(b) How the atomic number and mass number of a nucleus changes when it (a) emits an alpha particle, (b) emits an electron, (c) emits a positron, (d) capture an electron. **10**

6. (a) Give the sketch of Fermi-Kurie plot. Also write the importance of this plot. **10**

(b) Explain the process Gamma decay in detail and write a note on multipole transitions in nuclei. **10**

Unit IV

7. How the liquid drop model explain the binding-energy curve ? Discuss the need of inclusion of asymmetry and pairing energy term in the binding energy formula. Also write the limitations of liquid drop model. **20**

8. How fussion reactors works explain in details. Also explain the nuclear fusion and thermonuclear reactions with suitable example. **20**

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BB-284

M. Sc. EXAMINATION, Dec. 2017

(Second Semester)

(Re-appear Only)

PHYSICS

PHY-508-B

Elements of Nuclear Physics

Time : 3 *Hours*] [*Maximum Marks :* 100

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Why the ordinary light is not suitable to study the size and shape of nuclei ? Explain it. Discuss the techique used to measure the nuclear mass. **10**

(b) Write the semi-empirical mass formula for calculating the binding energy in a nucleus. Calculate the energy equivalent of the missing mass in ^{2}H. [Measured mass of ^{2}H is 2.016490u]. **10**

2. (a) What is the basis of technique used to measure electric quadrupole moments ? Define the electric quadrupole moment of a nucleaus with the help of suiable expression. How one can calculate it, deduce an expression. Why spherically symmetric charge distribution has zero quadrupole moment. **15**

(b) Sketch the plot depicting the charge and matter distribution in a Nucleus. **5**

Unit II

3. Discuss the working of gas filled detectors. Explain the working, constructions, merits and limitations of proportional counter. **20**

4. (a) Explain the various modes of energy loss of charged particles in matter. Discuss the dependence of stopping power on energy and nature of projectile. **10**

(b) Illustrate the mechanism of interaction of gamma radiation with matter. Also discuss the linear and mass attenuation coefficient. **10**

Unit III

5. (a) Discuss the processes of Alpha and Beta decay along with their significance to understand the nuclear structure. Both 14O and 19O undergo beta decay. Which would you expect to emit a positron and which an electron ? Why ? **10**