarks
c) 2 quarks and 1 antiquark d) 3 quarks

Part – B

5 x 4 = 20 Marks

Answer the following

Answer should not exceed 200 words or one page

11. a) Briefly explain about alpha decay.
(or)
b) Explain the nuclear magnetic moment.
12. a) What is binding energy? Express the formula to calculate binding energy.
(or)
b) Explain parity.
13. a) Outline any four conservation laws associated with nuclear reactions.
(or)
b) Discuss about the energy levels of nuclei.
14. a) Classify the types of detectors available for the measurement of nuclear radiations.
(or)
b) Briefly explain the working of scintillation counter.
15. a) Discuss about the classification of bosons.
(or)
b) Outline the types of interactions in elementary particles.

Part - C

5 x 7 = 35 Marks

Answer all questions

Answer should not exceed 600 words or six pages

16. a) Discuss the general properties of nucleus.
(or)
b) With neat diagram, explain the shell model of the nucleus.
17. a) Explain the charge independence and charge symmetry of nuclear forces.
(or)
b) Discuss in detail about the meson theory of nuclear forces.
18. a) Explain the types of nuclear reactions.
(or)
b) Explain Breit-Wigner one level formula.
19. a) Discuss the types of nuclear solid state detectors.
(or)
b) Explain in detail about coincidence and anticoincidence circuits.
20. a) Derive Gell Mann – Okubo mass formula.
(or)
b) Discuss the conservation laws governing elementary particles.
