ST—455—2022

FACULTY OF SCIENCE

M.Sc. (Second Year) (Fourth Semester) EXAMINATION

MAY/JUNE, 2022

(CBCS Pattern)

INORGANIC CHEMISTRY

Paper XXIII CH-544/1

(Nuclear and Radiation Chemistry)

(Wednesday, 6-7-2022)   **Time : 2.00 p.m. to 5.45 p.m.**

Time— 3.45 *Hours*   *Maximum Marks—*75

N.B. :— *All* questions are compulsory.

1. Solve any *three* out size :   15

   (*a*) Discuss the principle of Breeder reactor.

   (*b*) Enlist the characteristics of α-radiation.

   (*c*) What are the characteristics of radioactive decay of Ra^{226} ?

   (*d*) Discuss the significance of fission barrier. Write its importance.

   (*e*) Explain the term 'K-electron capture.'

   (*f*) Explain the term 'Binding Energy'. How is binding energy related to the mass defect ?

P.T.O.

2. Attempt any *three* of the following : 15

    (*a*) Give the characteristics property of :

        (*i*) α-rays

        (*ii*) β-rays

        (*iii*) γ-rays.

    (*b*) Comment on reprocessing of nuclear fuel.

    (*c*) Give the salient features of shell model.

    (*d*) Give a short note on nuclear fission.

    (*e*) Write and explain the principle of radiolysis.

    (*f*) Draw and explain the absorption spectrum of α-particle.

3. Solve the following :

    (*a*) Write notes on :

        (*i*) Atom bomb

        (*ii*) Hydrogen bomb. 7

Or

Explain the characteristic features of liquid drop model.

    (*b*) Describe the recoil chemistry of nuclear reactions. 8

Or

Radiolysis of water involves formation of ionic product, radical products as well as molecular product. Illustrate.

4. Solve the following :

    (*a*) Discuss the features of optical model. 7

Or

Explain the mechanism of electron capture with example.

(*b*) What is the order of radioactive disintegration process ? Derive the relationship between half life and decay constant. 8

<p align="center">*Or*</p>

Explain the theory of α-decay.

5. Write short notes on (any *three*) : 15

(*a*) Fission barrier

(*b*) Auger effect

(*c*) Nuclear reactor

(*d*) Nuclear fission.