22CHP314

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2023
(Third Semester)

Branch – **CHEMISTRY**

SOLID STATE AND NUCLEAR CHEMISTRY

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1. X-rays are generated by
   (i) Geiger tube (ii) Goniometer
   (iii) Coolidge tube (iv) Rotometer

2. To get an n-type of semi-conductor the impurity to be added to Si should have which of the following number of valence electrons?
   (i) 1 (ii) 3 (iii) 2 (iv) 5

3. 1 amu is equivalent to
   (i) 931 MeV (ii) 0.51 eV
   (iii) 9.31 MeV (iv) 1.02 MeV

4. A Cyclotron is used to
   (i) accelerate protons (ii) accelerate electrons
   (iii)accelerate protons & electrons (iv) accelerate neutrons

5. During an atomic explosion the energy released is due to the conversion of
   (i) Proton to neutron (ii) chemical energy into heat energy
   (iii)mechanical energy into nuclear energy (iv) mass into energy

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6. a Derive Bragg's equation for X-ray diffraction.
   OR
   b Outline the Principles and applications of electron diffraction pattern.

7. a Explain free electron theory and mention the electrical and mechanical properties of metals.
   OR
   b Discuss the types and Band theory of semi-conductor.

8. a Write note on: (i) Mass defect (ii) Binding energy.
   OR
   b What is meant by (i) Nuclear cross section (ii) Threshold energy?

9. a Outline radioactive emanations and list out some characters of radiation rays.
   OR
   b Describe the working of G.M.Counter.

10. a Explain the Principle and types of nuclear reactors.
    OR
    b Discuss about Dating of objects.

Cont...

SECTION -C (30 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 6 = 30)

11. a Explain the Principle, experimental method and application of Neutron diffraction.

OR

b Define: Fourier synthesis and write its application in the analysis of crystal structure of S-tetrazine.

12. a State Hume-Rothery ratio and discuss the different phases of Cu-Zn system.

OR

b Discuss about the different types of crystal defects.

13. a Describe Liquid drop model and Fermi gas model.

OR

b Write note on: (i) Nuclear cross section (ii) Q-value.

14. a How radioactivity is deducted and determined by Cloud chamber?

OR

b Explain about LINAC & Cyclotron particle accelerators.

15. a Give short note on: (i) Projectile capture (ii) Particle emission (iii) Spallation.

OR

b (i) Explain about nuclear fusion and stellar energy. (ii) What are transuranic elements and how these are prepared?

Z-Z-Z END