



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – CHEMISTRY

SECOND SEMESTER – NOVEMBER 2016

CH 2954 - NUCLEAR AND RADIO CHEMISTRY

Date: 14-11-2016
Time: 01:00-04:00

Dept. No.

Max. : 100 Marks

Part-A

Answer ALL questions.

(10 × 2 = 20)

1. What are nuclear isomers?
2. Define binding energy of a nucleus.
3. State the importance of neutrons in stabilizing a nucleus.
4. Define life time τ of nuclei. How is this factor related to decay constant, λ ?
5. What is Auger effect?
6. How are thermal neutrons obtained?
7. List out the reasons for not using nuclear fusion reactions to tap energy.
8. Explain Radioactive series.
9. Write Geiger- Nuttal rule and its application.
10. What is meant by enriched uranium? What is its significance?

Part-B

Answer any EIGHT questions.

(8 × 5 = 40)

11. Give an account of mesons.
12. Explain one model to understand solvated electrons.
13. Discuss the demerits of liquid drop model of nucleus.
14. What are scintillation counters? Cite an example for the compound used in it.
15. Mention some characteristics of solvated electrons.
16. What type of nuclei undergo electron capture?
17. How is the radius of a nucleus calculated theoretically?
18. How are charged particles accelerated?
19. How are the magic numbers explained by shell model?
20. Describe induced radio activity with an example.
21. Explain the principle of carbon dating.
22. An isotope of an element X is $^{239}\text{X}_{90}$. This isotope emitted four α particles and four β^- particles to form a nucleus Y. What is the isotope Y?

Part-C

Answer any FOUR questions.

(4 × 10 = 40)

23. Explain any four spontaneous processes of nucleus.
24. Discuss the factors affecting stability of a nucleus
25. Discuss the use of nuclear chemistry in medical field.
26. Derive an equation for the theoretical calculation of binding energy of a nucleus using liquid drop model.
27. Explain neutron activation analysis and mention the advantages of this technique.
28. Write notes on the following in about 100 words each:
[a] Collective model of nucleus [b] Scintillation counters
[c] Chemical dosimeters [d] Hot atom chemistry
