National Institute of Technology Hamirpur
Department of Physics and photonics Sciences
End Term Examination (December 2022)
M.Sc. 2nd Year (3rd Semester)
Nuclear Physics (PH-632)

M.M.: 50 T.T.: 3hrs

Note: All questions are compulsory.

1. Discuss the concept of nuclear binding energy and its systematic variation with the mass number. (5)

2. Discuss how the mass defect for a given mass number 'A' varies as a function proton number 'Z' and plot the graph for even and odd 'A'. (5)

3. Discuss Yukawa theory of nuclear forces and the need for π meson. (5)

4. Discuss the failures of liquid drop model and need for shell model of nuclear. (5)

5. Write down the experimentally measured properties of a deuteron nucleus. By solving appropriate Schrodinger equation explain how the binding energy of this nucleus is used to find out the depth of its nuclear potential. (3+4)

6. Discuss different types of β-decay. Discuss different conservation laws that are either obeyed or violated during the β-decay. (3+4)

7. What are different processes by which Υ-rays interact with matter? Discuss any two in detail. (8)

8. Why was a new particle called neutrino was hypothesized? Write down its properties and discuss methods of its detection. (2+3+3)

9. Discuss the need for the compound nucleus reaction mechanism? Derive Breit Wigner one level formula for a compound nucleus. (4+4)