

**Model Question Paper**  
**Nuclear physics - Part V**

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

5 x 1 = 5

**Part-A**

- 1) The disintegration constant  $\lambda$  of a radioactive element is 0.00231 per day then its mean life is  
(a) 300 days (b) 231 days (c) 531.4 days (d) 432.9 days
- 2) The number of ions produced by 1 mR of radiation in 500 milligram of air is  
(a)  $1.6 \times 10^{12}$  pair (b)  $1.6 \times 10^9$  pair (c)  $8 \times 10^{12}$  pair (d)  $8 \times 10^8$  pair
- 3) Between latitudes of  $42^\circ$  and  $90^\circ$ , the cosmic ray intensity is.  
(a) minimum (b) maximum (c) a constant (d) none of the above
- 4) Which of the following is not emitted by a natural radioactive substance?  
(a) electron (b) electromagnetic radiations (c) alpha particles (d) neutrons
- 5) Particles possessing rest mass intermediate between  $250m_e$  to  $1000m_e$  are known as.  
(a) mesons (b) leptons (c) baryons (d) Hyperons

**Part-B**

11 x 5 = 55

- 6) Write a note on discovery of neutron.
- 7) Explain the radio-carbon dating method.
- 8) State the principle, construction and working of atom bomb.
- 9) Explain the characteristics of nuclear forces.
- 10) Write the differences between an atom bomb and a nuclear reactor.
- 11) Explain the biological hazards of nuclear radiation.
- 12) State any five properties of neutrons.

**Part-C**

2X10=20

- 13) a) What are particle accelerators? Explain the two major type of accelerators.  
b) Explain chain reaction in nuclear fission.
- 14) a) Obtain an expression to deduce the amount of the radioactive substance present at any moment.  
b) Singly ionized magnesium atoms enter into the velocity selector of Bainbridge mass spectrograph having electric and magnetic fields 30 kV/m and 0.1 tesla respectively. Calculate the radii of the path followed by the two isotopes of mass number 24 and 25 when the deflecting magnetic field is 0.5 tesla. Mass of nucleon  $1.67 \times 10^{-27}$  charge of the ion  $e = 1.7 \times 10^{-19} C$ .
- 15) Derive the relation  $N = N_0 e^{-\lambda t}$ . Derive an expression for half - life.

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