

6. (a) Explain in detail the single particle model of the nucleus and write a note on spin orbit coupling.

Or

- (b) Discuss in detail the collective model of Bohr and Mottelson.

2019

Time : 3 hours

Full Marks : 80

Answer from both the Section as per direction

The figures in the right-hand margin indicate marks

Candidates are required to answer in their own words as far as practicable

(BASIC NUCLEAR PHYSICS)

SECTION—A

1. Answer any *four* of the following : 4 × 4
- (a) Explain the Nuclear mass and binding energy of the nucleus.
 - (b) Write a note on tensor forces.
 - (c) Explain Yukawa interaction.
 - (d) Explain different nuclear reaction with examples.

(2)

(e) What are magic number? Explain its importance.

(f) Write a note on Schmidt lines.

Or

2. Answer all questions :

2 × 8

(a) Define binding energy of the nucleus.

(b) Define tensor forces.

(c) What do you mean by effective range?

(d) Define Yukawa potential.

(e) Explain fission and fusion reactions.

(f) Briefly explain the features of Liquid drop model.

(g) What are magic number?

(h) Define magnetic moment of the nucleus.

SECTION—B

Answer all questions :

16 × 4

(3)

3. (a) Explain in detail the magnetic dipole moment and electric quadrupole moment of the nucleus.

Or

(b) Define deuteron and explain in detail the magnetic moment and quadrupole moment of the deuteron.

4. (a) Explain in detail the $n-p$ scattering at low energy and obtain an expression for scattering cross section.

Or

(b) Explain in detail the Meson theory of nuclear forces.

5. (a) Explain nuclear resonances and obtain Breit-Wigner formula for s-waves.

Or

(b) Explain in detail the Bohr-Wheeler's theory of fission.