MANIPAL
ACADEMY of HIGHER EDUCATION
(Deemed to be University under Section 3 of the UGC Act, 1956)

Reg. No.										

DEPARTMENT OF SCIENCES, II SEMESTER M.Sc. (Physics)
END SEMESTER EXAMINATIONS, Makeup -JULY 2022

5254

SUBJECT: NUCLEAR AND PARTICLE PHYSICS [PHY ~~4208~~]
(REVISED CREDIT SYSTEM-2017)

Time: 3 Hours **Date: 27/07/2022** **MAX. MARKS: 50**

Note: (i) Answer ALL questions
(ii) Assume missing data, if any

1. **(a) Using Rutherford experiment, estimate size of the nucleus.**
   (b) What is alpha decay? Quantitatively explain the phenomenon of alpha decay using quantum mechanics. **[5+5]**

2. **(a) Using potential energy curves, distinguish between proton-proton and neutron-neutron interaction.**
   (b) Elucidate two phenomenon that occur due to interactions of matter with gamma rays. Draw the necessary diagrams.
   (c) Describe the experimental demonstration of detection of neutrinos. Draw the necessary diagram. **[3+4+3]**

3. **(a) Describe liquid drop model of nucleus.**
   (b) Describe the principle and working of Scintillation detector.
   (c) What are magic number? **[3+5+2]**

4. (a) Discuss various possible interactions of electrons with matter.
(b) What is Compton Effect? Write down the expression for Compton shift.
(c) Define mass attenuation coefficient. [3+5+2]

5. (a) Classify the four fundamental forces. What are quarks? Define the term elementary particles. What are Fermions and Bosons?
(b) Elucidate the meson theory of nuclear forces.
(c) What is strangeness quantum number? [5+3+2]