18CHP14

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2022
(Third Semester)

Branch – CHEMISTRY

INORGANIC CHEMISTRY - III

Time: Three Hours Maximum: 50 Marks

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

1 The diffraction pattern of a certain metal was measured with X-ray radiation of a wavelength of 2.45A. The second order Bragg diffraction peak was found at an angle 2theta of 50 degrees. The d-spacing between the diffraction planes in the copper metal is_____(Sin $50^o = 0.76$, Sin $25^o = 0.42$)
(i) 3.25A (ii) 5.83A
(iii) 0.41A (iv) 4.2A

2 Lattice vacancies are created when certain atoms in a semiconductor are missing. What is this defect?
(i) Tunnel defect (ii) Avalanche defect
(iii) Frenkel defect (iv) Schottky defect

3 A radioisotope of argon, ^{35}Ar, lies below the "band of stability: (n/p ratio too low). One would predict that it decays via
(i) neutron emission (ii) beta emission
(iii) positron emission (iv) fission

4 A Geiger-Muller tube is a
(i) gas ionization detector (ii) cloud chamber
(iii) fluorescence detector (iv) photographic detector

5 Which one of the following would be most likely to undergo thermonuclear fusion?
(i) ^{2}H (ii) ^{4}He
(iii) ^{56}Fe (iv) ^{235}U

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

6 a Derive Bragg equation.
OR
b Describe the structure of Zinc blende.

7 a What are solid solutions? Give its classification.
OR
b Explain nonstoichiometric defects with examples.

8 a Describe (i) Mass defect (ii) Packing fraction.
OR
b Explain (i) Columbic barrier (ii) Cross section.

Cont...

9 a Explain cloud chamber for detection of radioactive rays.

OR

b Discuss on cyclotron and its uses.

10 a Explain (i) Spallation (ii) Fertile isotopes.

OR

b Explain stellar energy with reactions.

SECTION -C (30 Marks)

Answer **ALL** questions

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

11 a Discuss the principle, instrumentation, and applications of neutron diffraction.

OR

b Discuss the principle, instrumentation, and applications of electron diffraction.

12 a Give an account on interstitial compounds (i) Spinel (ii) Metal clusters.

OR

b Give the types of semiconductors and explain the effect of temperature on them.

13 a Give an account on stable subatomic particles.

OR

b Compare and contrast liquid drop and shell nuclear models.

14 a Explain (i) Scintillation counter (ii) Cherenkov counter.

OR

b Give an account on (i) LINAC (ii) betatron.

15 a Explain fission reaction and atom bomb.

OR

b Explain (i) Neutron activation analysis (ii) Isotopic dilution studies.

Z-Z-Z END