1212165090002.

Code No. 3251/CORE

FACULTY OF SCIENCE

M.Sc. IV-Semester Examination, May / June 2018

Subject: Physics

Paper- I : Nuclear Physics

Time : 3 Hours Max. Marks: 80

PART – A (8X4=32 Marks)
(Short Answer Type)

1. Write down the exchange force theories by including the potentials.
2. Write down the contributions made by the spin orbit interactions in explaining the ground states of nucleus.
3. What are Fermi-Kurie plots and their importance in explaining the beta spectrum?
4. Discuss the multi polarity of gamma radiation.
5. Discuss the different types of scintillator and their characteristics used for the spectrometric measurements.
6. Using the Range – energy relation of the charged particle interaction what are the conclusions drawn from the above relations.
7. List out the properties of Compound nucleus formation interactions.
8. Explain briefly fundamental type of interactions along with charge carriers.

PART – B (4x12= 48 Marks)
(Essay Answer Type)

9. (a) Give the theory of the ground state of the deuteron assuming a central square well interaction potential. Show that there are no excited states for the deuteron.

OR

(b) Explain the origin of nuclear magnetic dipole moment and electric quadrupole moment. With the relevant theory describe a method for the determination of magnetic dipole moment of a nucleus.

10. (a) Give the Gamow's theory of alpha decay and show how it explains the observed relation between the decay constant and the rage of alpha particles.

OR

(b) Explain the multipole character or gamma radiation and discuss the selection rules for nuclear transitions leading to emission of gamma rays.

11. (a) Explain the interactions of heavy charge particles with material medium and obtain the Bethe-Bloch formula for energy loss.

OR

(b) What is exponential law of attenuation? How do you determine the mass attenuation coefficient? What is the advantages of using mass attenuation coefficient instead of linear attenuation coefficient?

12. (a) State the classification of the elementary particles based on their masses and name at least two members in each class.

OR

(b) Explain briefly the isospin formalism and the strangeness concept. How the isospin and strangeness quantum numbers are related?

* * *