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PHY-551

Nuclear physics and Analytical Techniques

M.Sc. PHYSICS (MSCPHY-12/13/16/17)
Second Year, Examination-2019

Time: 3 Hours **Max. Marks: 80**

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Note:- This paper is of Eighty (80) marks divided into two (02) Section A and B. Attempt the question contained in these sections according to the detailed instructions given therein.

Section-A

(Long Answer Type Question)

Note:- Section - A contains five (05) long answer-type questions of fifteen (15) marks each. Learners are required to answer any three (03) questions only. **(3×15=45)**

1. Explain liquid drop model and obtain the Bethe-Weizsacker formula and explain the alpha decay with the help of semi-empirical formula.

2. Give the classification of fundamental interactions, elementary particle and conservation laws.

3. Explain different properties of nucleus in detail. Define terms Bohr magnetron and magnetic dipole moment.

4. Give the principle, theory and application of SEM and TEM.

5. Give the principle, theory and application of NMR and NMR spectrometers. Explain the NMR spectra of Ethyl alcohol.

Section-B

(Short Answer Type Question)

Note:- Section-B contains eight (08) short answer type questions of seven (07) marks each. Learners are required to answer any five (05) questions only. **(5×7=35)**

1. Discuss fine structure of α spectrum, Geiger-Nuttal law and Gamow's theory of α decay.

2. Explain Fermi theory of β decay and parity violation in β decay.

3. Define internal conservation, Mossbauer Effect and its application.

4. Explain transient and secular equilibrium. How the age of fossil or dead tree can be determined by carbon dating technique.

5. What is Q equation? Find out the solution of Q equation. Calculate the Q value or reaction ${}^{14}_{7}N(\alpha, p){}^{17}_{8}O$ which occurred in Rutherford's α range in nitrogen experiment.

6. Explain Gell-Mann-Nishijima relation and Feynman diagrams.

7. Give the principle and application of ESR.

8. Write down a short note in Linear accelerator, Give an introduction on particle accelerators in India.