ANSWER

SEM IV UG-II MCQ 2020

Modern Physics(Nuclear Physics) Core-IX

1.A nucleus emits an α-particle, followed by two β-particles. The final nucleus will be

- an isotone of the original one.
- ✓ an isotope of the original one.
- an isobar of the original one.
- none of these

2.The radius R of a nucleus is given by

- R = $r_0 A^{-1/3}$
- ✓ R = $r_0 A^{1/3}$
- R = $r_0 A^3$
- None of these

3.1 barn is an unit of area having the magnitude of

- $10^{24}\,\mathrm{cm}^2$
- $\mathbf{10^{-28}\,m^2}$
- $10^{-24}\,cm^2$
- None of these.

4.A nucleus with A=235 spilts into two nuclei of mass numbers in the ratio 1 : 2.The ratio of the radii of the new nuclei are

- 1 : 2
- ✓ 1 : 1.26
- 8 : 1
- None

5.Nuclear force is

- Spin independent
- Both charge and spin independent
- ✓ Spin dependent but charge independent
- Charge dependent

6.Which one of the following statements is correct?

- ✓ The mass of the nucleus must be less than the sum of the masses of the constituent neutrons and protons.
- o The mass of the nucleus must be equal to the sum of the masses of the constituent neutrons and protons
- o The mass of the nucleus must be greater than the sum of the masses of the constituent neutrons and protons.
- o The mass of the nucleus must be equal to only the masses of the constituent neutrons .

7.The order of magnitude of the binding energy per nucleon in a nucleus is

- o 10^{-3} MeV
- ✓ 10 MeV
- o 10^{-3}MV
- o $0.1\ MeV$

8.If the nuclear radius of ^{27}Al is 3.6 Fermi, the approximate nuclear radius of ^{64}Cu in Fermi is

- ✓ 4.8 fm
- o 3.6 fm
- o 2 fm
- o 2.4 fm

9.The nucleus which is an isotope of Cl-37 and also an isobar of Ar-18 has mass number A and atomic number Z given by

- o A=35,Z=18
- ✓ A = 37, Z = 17
- o A = 39, Z = 17
- o A = 37, Z = 19

10.Which of the following statements with reference to nuclear forces is not true?

- o Short range
- o Charge independent
- o Strongest force
- ✓ Spin independent

11.The mean momentum of a nucleon in a nucleus with mass number A varie

- o A
- o $\boldsymbol{A^{-1/3}}$
- o $A^{-2/3}$
- o A^2

12.The asymmetry term in semi-empirical mass formula is due to

- non-spherical shape of the nucleus
- non-zero spin of the nucleus
- ✓ unequal number of protons and neutrons in the nucleus
- odd number of protons inside the nucleus

13.According to the shell model of the nucleus

- ✓ magic number exist
- nucleons interact with their nearest neighbours only
- nucleons in a nucleus interact with a general force field
- large electronic quadrupole moment exists for certain nuclei

14. Which one of the following nuclei is 'doubly magic'?

- $^{120}_{50}Sn$
- $^{208}_{82}Pb$
- $\mathbf{^{88}_{38}Sr}$
- none

15.Which one of the following nuclei is a closed shell nucleus?

- $^{16}_{8}O$
- $^{40}_{20}Ca$
- $^{48}_{20}Ca$
- ✓ All the three

16.The N –values of four nuclei are given below.Which one has the lowest neutron absorption cross-section?

- ✓ 50
- 143
- 146
- 12

17.The volume of a nucleus in an atom is proportional to the

- ✓ Mass number
- Proton number
- Neutron number
- Electron number

18.The size of nucleus is estimated to be of the order of

- few picometer (10^{-12} m)
- ✓ few femtometer (10^{-15} m)
- few nanometer (10^{-9} m)
- few micrometer (10^{-6} m)

19.Which one of the following statement is correct?

- The density of the nuclear matter is proportional to mass number A.
- The density of the nuclear matter is proportional to mass number A^2.
- ✓ The density of the nuclear matter is independent of mass number A.
- The density of the nuclear matter is proportional to mass number $A^{1/3}$.

20.The Surface-energy term appears in semi-empirical mass formula as a result of

- repulsion between the charged particles, protons, in the nucleus
- ✓ reduction of total binding energy due to nucleons on the surface of the nucleus
- excess number of neutrons in the nucleus
- intrinsic nucleonic spin