OR

Discuss the concept of hard and soft acids and bases.

Unit II

Q.2. Discuss the application of nano particles in drug delivery system.

OR

Explain the following –

(a) Size and shape controlled synthesis of nano- particles

(b) Structure of ceramics

Unit III

Q.3 Discuss the liquid drop model of nuclear fission.

OR

What are power reactors? How does nuclear power reactor differ from thermal power plants? Describe the main features of power reactors.

Unit IV

Q.4. What do you understand by radioactive isotopes? Describe its application in medical science and agriculture.

OR

(a) Write note on counting statistics.

(b) A piece of wood recorded in an excavation has 25.6% as much C^{14} (half life=5760 years) as ordinary wood today has. When did the piece get burried?

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ROLL NO.....

CHE. 402/22

IV SEMESTER EXAMINATION, 2022

M.Sc. (CHEMISTRY)

PAPER-II

CATALYSIS, MATERIAL & NUCLEAR CHEMISTRY

TIME: 3 HOURS **MAX.- 80**

MIN.- 16

Note: The question paper consists of three sections A, B & C. All questions are compulsory.
Section A- Attempt all multiple choice questions.
Section B- Attempt one question from each unit.
Section C- Attempt one question from each unit.

SECTION 'A' $2 \times 8 = 16$

Multiple Choice Questions

(1) A catalyst is more effective in -

(a) Finely powdered state (b) Colloidal state

(c) Rough surface (d) All of these

(2) Metal ions with ------- positive charges and ---------- ionic sizes tend to be hard acids -

(a) low, bigger (b) high, smaller

(c) low, smaller (d) high, bigger

(3) Fullerenes having atleast one Nitrogen atom is known ad----------

(4) The most common sysnthetic bone grafting ceramic is ----------

(a) Feldspar (b) Mullite

(c) Kaolinite (d) Hydroxyapatite

(5) The Coulomb repulsion between the protons in the nucleus ------- the binding energy -

(a) Increases (b) Reduces

(c) May increase or decrease (d) None of these

(6) Nuclear Power Reactors are devices based on -

(a) Fission reaction (b) Fusion Reaction

(c) Both fission and fussion (d) None of these

(7) Ionisation based detectors mostly use ---------- as the active medium -

(a) Liquid (b) Gas (c) Solid (d) All of these

(8) One GBq is eual to ---- Disintegrations per second

(a) 1.0×10^9 (b) 3.7×10^{10}

(c) 3.7×10^7 (d) 1.0×10^7

SECTION 'B' $\boxed{4 \times 6 = 24}$

Short Answer Type Questions (Word limit 200-250 words.)

Unit I

Q.1. Explain Acid – base dissociation.

OR

Write short note on the following -

(a) Nucleofugacity (b) $\propto$ −effect

Unit II

Q.2. Write note on optical properties of nano-particles.

OR

Explain Ceramic having oxide.

Unit III

Q.3. Write note on nulcear cross section.

OR

The binding energy of $^{20}_{10}Ne\ is\ 160.64\ meV$. Find the atomic mass.

Given mass of proton = 1.007825 amu

and of neutron = 1.008665 amu

Unit IV

Q.4. Describe radioactive isotopes.

OR

Explain how radioactive technology helps in the determination of age of fossils.

SECTION 'C' $\boxed{4 \times 10 = 40}$

Long Answer questions (Word limit 400-450 words.)

Unit I

Q.1. Discuss kinetic of acid-base catalysis with special reference to ester hydrolysis highlighting their energetic.