

FACULTY OF SCIENCE

M. Sc. IV – Semester (CBCS) Examination, May / June 2016

Subject : Physics

Paper – I : Nuclear Physics

Time : 3 Hours

Max. Marks: 80

Note : Answer all questions from Part–A and Part–B. Each question carries 4 marks in Part–A and 12 marks in Part – B.

PART – A (8 x 4 = 32 Marks)
(Short Answer Type)

- 1 Compare the liquid drop and shell model of nuclei.
- 2 What do you mean by nuclear forces?
- 3 Explain the selection rules of gamma decay.
- 4 What is neutrino hypothesis regarding β -decay?
- 5 Describe the phenomenon of photo electric effect.
- 6 Derive the relation for change in wavelength of gamma photons due to Compton scattering.
- 7 What is meant by stripping reactions?
- 8 Explain about quark model.

PART – B (4 x 12 = 48 Marks)
(Essay Answer Type)

- 9 (a) Show that the nucleons in the deuteron spend only one third of the time within the range of nuclear force and thus the deuteron is loosely bound.
OR
(b) With the necessary formulation give an account of the single particle shell model choosing a suitable potential.
- 10 (a) Discuss Fermi's theory of beta decay and explain about Fermi-Kurie plot.
OR
(b) Describe about the fine structure of α - spectrum on the basis of Gamow's theory.
- 11 (a) Discuss the mechanisms through which the charged particles lose energy during their passage through matter and obtain expression for the stopping power of the medium.
OR
(b) Compare and contrast between gaseous and solid state detectors for nuclear radiations with regard to the principle of detection, efficiency and range of applications.
- 12 (a) Give the classification of elementary particles and explain about their quantum numbers.
OR
(b) Define the Q-value of nuclear reactions and explain the kinematics of nuclear cross sections.
