

Model Question Paper

Nuclear physics - Part I

12th Standard

Physics

Reg.No. :

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I. Answer all the questions.

II. Use Blue pen only.

Time : 01:00:00 Hrs

Total Marks : 85

4 x 1 = 4

Section-A

- 1) The nuclear radius of ${}^8_4\text{Be}$ nucleus is
(a) $1.3 \times 10^{-15} \text{m}$ (b) $2.6 \times 10^{-15} \text{m}$ (c) $1.3 \times 10^{-13} \text{m}$ (d) $2.6 \times 10^{-13} \text{m}$
- 2) The nuclei ${}^{27}_{13}\text{Al}$ and ${}^{28}_{14}\text{Si}$ are example of
(a) isotopes (b) isobars (c) isotones (d) isomers
- 3) The mass defect of a certain nucleus is found to be 0.03 amu. Its binding energy is
(a) 27.93eV (b) 27.93KeV (c) 27.93MeV (d) 27.93GeV
- 4) Nuclear fission can be explained by
(a) shell model (b) liquid drop model (c) quark model (d) Bohr atom model

Section-B

5 x 3 = 15

- 5) What are isotopes? Give an example.
- 6) What are isobars? Give examples.
- 7) What are isotones? Give examples.
- 8) Select the pairs of isotopes, isobars and isotones from the following nuclei: ${}^{22}_{11}\text{Na}$, ${}^{24}_{12}\text{Mg}$, ${}^{24}_{11}\text{Na}$, ${}^{23}_{10}\text{Ne}$.
- 9) Define: amu and give the mass equivalent and energy equivalent of 1 amu.

Section-C

4 x 5 = 20

- 10) Show that nuclear density is almost a constant for all nuclei.
- 11) Explain the variation of binding energy with mass number by a graph and discuss its features
- 12) Explain the different characteristics of nuclear forces.
- 13) Explain the Soddy-Fajan's radioactive displacement law.

Section-D

4 x 10 = 40

- 14) a) How do you classify the elementary particles into four groups?
(OR)
b) Describe the discovery of neutrons. Mention the properties of neutrons.
- 15) a) Describe the principle and action of a Bainbridge mass spectrometer to determine the isotopic masses.
(OR)
b) Explain the construction and working of a GM (Geiger-Muller) counter.
