

# DD-751

## M. Sc. (Fourth Semester) EXAMINATION, 2020

PHYSICS

Paper First

(Nuclear and Particle Physics)

*Time : Three Hours*

*Maximum Marks : 80*

**Note :** Attempt all the *five* questions. *One* question from each Unit is compulsory. All questions carry equal marks.

### Unit—I

1. (a) Explain *two* nucleon system. 8
  - (b) Explain tensor forces. 8
- Or*
- (a) Explain Iso-spin formalism. 6
  - (b) Describe Meson's theory of nuclear forces. 10

### Unit—II

2. (a) Describe threshold energies. 6
  - (b) Establish Breit-Wigner single-level formula. 10
- Or*
- (a) Explain direct and compound nuclear reactions. 8
  - (b) Describe scattering matrix. 8

**Unit—III**

3. (a) What is Beta Decay ? 3  
(b) Describe shape of the beta spectrum. 5  
(c) Derive angular momentum and parity selection rules for beta decay. 8

*Or*

- (a) Explain two component theory of neutrino decay. 6  
(b) What is Gamma decay ? Explain multiple transition in nuclei. 6  
(c) Explain nuclear isomerism. 4

**Unit—IV**

4. (a) Explain liquid-drop model in detail. 8  
(b) Explain single particle shell model. 8

*Or*

- (a) Explain spin-orbit interaction. 8  
(b) Describe magic numbers. 4  
(c) Explain magnetic moments. 4

**Unit—V**

5. (a) Describe fundamental interactions. 8  
(b) Explain Leptons and Hadrons. 8

*Or*

Explain SU(2) and SU(3) multiples and their properties.