

CS/2110

SHEET NO. 1
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5246/NM

Total No. of Sheets used 1Total No. of Questions 9Subject PhysPaper CTitle of the Paper Nuclear & Radiation PhysicsTime allowed 3 Hrs. Maximum Marks 30 Minimum Pass Marks 4

Please assign marks to each question

Note : The candidates are required to attempt two questions each from Section A & B Section C will be compulsory

Sec-A

- Q1. Explain the term mass defect, binding energy and atomic mass unit. Discuss how binding energy varies with the mass no. A. (5)
- Q2. Discuss at least five reasons of failure of proton-electron hypothesis about nuclear structure. (5)
- Q3. What are nuclear Magic numbers? Give their experimental evidence. (5)
- Q4. Use the single particle Shell model to predict the spins and magnetic moments of ${}_{13}\text{Al}^{27}$, ${}_{16}\text{S}^{33}$, ${}_{18}\text{Ar}^{41}$ and ${}_{30}\text{Zn}^{67}$ and ${}_{29}\text{Cu}^{63}$. (5)

Sec-B

- Q5.(a) State Gieger Nuttal law and its importance. (2)
- (b) List the important features of β -decay. (3)
- Q6. Find (a) How long will it take for $\frac{3}{4}$ of the atoms originally present to disintegrate (2.5)
- (b) What is the disintegration constant and average life of this substance. Given $t_{1/2} = 20$ days (2.5)
- Q7. Explain γ -ray spectra. Explain difference between γ -decay and internal conversion. (5)
- Q8. What is the Q-value of a reaction. Derive its expression in terms of masses and kinetic energies of incident and product particles? (5)

Sec-C

Attempt any five questions carrying 2 marks each.

- Q9. (i) Explain the concept of nuclear magnetic moment.
- (ii) Why density of nucleus is very large?
- (iii) In β -decay what is the role of neutrino?
- (iv) Explain nuclear Isomerism.
- (v) Prove by taking an example the nuclear forces are charge independent.
- (vi) Define nuclear reaction cross-section and give its units.
- (vii) What is Radioactive Branching?