LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **PHYSICS**

SIXTH SEMESTER – **NOVEMBER 2016**

PH 6611 – ATOMICS AND NUCLEAR PHYSICS

Date: 14-11-2016   Dept. No.   Max. : 100 Marks
Time: 09:00-12:00

PART-A

Answer **ALL** questions   (**10 x 2 =20 marks**)

1. Write the properties of positive rays.
2. Define Pauli's exclusion principle.
3. Explain fine structure of the sodium D-line.
4. Calculate the wavelength separation between the unmodified line of wavelength 6000 Å and the modified lines when a magnetic induction of 1 Wbm^{-2} is applied, in normal Zeeman effect.
5. Classify isobar and isotope with example.
6. Define range of an α particle.
7. Define chain reaction.
8. Explain nuclear fission. Give example.
9. State Hubble's law.
10. What are cosmic ray showers?

PART –B

Answer any **FOUR** questions   (**4 x 7.5 =30 marks**)

11. What are positive rays? Describe Thomson's method for positive ray analysis.   (7.5)

12. Explain about (i) L-S coupling and (ii) j-j coupling.   (4+3.5)

13. Explain (i) mass defect (ii) binding energy (iii) packing fraction.   (3x2.5)

14. Discuss the liquid drop model of a nucleus.   (7.5)

15. Give an account of anti-particles with suitable examples.   (7.5)

16. Explain the four fundamental interactions in elementary particles.   (7.5)

PART – C

Answer any **FOUR** questions   (**4x12.5=50 marks**)

17. Give an account of Bohr – Sommerfield model of an elliptical electron orbits of hydrogen atom. How does it account for the fine structure of hydrogen atom?   (12.5)

18. Describe the experimental arrangement of Zeeman Effect and Anomalous Zeeman effect.   (12.5)

19. Describe the method of measuring the range of α particle using Geiger and Nuttal experiment.
                                                                                          (12.5)
20. Discuss in detail the Gamow's theory of α-decay.   (12.5)

21. (i) Distinguish between primary and secondary cosmic rays . (ii) Write a note on cosmic rays and variation with latitude, altitude, longitude, and east-west direction .   (2.5+10)
22. Explain in detail about the quantum numbers in elementary particle.   (12.5)