

Roll No.
800 -/-/25/30

February 2019
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. Define nuclear reaction and discuss in detail direct and compound nuclear reaction mechanism with examples.

OR

- (a) Discuss nuclear forces and their explanation.
(b) Reciprocity theorem.

2. Why accelerators are needed ? Discuss working, construction and application of cyclotron. Is it possible to accelerate a neutron with cyclotron.

OR

Discuss in detail Electron Synchrotron.

3. Discuss liquid drop model in detail and explain nuclear fission and fusion on the basis of liquid drop model.

OR

- (a) Describe nuclear quadrupole moment.
(b) Define magic numbers and their existence.

4. Write short notes on any two of the following :

- (a) Multipole Radiation
(b) Internal Conversion
(c) Nuclear Isomerism
(d) General features of β ray spectrum.

5. Define elementary particles and give their detailed classification.

OR

Show that following reactions are allowed or not :

- (a) $\pi^- + p \rightarrow \Lambda^0 + \pi^0$
(b) $\pi^+ + p \rightarrow \Sigma^+ + k^+$
(c) $n \rightarrow p + e^- + \bar{\nu}_e$
(d) $\mu^- \rightarrow e^- + \bar{\nu}_e + \nu_\mu$
(e) $n^0 \rightarrow \pi^+ + \pi^- + \pi^+$
(f) $\pi^- + p \rightarrow \Sigma^0 + \Lambda^0$
(g) $\pi^+ + n \rightarrow \Sigma^+ + k^0$
(h) $\pi^0 + n \rightarrow \Lambda^0 + k^0$
(i) $n \rightarrow p + \pi^-$
(j) $\pi^- + n \rightarrow \Sigma^- + k^+$

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