

Subject Code—58449

B. Sc. EXAMINATION

(Main/Reappear) (Batch 2018 Onwards)

(Fifth Semester)

PHYSICS

CPL-502 Paper-II

Nuclear Physics

Time : 3 Hours

Maximum Marks : 80

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. 1 is compulsory. All questions carry equal marks.

1. (a) What will be mass of a radioactive substance after 80 days if initial mass is 100 g and half life is 10 days ?
- (b) What is the shape of β -particle energy spectra ? Why Pauli proposed neutrino for β -decay ?

- (c) What are the similarities between liquid drop and nuclei ?
- (d) Why shell model is required to account nuclear properties ? Discuss briefly.
- (e) Define range of alpha particles in matter.
- (f) What are compound nuclear reactions ? Discuss briefly.
- (g) What is the basic principle of a scintillator detector ?
- (h) For energy measurement of a charged particle which detector is best and which one is worst : (a) G.M. (b) Scintillator NaI (c) Si. 8×2=16

Unit I

- 2. (a) Discuss the nuclear binding energy per mass curve in detail. 10
- (b) Define nuclear magnetic dipole moment. On what factors, its value is dependent on ? 6
- 3. (a) Discuss Geiger-Nuttall law for α -decay. 8

- (b) Discuss about the p-e and p-n hypotheses about nuclear composition. What are the drawback for "p-e" model ? 8

Unit II

4. Discuss various terms in liquid drop mass formula in detail. What is the importance of this semi-classical mass formula ? 16
5. (a) Discuss the meson theory of Yukawa in detail. 12
- (b) What are the limitations of liquid-drop model ? 4

Unit III

6. Discuss the photoelectric, Compton and pair production interaction of gamma rays in detail. 16
7. (a) Discuss various type of nuclear reactions in brief. 8
- (b) Discuss Bethe formula of energy loss of charged particle in brief. What are its applications ? 8

Unit IV

8. Discuss the interaction of charged particles in gas detectors. What are the differences between ionization chamber, proportional and G.M. counters ? 16
9. Discuss the working of cyclotron and synchrotron accelerators. 16