

**M.Sc., Final Examinations,
December 2017**

(Directorate of Distance Education)

PHYSICS

**Paper– VI: DPB – 520: Nuclear Physics, Cosmic Rays
and Elementary Particles**

Time: 3 hrs]

[Max. Marks: 75/85

Note:

*Answer any FIVE questions from parts A, B and C without omitting any part
(Common to All) Part – D is for the students whose max. marks is 85.*

PART – A

1. How nuclear radius is determined from a) alpha decay method and b) electron scattering method? Explain. (15)
2. Explain Photoelectric effect, Compton effect and pair production in the process of interaction of gamma radiation with matter. (15)
3. a) Explain the principle and working of Betatron and mention its applications.
b) Obtain an expression for the Q value of a nuclear reaction. (8 + 7)

PART – B

4. a) Describe the theory of alpha decay and account for its Q – value.
b) Explain the resonance scattering of gamma rays. (8 + 7)
5. a) Discuss the meson theory of nuclear forces.
b) Give an account of the anomalous magnetic moment of neutron. (9 + 6)
6. a) Arrive at semi empirical mass formula for the estimation of mass per nucleon using the concept of Bethe - Weizsacker.
b) What do you mean by nuclear evaporation? (10 + 5)

PART – C

7. a) Explain the working of a nuclear reactor and obtain an expression for four factor formula.
b) How criticality in size dominates in the homogenous reactor? Explain. (9 + 6)
8. a) Explain in detail the origin, composition and energy spectrum of cosmic rays.
b) Describe the motion of charged particle in earth's magnetic field. (9 + 6)

Contd.....2

9. a) Outline the methods of determining mass, spin and life time of elementary particles.
b) How the elementary particles are classified? Explain. (9 + 6)

PART – D

10. *Write short notes on any TWO of the following:* $2 \times 5 = 10$
a) Nuclear Spin.
b) Auger Effect
c) Van Allen Belts

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