

IV Semester B.Sc. Examination, May/June 2010
(Semester Scheme)
CHEMISTRY (Paper - IV)

Time : 3 Hours

Max. Marks : 60

Instructions: 1) The question paper has two Parts. Answer both the Parts.
2) Write equations wherever necessary.

PART - A

Answer any six of the following questions. Each question carries two marks.

(6×2=12)

1. What is biochemical oxygen demand ?
2. Define
 - a) axis of symmetry
 - b) plane of symmetry
3. What is homogeneous catalysis ? Give an example.
4. Define 'mass defect'.
5. What is hardening of steel ?
6. How does acetyl chloride react with ammonia ?
7. What is the action of heat on tartaric acid ?
8. Write keto-enol tautomers of ethylacetoacetate.
9. Calculate the number of degrees of freedom of a pure liquid in equilibrium with its vapour.
10. Write a short note on smectic liquid crystals.

PART - B

Answer any eight of the following questions. Each question carries six marks.

(8×6=48)

11. a) Calculate the half life of a radioactive element whose decay constant is $1.35 \times 10^{-4} \text{ year}^{-1}$.
b) Give the use of any two radioactive isotopes in the field of agriculture.
c) Name any two nuclear reactors of India and mention the places where they are located.

(2+2+2)



12. a) Explain the principle and working of GM counter in the detection and measurement of radioactivity.
- b) What is the role of a coolant in a nuclear reactor? Give an example for a coolant. (4+2)
13. a) How is ferrosilicon manufactured? Mention its uses.
- b) What is austenite? Mention its properties. (4+2)
14. a) Explain the methods of obtaining metal powders with examples.
- b) How is wolframite concentrated? (4+2)
15. a) What is the effect of sulphur dioxide pollutant in the atmosphere?
- b) Mention any two principles of green chemistry.
- c) How are gaseous and liquid radioactive wastes disposed? (2+2+2)
16. a) Give the general characteristics of a catalyst.
- b) What is an adsorption isotherm? Give the expression for Langmuir adsorption isotherm and explain the terms involved. (3+3)
17. a) Explain Frenkel defect in solids.
- b) Calculate the number of particles per unit cell in body centered cubic crystal.
- c) Name the crystal system with lattice dimensions $\alpha = \beta = \gamma = 90^\circ$; $a = b \neq c$. (2+2+2)
18. a) Derive Bragg's equation $n\lambda = 2d \sin \theta$.
- b) What is the coordination number and crystal structure when the radius ratio range is 0.414 - 0.732? (4+2)
19. a) Draw a labelled phase diagram of lead-silver system. Identify the eutectic point. What is the composition at this point?
- b) What is a freezing mixture? Give an example.
- c) How many components are present in $\text{NaCl} + \text{water} \rightarrow \text{NaCl}(\text{aq})$. (3+2+1)
20. a) Explain the mechanism of benzoin condensation. (4+2)
- b) How is benzaldehyde obtained from benzoyl chloride?
21. a) Write equation to show the reaction of acetamide with bromine in alkali solution.
- b) How is acetone obtained from methyl cyanide?
- c) pKa value of formic acid is lower than acetic acid. Give reason. (2+2+2)
22. a) Give an example for Wolff-Kishner reduction.
- b) How is butanoic acid obtained from diethylmalonate?
- c) How is ethylacetate converted to ethylacetoacetate? (2+2+2)