

Roll No.

Total No. of Pages : 02

Total No. of Questions : 07

B.Sc.(CS) (2013 Batch) (Sem.-6)

NUCLEAR PHYSICS

Subject Code : BCS-603

Paper ID : [72783]

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) Explain the term atomic mass unit. Compute the value of 1 a.m.u. in MeV.
- b) What is the importance of quadrupole moment in nuclear physics?
- c) Why stable nuclei have more neutrons than protons?
- d) What is the significance of binding energy curve?
- e) Calculate the energy of electron at rest in electron volts.
- f) What is the difference between half life and mean life in radioactivity?
- g) What is the cause of radioactivity?
- h) Define Q-value of a nuclear reaction.
- i) What is β -decay?
- j) What do you mean by transmutation?

SECTION-B

2. Give the properties of the nucleus. Explain the terms : angular momentum of the nucleus, nuclear magnetic dipole moment and nuclear electric quadrupole moment.
3. Give the main assumptions of liquid drop model. Derive the expression for semi- empirical mass formula.
4. What are magic number nuclei? How does shell model explain the existence of magic numbers 2, 8, 20 and 28 only? Define total angular momentum vector J and show that the z-component is quantized.
5. State the conditions for α -decay and explain why in α -decay of a radioactive nuclide the kinetic energy of the emitted α -particle is a little less than the disintegration energy.
6. Discuss the evidence of existence of neutrinos. Why was their existence postulated?
7. Discuss the compound nucleus theory nucleus reactions. Comment on life time and decay scheme of compound nucleus. How the liquid drop model can be used as the basis of compound nucleus theory?

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