

C-5/2110
 NUCLEAR AND RADIATION PHYSICS-C
 SEMESTER-V
 (SYLLABUS DECEMBER-2019)

TIME ALLOWED 3 Hrs

M.M 30

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

Sec-A

Q1. (a) Justify with examples that nuclear forces are charge independent and saturated forces. (3)

(b) Define mass defect and packing fraction. (2)

Q2. Explain the terms- (i) Nuclear Magnetic moment (ii) Nuclear Quadrupole moment (5)

Q3. Discuss Fermi Gas Model. (5)

Q4. List the main assumption of Liquid drop model and hence derive the Semi Empirical Mass Formula. (5)

Sec-B

Q5. Describe Neutrino hypothesis for β -decay. What is the evidence for the existence of the neutrino? (5)

Q6. 10 mg of radioactive material of Half-life 2 years is kept in a store. How much of the materials remains undecayed after 8 years. (5)

Q7. Write notes on- (i) Electron capture (ii) internal conversion (5)

Q8. (a) Calculate the threshold energy for $N^{14} (n, \alpha) B^{11}$ reaction. Given the

mass of $n^1 = 1.008987$ a.m.u

mass of $N^{14} = 14.007550$ a.m.u

mass of $\alpha = 4.003879$ a.m.u

mass of $B^{11} = 11.012811$ a.m.u

(3)

(b) Write notes on (i) Stripping and pick-up reaction (ii) Compound Nucleus (2)

Sec-C

Attempt any five questions carrying 2 marks each.

Q9. (i) Why do stable nuclei never have more protons than neutrons?

(ii) Predict the ground state spin and parity of ${}_{29}\text{Cu}^{63}$.

(iii) What are the conditions for nuclear stability?

(iv) What is the basis difference between α and β -ray spectra.

(v) Explain pair production.

(vi) What is the condition for permanent equilibrium in successive radioactive disintegration?

(vii) What is Q-Value of a nuclear Reaction?

2x5=10