

**S-497**

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# **MSCPH-511**

## **Nuclear Physics**

M.Sc. Physics (MSCPH)

3rd Semester Examination, 2022 (Dec.)

**Time : 2 Hours]**

**Max. Marks : 70**

**Note :** This paper is of Seventy (70) marks divided into two (02) Sections A and B. Attempt the questions contained in these sections according to the detailed instructions given therein.

### **SECTION–A**

#### **(Long Answer Type Questions)**

**Note :** Section 'A' contains Five (05) long answer type questions of Nineteen (19) marks each. Learners are required to answer any Two (02) questions only.

(2×19=38)

1. Explain the magic numbers. Discuss the nuclear Shell model in detail and explain how it can be used to predict the magic numbers.

2. Write Short notes on the following :
  - (a) Quadrupole moment.
  - (b) K-capture and internal Conversion.
  - (c) Scintillation detectors.
3. Explain the principle of Cyclotron and its working with figure.
4. Write the assumption and merits of liquid drop model and also write down the Bethe Weizsacker formula and explaining various terms in it.
5. Describe various types of nuclear reactions with examples. Also discuss conservation laws in nuclear reactions.

## **SECTION-B**

### **(Short Answer Type Questions)**

**Note :** Section 'B' contains Eight (08) short answer type questions of Eight (08) marks each. Learners are required to answer any Four (04) questions only. (4×8=32)

1. Define Binding energy. Also plot binding energy curve and explain it.
2. Derive the equation of successive disintegration.

3. State and explain the assumptions of compound nucleus hypothesis in nuclear reaction. Also discuss direct reactions.
  4. Describe collective model.
  5. Explain nuclear magnetic moment in details.
  6. Describe reaction cross-section.
  7. Explain fermi theory of  $\beta$  decay.
  8. Describe construction, principle and working of a surface barrier detector.
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