

Roll No.
1000 -/40/20

February 2016

M. Sc. IIIrd Semester Examination

PHYSICS

Second Paper : Nuclear and Particle Physics

Time 3 Hours]

[Max. Marks : Regular 85 / Private 100

Note : This question paper is meant for all Regular and Private students. Answer all five questions. All questions carry equal marks. The blind candidates will be given 60 minutes extra time.

1. Explain with an example that there has to be a tensor component also in nuclear force. Write a brief note on tensor force.

OR

Give Yukawa theory of nuclear force the actual force in the nucleus is different from this. Give reasons for it. <http://www.davvonline.com>

2. Why phase stability is important in a cyclotron ? Explain its principle. Why frequency modulated cyclotrons are needed ?

OR

(a) Give principle and working of a linear accelerator. What are their advantages and limitations.
(b) Why the design of an electron cyclotron is different from that of other particle accelerators?

3. (a) Explain Bohr-Wheeler theory of nuclear fission.
(b) What does the quadrupole moment of a nucleus signify ?

OR

How are magic numbers explained ? In what way the spin-orbit interaction is important ?

Briefly explain one more nuclear property which could be explained by the nuclear shell model.

4. Why higher order multipole radiations are also important in a nuclear system ?

Which multipole transitions are possible in a gamma decay when transitions take place from $J_i^{\pi_i} \rightarrow J_f^{\pi_f}$ (i, j mean initial and final states respectively and π_i and π_f are the corresponding parties) $\frac{3^+}{2} \rightarrow \frac{5^-}{2}$ states ?

OR

Write short notes on internal conversion and on isomerism.

5. How isospin and strangeness were helpful in getting insight of the elementary particles symmetry? Illustrate with an example.

OR

Write a short note on fundamental interactions and their relative strengths.

When the gravitational interaction is the weakest of all, why it plays the most dominant role in celestial motion ?