



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – PHYSICS

FOURTH SEMESTER – APRIL 2016

PH 4808 - NUCLEAR PHYSICS

(UPTO 11TH BATCH)

Date: 18-04-2016

Dept. No.

Max. : 100 Marks

Time: 09:00-12:00

PART A

Answer ALL questions

10x2=20

1. What are the similarities between a liquid drop and a nucleus?
2. Give examples for direct and stripping reactions?
3. What do you understand by parity conservation?
4. Why Helium has no magnetic moment?
5. Define Barlett and Heisenberg operators.
6. Find minimum energy needed for electron positron pair production.
7. What is tow-theta puzzle?
8. What do you mean by charge independence of nuclear forces?
9. Why ${}_1\text{H}^3$ and ${}_2\text{He}^3$ are called as mirror nuclei?
10. Calculate the mass number of nucleus whose radius 4.2 Fermi.

PART B

Answer any FOUR questions

4x7.5=30

11. Discuss electron scattering experiment leads to the determination of the nuclear size.
12. Explain meson theory of nuclear forces.
13. Narrate five factors contributing to binding energy of a nucleus? Obtain Semi empirical mass formula.
14. Find the total angular momentum and parity for the ground state of ${}_{16}\text{S}^{33}$ nucleus from the shell model .Also find the electric quadrupole moment from collective model.
15. Bring out classification of elementary particles with quantum numbers and conservation laws.

PART C

Answer any FOUR questions

4x12.5=50

16. Give a detailed account on spin orbit interaction in shell model and explain the significance of magic numbers
17. Explain Fermi theory of β decay and curie plot.
18. Obtain Breit -wigner single level formula ($l=0$) and hence discuss the absorption cross section at high energies.
19. Write a short note on CPT theorem with examples.
20. What are Quarks? Give the quark model of i) mesons ii) Protons and antiprotons.
