

RAN-2403080104044004
M. Sc. (Sem. - IV) Examination September - 2025
Nuclear Physics (Paper - PH-544 - Elective - 4) Nuclear Reactions
Time: 3 Hours]
[Total Marks: 70
સૂચના : / Instructions

- (1) ઉપરોક્ત દર્શાવેલ વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fill up strictly the above details on your answer book
- (2) Symbols used in the question paper have their usual meanings.
- (3) Figures on the right indicate full marks of the question.
- (4) Students can use non-programmable scientific calculator.

Seat No.:

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Student's Signature

Q. 1. Attempt any two. (18)

- a. Derive an expression for differential cross section for Rutherford's scattering.
- b. Interpret the energetics of nuclear reactions and derive an expression for the minimum threshold energy for endoergic reaction.
- c. Derive the relation between the kinetic energy and the angle of the projectile during a nuclear reaction.

Q. 2. Attempt any two. (18)

- a. Describe the theory of super-heavy elements.
- b. Discuss stripping reactions in detail.
- c. Derive Breit-Wigner formula for the nuclear resonance reaction.

Q. 3. Attempt any two. (18)

- a. Describe neutron interference experiment in detail.
- b. Discuss classification of neutrons according to their energy.
- c. What are neutron sources. Give classification of neutron sources based on the value of energy associated with them. Write applications of neutrons in various fields.

Q. 4. Attempt any two. (16)

- a. Discuss cross-section of neutron-induced fission.
- b. Describe sources of energy in different stars.
- c. Discuss the theory of emission of neutrons with fission fragments.