

January 2022
M. Sc. III 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. Discuss low-energy $n - p$ scattering and spin dependence of $n - p$ forces.

OR

- (a) Reciprocity Theorem
- (b) Nuclear Reaction Mechanism.

2. What do you know about Accelerators ? Why they are needed ? How cyclic accelerators are superior then linear accelerator ?

OR

Discuss in detail Electron Synchrotron.

3. Discuss Liquid Drop Model in detail. Explain fission and fusion on this.

OR

Define Quadruple Moment and find its expression for a nucleus also discuss its different values of different shapes.

4. Discuss general β -ray spectrum. Describe Fermi Theory of β -decay in detail.

OR

- (a) Nuclear Isomerism
- (b) Multipole Radiation.

5. Discuss broad classification of Elementary Particles.

OR

Show that following reactions are allowed or not :

- (a) $\pi^+ + p \rightarrow \epsilon^+ + k^+$
- (b) $\pi^- + p \rightarrow \epsilon^0 + k^0$
- (c) $\eta \rightarrow p + e^- + \bar{\nu}_e$
- (d) $\pi^- + n \rightarrow \epsilon^- + k^0$
- (e) $\mu^+ \rightarrow e^+ + \bar{\nu}_e + \bar{\nu}_\mu$.