

Reg. No

Name

23U344

B.Sc. DEGREE END SEMESTER EXAMINATION : NOVEMBER 2023

SEMESTER 3 : PHYSICS

COURSE : 19U3PCHE3.1 : ADVANCED PHYSICAL CHEMISTRY - 1

(For Regular - 2022 Admission and Improvement/Supplementary - 2021/2020/2019 Admissions)

Time : Three Hours

Max. Marks: 60

PART A

Answer All (1 mark each)

1. Give an example for a tetragonal crystal.
2. Give the eutectic composition of lead-silver system.
3. Which physical phenomenon is used in gas masks?
4. Write down the number of atoms associated in the unit cell of an element with simple cubic structure.
5. Define an improper rotation axis.
6. How many phases are present in a homogeneous system?
7. Who discovered carbon nanotubes?
8. The liquid crystals possessing limiting mobility and flowing in layers are of type.
(1 x 8 = 8)

PART B

Answer any 6 (2 marks each)

9. State phase rule and define the terms involved.
10. Suggest a green method to synthesize nanogold . Explain the procedure.
11. Represent different axes of rotation in benzene and identify the principal axis.
12. Draw the Miller indices of (100) and (111) Plane.
13. Discuss the effect of temperature on adsorption.
14. Why does ZnO appear yellow on heating?
15. Briefly explain the intermolecular forces present in liquids.
16. Distinguish between Schottky defect and Frenkel defect.
(2 x 6 = 12)

PART C

Answer any 4 (5 marks each)

17. Explain how the phase rule is modified for applying to a condensed system. Draw a general phase diagram for a simple eutectic system A-B.
18. An element crystallises with a FCC structure with a unit cell edge of 388 pm. Its density is 12.16 g cm^{-3} . Calculate the atomic mass of the element.
19. Differentiate between chemical adsorption and physical adsorption?
20. What are Nanocomposites? Discuss their properties and applications.
21. Compare smectic, nematic and cholesteric liquid crystals.
22. Systematically predict the point group of C_2H_2 and HCl.
(5 x 4 = 20)

PART D

Answer any 2 (10 marks each)

23. a) What are the separations of the planes with Miller indices (111), (211) and (100) in a crystal in which the cubic unit cell is of side 432 pm?
b) The angle of a first order X-ray diffraction from a set of crystal planes with an interplanar spacing of 99.3 pm is 20.85° . What is the wavelength of the X-ray radiation?
24. Systematically work out the point group of the following molecules.
a) PCl_5 b) Nitrate ion c) CO_2 d) Benzene
25. a) Elaborate on Nanomedicine and drug delivery applications using different nanomaterials.
b) Briefly write the properties and applications of nanocomposites.
26. Discuss the phase diagrams of water system and sulphur system.

(10 x 2 = 20)