

T.Y.B.SC. SEM – VI (2014 COURSE) : WINTER - 2017

SUBJECT: PHYSICS: NUCLEAR PHYSICS

Day : Friday
Date : 27/10/2017

Time : 12.00 NOON TO 02.00 PM
Max. Marks: 40.

W-2017-0680

N.B.:

- 1) All questions are **COMPULSORY**.
 - 2) Figures to the **RIGHT** indicate full marks.
 - 3) Draw neat labeled diagrams **WHEREVER** necessary.
-

Q.1 Attempt any **TWO** of the following: **(10)**

- a) Write a note on nuclear size and density.
- b) Calculate the binding energy of ${}_{26}\text{Fe}^{56}$, if it's mass is 55.975 a.m.u. Also calculate B.E per nucleon. Mass of Proton = 1.007825 amu, Mass of neutron = 1.008665 amu.
- c) Discuss in detail the applications of radioactivity.

Q.2 Attempt any **TWO** of the following: **(10)**

- a) Explain with neat labelled diagram the working of Scintillation counter?
- b) What is mean by Q-value of the nuclear reaction? Obtain an expression for Q-value equation.
- c) Show that mass of Radium with an activity of one curie is almost one gram. (Mass number of Radium = 226 and Half-life = 1600 years).

Q.3 Attempt any **TWO** of the following: **(10)**

- a) Draw and explain binding energy curve. State its features.
- b) What is Nuclear reactor? List essential components of the reactor.
- c) What do you mean by half-life of radioactive element? Obtain necessary equation.

Q.4 Attempt any **FIVE** of the following: **(10)**

- a) Define Parking fraction.
- b) Find the amount of energy released, when a one microgram of mass is converted into energy.
- c) Define (i) Isotope (ii) Isobars (iii) Isomer (iv) Isotone.
- d) Explain nuclear fusion reaction.
- e) Give applications of accelerator.
- f) Energy released per fission of U^{235} atom is 200 MeV. Calculate energy released during the fission of one gram of U^{235} .
- g) What is linear accelerator?

* * *