



WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 4th Semester Examination, 2021

CEMACOR09T-CHEMISTRY (CC9)

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.*

Answer any *three* questions taking *one* from each unit

Unit-I

1. (a) Explain why, metal oxides are generally unstable at high temperature from Ellingham diagram? 2
- (b) Describe the principle and reactions related to the extraction of Aluminium by electrolytic reduction. 3
- (c) What is the role of Cryolite in the extraction of Aluminium? 2
- (d) What is 'leaching'? Name two basic leaching reactors. 3

2. (a) Write the difference between calcination and roasting. 2
- (b) The choice of flux depends upon the impurities present in the ore. — Comment. 2
- (c) What is Hydrometallurgy? How are Gold and Silver extracted by this method? Write the reactions. 3
- (d) Which factor influences refining of Ni by Mond process? 2
- (e) Which method is used for refining Zr and Ti by removal of oxygen and nitrogen? 1

Unit-II

3. (a) Give a comparative account of the chemistry of O, S, Se and Te with respect to their oxidation states and stability of hydrides. 5
- (b) Discuss the structure and bonding of polyphosphazenes. 3
- (c) Catenation power of carbon is higher than that of boron and nitrogen. — Explain. 2
- (d) What are silicones? Discuss their polymeric nature. 3
- (e) Give examples to show that hydroxylamine possesses both oxidizing and reducing properties. 2
- (f) How would you isolate Argon from air? State one use of it. 2
- (g) Write down the formula and structure of a dithionic acid. Explain why it is not considered as a member of the polythionic acid group having the general formula $H_2S_nO_6$. 3

4. (a) How does Be differ from other alkaline earth metals? 2
 (b) Explain why boron nitride is called 'inorganic graphite'? 2
 (c) Write the structure of N_2O_5 and comment on its stability and decomposition products. 4
 (d) Complete the following reactions: 4

$$\text{B}_3\text{N}_3\text{H}_6 + \text{HCl} \rightarrow$$

$$(\text{NPCl}_2)_3 + \text{CH}_3\text{MgI} \rightarrow$$

 (e) What is clathrates? Give example. 2
 (f) Me_3P acts as a stronger base than Me_3N in their reaction with B_2H_6 — Explain. 3
 (g) Give a convenient route for the synthesis of XeOF_4 with equations. Why it cannot be stored in glass/quartz vessel? 2+1

Unit-III

5. (a) Distinguish between ambidentate and flexidentate ligands with proper example. 2
 (b) What are chelates? Mention one application of it in qualitative and quantitative analysis. 3
 (c) $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$ has two isomeric forms. Suggest a chemical method to elucidate the structure of the isomers. 3
 (d) Write the IUPAC name of $[(\text{CO})_3\text{Fe}(\text{CO})_3\text{Fe}(\text{CO})_3]$ and the formula of μ -amido- μ -hydroxooctaminedicobalt(III) ion. 2
6. (a) Give the IUPAC names of $[\text{Co}(\text{NH}_3)_4(\text{NO}_2)\text{Cl}]$, $[\text{Pt}(\text{NH}_3)_4][\text{PtCl}_4]$. 2
 (b) Which ligands satisfy the primary and secondary valency in $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$? 3
 (c) Explain why, $\text{K}_4[\text{Fe}(\text{CN})_6]$ is non-toxic whereas KCN is toxic? 2
 (d) Draw the possible geometrical isomers of $[\text{Co}(\text{en})(\text{NH}_3)_2\text{BrCl}]^+$ and hence predict which of them would be optically active. 3

N.B. : Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.

—x—