Registration No :

Total Number of Pages : 01

M.Sc.I
FPYC604

6th Semester Regular / Back Examination 2018-19
FUNDAMENTALS OF NUCLEAR & PARTICLE PHYSICS
BRANCH : M.Sc.I(AP)
Time : 3 Hours
Max Marks : 70
Q.CODE : F406
Answer Question No.1 which is compulsory and any FIVE from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer the following questions :** (2 x 10)
a) A nucleus with A=235, is split in to two nuclei with mass ration 2:1. Find the size of the nucleus at the time of split.
b) Describe what do you mean by isotope, isobar, isotone and isomer.
c) What is packing fraction of nuclei. Plot a graph between packing fraction vs mass number.
d) Write the properties of α , β , γ rays.
e) Derive equation for Q-value of a nuclear reaction.
f) Derive the Coulomb barrier of a nuclear reaction.
g) Determine the spin and parity of $_9F^{17}$
h) Describe Charmed mesons.
i) What do you mean by isospin? Write isospin quantum numbers of quarks.
j) Write i. Yukawa and ii. Woods-Saxon Potentials and its uses in nuclear physics.

Q2 a) Derive the Coulomb and Asymmetry Energy terms of Semi empirical mass formula. **(5)**
b) Develop equation for Nuclear electric quadrupole moment. **(5)**

Q3 a) Analyze different Conservation laws in Nuclear reactions. **(5)**
b) Formulate the condition of stability against spontaneous fission. **(5)**

Q4 a) Develop radioactive decay law derive by Rutherford and Soddy. **(5)**
b) Describe Nuclear chain reaction. **(5)**

Q5 a) Describe Gell-Mann-Nishijima Scheme. **(5)**
b) Give the particle classifications of Bosons. **(5)**

Q6 Derive equation for low energy nuclear reaction cross section by partial wave analysis. **(10)**

Q7 Give the significant of magic number. Discuss Nuclear shell models and it's predictions. **(10)**

Q8 **Write short answer on any TWO :** **(5 x 2)**
a) Nuclear Collective model
b) Nuclear reactor
c) Quark Colour