Reg.No. : ☐☐☐☐☐☐

I.Answer all questions

II.Use blue pen only.

Time : 01:00:00 Hrs

Total Marks : 75

Part-A

3 x 1 = 3

1) Slow neutrons are neutrons having energies between

   (a) 1000 eV to 2000 eV   (b) 2000 ev to 0.5 ev   (c) Oev to 1000 eV   (d) 0.5 ev to 10 mec

2) The mass of electron is ....times the mass of proton.

   (a) 1836   (b) 1/1836   (c) 1.67×10^{27} (d) 9.11×10^{31}

3) The nuclear radius is given by

   (a) $R = r_o^3 A$ (b) $R = r_0^{1/3} A^3$ (c) $R = r_o A^{1/3}$ (d) $R = ro^3 A^{1/3}$

Part-B

5 x 3 = 15

4) Define: Nuclear fission.

5) What is controlled chain reaction?

6) What is nuclear reactor?

7) What are the uses of nuclear reactors?

8) What is hydrogen bomb? Name the principle of it.

Part-C

5 x 5 = 25

9) Explain the radio-carbon dating method.

10) State the properties of α-rays.

11) Obtain an expression to deduce the amount of the radioactive substance present at any moment.

Part-D

3 x 10 = 30

12) Describe Bainbridge mass spectrometer to determine the isotopic masses of nuclei.

13) Explain the applications of radio isotopes in various fields.

14) Define binding energy. Explain the variation of binding energy with mass number.

15) a)   Determine the amount of PO^{210} required to provide a source of alpha particles of activity 5 milli curie. Given $T_{1/2}$ of polonium is 138 days.

   b)   Calculate the energy released in the reaction $_{13}Al^{27} +_1 H^2 \rightarrow_{12} Mg^{25} +_2 He^4$

   Given :

   Mass of $_{13}Al^{27}$ - 26.981535 amu

   Mass of $_1H^2$ - 2.014102 amu

   Mass of $_{12}Mg^{25}$ - 24.98584 amu

   Mass of $_2He^4$ - 4.002604 amu

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