



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION - PHYSICS

FOURTH SEMESTER – APRIL 2013

PH 4808 - NUCLEAR PHYSICS

Date : 30/04/2013

Dept. No.

Max. : 100 Marks

Time : 1:00 - 4:00

PART A

Answer **ALL** questions

10 x 2 = 20

1. Show that electrons do not exist in the nucleus.
2. What are stripping reactions? Give examples.
3. Write down Geiger Nuttal law and explain the various terms in it.
4. Give examples for mirror nuclei.
5. How are slow neutrons produced?
6. What is Levy's mass formula?
7. Why do we need moderators in Nuclear Reactors?
8. What are Leptons? Name any two Leptons and their antiparticles.
9. Which expression connects level width of resonance and lifetime of compound nucleus?
10. Define β^+ and orbital electron capture reactions.

PART B

Answer any **FOUR** questions

4 x 7.5 = 30

11. Give a brief account of the meson theory of nuclear forces.
12. Explain how the electron scattering experiment helps in determining the nuclear size.
13. Derive the semi-empirical mass formula of Weizacker.
14. How are neutron stars formed?
15. Discuss the various types of interactions in elementary particles. Compare them.

PART C

Answer any **FOUR** questions

4 x 12.5 = 50

16. Show from magnetic moment calculation, that deuteron is predominantly in the 3S_1 state.
17. Explain the importance of the spin-orbit interaction in shell model calculations which try to explain the "magic numbers"
18. Obtain an expression for transition probability and Curie plot for beta decay and hence obtain the Fermi selection rule.
19. Derive Breit- Wigner formula for $l=0$ state and discuss the same.
20. What are Quarks? Give Quark model of i) mesons ii) proton iii) antiproton
