Code No. 4333 / CBCS / NON-CBCS

FACULTY OF SCIENCE

M.Sc. IV – Semester Examination, May / June 2015
Subject: Physics
Paper – I
Nuclear Physics

Time: 3 Hours \hspace{1cm} 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 (8x4 = 32 Marks)
[Short Answer Type]

1. Explain about the Yukawa hypothesis
2. Discuss the inadequacies of liquid drop model
3. What do you mean by $\alpha$-decay?
4. Describe gamma decay
5. Pair production interaction cannot occur at photon energies less than 1.02 MeV. Why? Explain.
7. What do you mean by a compound nucleus?
8. Explain nuclear reaction.

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

9. a) Discuss the theory of ground state of deuteron and explain why the excited states of deuterons do not exist.
   \hspace{1cm} \text{OR}
   \hspace{1cm} b) Deduce the equation for electric quadrupole moment.

10. a) Outline the Fermi’s theory of beta decay and show how it explains the observed systematics of beta decay.
   \hspace{1cm} \text{OR}
   \hspace{1cm} b) Discuss in detail about Gamow’s theory of $\alpha$ - decay.

11. a) Describe interaction of gamma rays with matter with special reference to their dependence on gamma energy and the atomic number of target.
   \hspace{1cm} \text{OR}
   \hspace{1cm} b) Describe the principle and operation of a solid state detector.

12. a) What are stripping and pick-up reactions? Give the theory of $(d, p)$ stripping reactions.
   \hspace{1cm} \text{OR}
   \hspace{1cm} b) Give the classification of fundamental forces and elementary particles.

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