35072

M.Sc. DEGREE EXAMINATION, OCTOBER 2015.

THIRD SEMESTER

Physics

NUCLEAR AND PARTICLE PHYSICS

Time : Three hours Maximum : 75 marks

(No additional sheet will be supplied)

PART A — (5 × 3 = 15 marks)

Answer any FIVE questions.

Each question carries 3 marks.

Each answer should not exceed 1 page.

1. What are the salient features of Shell model?
2. Explain direct nuclear reactions with suitable examples.
3. Write a note on van de Graff generator.
4. What are high energy accelerators? Explain their importance.
5. Distinguish between Nuclear fission and fusion reactions.
6. Write a note on power reactors.
7. Briefly explain elementary particle interactions.
8. What is the importance of symmetry groups? Explain.

PART B — (4 × 15 = 60 marks)

Answer ALL questions.

Each question carries 15 marks.

Each answer should not exceed 6 pages.

9. (a) Explain the theory of Ground state of Deuteron.

   (b) What are the characteristics of nuclear forces?

Or

10. (a) Discuss resonance theory of nuclear cross section.

    (b) Derive Briet-Wigner formula.

11. (a) Explain the classification of accelerators.

(b) With a neat diagram, explain the working of wave guide accelerator.

Or

12. (a) Write a note on high energy circular accelerators.

(b) Distinguish between Cyclotron and Betatron.

13. (a) With suitable examples, explain thermonuclear reactions.

(b) Explain the construction and working principle of hydrogen bomb.

Or

14. (a) Explain the four factor formula and critical size of nuclear reactor.

(b) Write a short note on power reactors.

15. (a) Explain the classification of elementary particles.

(b) Write a note on Baryons.

Or

16. (a) Explain various conservation laws associated with elementary particles.

(b) What is a Quark? What are the quark notations of proton and neutron?