



HN-003-010314 Seat No. _____

M. Sc. (Chemistry) (Sem. III) (CBCS) Examination

May/June - 2017

**Physical & Material Chemistry : C(PM) - 304
(Nuclear & Radiochemistry) (Ele-I) (New Course)**

**Faculty Code : 003
Subject Code : 010314**

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

- Instructions :** (1) All questions are compulsory.
(2) All questions carry equal marks.

- 1 Answer the following : (any seven)
- (a) Define : Radioactivity, Breeder, Curie, Isotope exchange.
 - (b) Give the synthesis of Br^{82} .
 - (c) Enlist the various methods for the detection and measurement of radioactivity.
 - (d) Discuss Frenkle dosimeter.
 - (e) What are the criteria for the selection of radioisotopes as tracers ?
 - (f) Give the equation for the determination of surface area of powder by isotope exchange.
 - (g) Give the relation between decay constant and half-life period.
 - (h) How tracers are useful in agriculture ?
 - (i) State the various primary radiation-chemical processes ?
 - (j) Give an account for characteristics of isotope effect.

2 Write notes on : (any **three**)

- (a) Neutron activation analysis
- (b) Thermodynamic isotope effect
- (c) Film Badge
- (d) Four factor formula in reactors.

3 Answer the following : (any **two**)

- (a) Discuss kinetic isotope effect in detail with suitable examples.
- (b) What are the characteristics of a nuclear reactor ? Discuss in detail. What are the applications of nuclear reactor ?

OR

- (a) Describe the basic reaction involving active species produced in the primary act.
- (b) What is mass defect ? Derive an expression for the determination of mass defect. How mass defect is related to binding energy of nucleus ?

4 Answer the following : (any three)

- (a) Derive an expression for the determination of half-life of a radioactive element.
- (b) Explain the working of Geiger-Muller counter.
- (c) Discuss the mechanism of isotope exchange reactions.
- (d) Describe direct reading dosimeter.

5 Answer the following : (any **two**)

- (a) Explain in detail :
 - (i) Soddy-Fajan displacement law
 - (ii) Nuclear stability.
- (b) Discuss the kinetics of homogeneous exchange reactions.
- (c) Discuss the applications of radiotracers in analytical chemistry and medicine.
- (d) Describe the process of nuclear fusion.

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