LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

SIXTH SEMESTER – APRIL 2017

PH 6611- ATOMICS AND NUCLEAR PHYSICS

Date: 20-04-2017 Dept. No. Max. : 100 Marks
09:00-12:00

PART-A

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

1. What are the properties of positive rays?
2. Briefly explain L-S and j-j coupling schemes.
3. State stark effect.
4. Briefly state the principle of Raman scattering.
5. Define mirror nuclei with examples.
6. State Geiger-Nuttal law.
7. What are sources of neutrons?
8. What is source of stellar energy?
9. State Hubble's law.
10. What is meant by strangeness number?

PART-B

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

11. Describe the Thomson parabola method of positive ray analysis with a neat sketch.
12. Give the theory of the origin of pure rotational spectrum of a molecule.
13. Explain the (i) theory and (ii) energy level of rotational spectra of a rigid diatomic molecule.
14. Explain in detail of (i) mass defect, (ii) binding energy and (iii) packing fraction of nucleus.

(2.5+2.5+2.5 marks)

15. (i) Explain the features of liquid drop model. **(4 + 3.5 marks)**

    (ii) Obtain condition for self-sustaining chain reaction.

16. Explain the discovery and types of cosmic rays. What are cosmic ray showers?

PART-C

Answer any **FOUR** questions: **(4 x 12.5 = 50 marks)**

17. (a) Explain the drawbacks of Bohr and Sommerfeld atom models. **(6.5 + 6 marks)**

    (b) Explain the hypothesis of vector atom model with its quantum numbers.

18. (a) An electron of energy 10 eV describing a circle in a plane at right angle to a uniform field of strength 10^{-4} weber/m^2. Mass of electron is 9.1×10^{-31} Kg. Calculate the radius of the orbit of electron. **(6.5 + 6 marks)**

    (b) Explain anomalous Zeeman effect.

19. (a) Explain the quantum treatment of Zeeman effect. **(6.5 + 6 marks)**

    (b) The Zeeman components of a 5461 Å spectral lines are 0.417 Å apart when the magnetic field is 1.5 T. Calculate the e/m of an electron.

20. (a) Give an account of nuclear magnetic moment of nucleus. **(6.5 + 6 marks)**

    (b) Deduce the range and stopping power of alpha particles.

21. (a) Describe the properties of various components used in a nuclear reactor. **(6.5 + 6 marks)**

    (b) Write about the radiation hazards and its protection.

22. (a) Explain the big-bang theory of universe. **(6.5 + 6 marks)**

    (b) Classify the elementary particles with its quantum numbers.

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