**Roll No.** | | | | | | | | | | | | | **Total No. of Pages : 02**

**Total No. of Questions : 07**

**B.Sc.(CS) (Sem.–6)**

# NUCLEAR PHYSICS

**Subject Code : BCS-603**

**M.Code : 72783**

**Date of Examination : 08-07-22**

**Time : 3 Hrs.** **Max. Marks : 60**

**INSTRUCTION TO CANDIDATES :**

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and a student has to attempt any FOUR questions.**

## SECTION-A

**1. Answer briefly :**

(a) Write a relation between mass number and radius of the nucleus.

(b) Explain the term '*nuclear magneton'*.

(c) Explain the term '*mass defect'*.

(d) What is the basic point of difference between liquid drop model and shell model of the nucleus?

(e) Why are even-even nuclei most stable?

(f) What is meant by range of an $\alpha$-particle?

(g) Define the term '*electron capture*'.

(h) Define main units of measuring intensity of radioactivity.

(i) Define Q-value of a nuclear reaction.

(j) What do you mean by nuclear reaction cross section?

## SECTION-B

2. Explain the concept of electric quadrupole moment of a nucleus. What is it's value for a nucleus having symmetrically situated protons?

3. Discuss the origin of asymmetry term in semi-empirical mass formula and derive the value of asymmetry energy term.

4. What are magic number nuclei? How does the shell model explain the existence of magic numbers 2, 8, 20 and 28 only?

5. State the conditions for alpha decay and explain why in alpha decay of a radioactive nuclide the kinetic energy of the emitted alpha particle is a little less than the disintegration energy.

6. Show that the law of conservation of energy and momentum are not obeyed in beta decay. Show how neutrino hypothesis explains this discrepancy?

7. Discuss the compound nucleus theory of nuclear reactions. Comment on the life time and decay scheme of compound nucleus.



**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student**.