

January 2018
M. Sc. IIIrd Semester Examination

PHYSICS
Second Paper : Nuclear and Particle Physics

Time 3 Hours]

[Max. Marks : Regular 85 / Private 100
[Min. Marks : Regular 28 / Private 33

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 exchange and tensor forces. Also explain 'Meson' theory of nuclear forces.

OR

Discuss $n-p$ scattering at low energy. What are stripping and pick up reactions.

2. Discuss the basic principles of operation of Cyclotrons, Synchrocyclotrons and Synchrotrons. What are the essential difference among them ? What limits the maximum energy obtainable from each.

OR

Discuss the basic principles of operation of linear accelerators. What are the advantages and disadvantages of linear accelerators as compared to circular type.

3. What are magic numbers ? How does the shell model account for it ? On the basis of shell model, find the spin, parity and magnetic moment of He^3 . <http://www.davvonline.com>

OR

Explain the types of nuclear fission. Discuss the Bhor and Wheeler's theory of nuclear fission.

4. Give a brief account of Fermi's theory of beta-decay and show how it was necessary to postulate the existence of neutrino. Explain also the Kurie plot.

OR

What is meant by parity violation in beta decay process ? Discuss in detail the multipole radiation.

5. The interaction between elementary particles are commonly classified in order of decreasing strength as strong, electromagnetic, weak and gravitational. What is meant by 'strength' in this context, and how the relative strength of these interaction are compared ?

OR

Write short notes on any two of the following :

- (a) SU(3) scheme of elementary particles.
(b) Conservation laws.
(c) Discovery of μ -meson.
(d) Classification of elementary particles.

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