

2023/TDC(CBCS)/ODD/SEM/  
CHMHCC-301T/261

TDC (CBCS) Odd Semester Exam., 2023

CHEMISTRY

( Honours )

( 3rd Semester )

Course No. : CHMHCC-301T

( s-, p-block Elements and Metallurgy )

Full Marks : 50

Pass Marks : 20

Time : 3 hours

*The figures in the margin indicate full marks  
for the questions*

SECTION—A

Answer *ten* questions, taking any *two* from each

Unit : 2×10=20

UNIT—I

1. Define allotropy. Write the allotropic forms of phosphorus. 1+1=2
2. What are cage compounds? Cite one example. 1+1=2
3. What are carboranes? Write the formula of a *closo*-carborane. 1+1=2

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( Turn Over )



( 2 )

UNIT—II

4. Noble gases are mostly chemically inert. Give reason. 2
5. Draw the structure of  $\text{XeOF}_4$ . Mention the hybridization state of central atom. 1+1=2
6. Write the balanced equation for the complete hydrolysis of  $\text{XeF}_6$ . 2

UNIT—III

7. What are conjugate acids and bases? Give one example of each. 2
8. What do you mean by levelling effect of a solvent? 2
9. " $\text{CO}_2$  acts as a Lewis acid." Explain. 2

UNIT—IV

10. What are inorganic polymers? Write the different types of inorganic polymers. 1+1=2
11. Draw the structure of  $(\text{BN})_n$ . 2
12. What are phosphazenes? Give one example of cyclic polymer. 1+1=2

UNIT—V

13. What is meant by the term 'metallurgy'? 2
14. Define flux and slag with suitable examples. 2
15. Write a short note on zone refining. 2

SECTION—B

Answer *five* questions, taking *one* from each Unit :

6×5=30

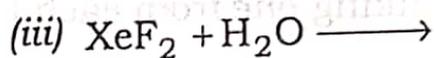
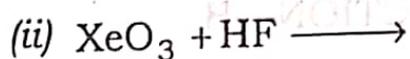
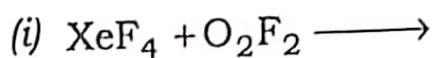
UNIT—I

16. (a) How is  $IF_5$  prepared? Explain its structure on the basis of hybridization scheme. 1+2=3
- (b) Write the structure of *closo*-, *nido*- and *arachno*-type of boron compounds or ions with suitable examples of each. 1+1+1=3
17. (a) How is peroxydisulphuric acid  $H_2S_2O_8$  prepared? Draw its structure. 2+1=3
- (b) Write one method for the preparation of boric acid. Why is  $H_3PO_3$  dibasic acid? Mention one application of boric acid in medicine. 1+1+1=3

UNIT—II

18. (a) How is  $\text{XeF}_6$  prepared? Draw the shape of the molecule and mention the state of hybridization of Xe-atom in it.  $1+1+1=3$

(b) Complete the following chemical equations :  $1 \times 3 = 3$



19. (a) Define clathrates. Write the important uses of clathrates.  $1+2=3$

(b) Draw and explain the structure of xenon oxydifluoride ( $\text{XeOF}_2$ ). 3

UNIT—III

20. (a) Explain why hard acids coordinate with hard bases and soft acids with soft bases. 3

(b) Explain Brönsted-Lowry theory of acids and bases with suitable examples. 3

21. (a) What are protic and aprotic solvents? Is liquid  $\text{NH}_3$  a protic or an aprotic solvent? Give reasons.  $2+1=3$

- (b) What is HSAB principle? Explain why  $\text{AgI}_2^{\ominus}$  is stable but  $\text{AgF}_2^{\ominus}$  is non-existence. 1+2=3

UNIT—IV

22. (a) Write the preparation and draw the structure of a cage compound of each of P and B. 1½+1½=3
- (b) Draw the open and closed structures of silicones. 1½+1½=3
23. (a) How is  $\text{SiH}_4$  prepared? Draw its structure. 2+1=3
- (b) Briefly describe the silicones, their general formula and one characteristic property. 1+1+1=3

UNIT—V

24. (a) Explain the electrolytic process for the extraction of zinc. 3
- (b) What are Ellingham diagrams? Write the uses of Ellingham diagram. 1+2=3
25. (a) Give an outline of extraction of chromium from its ore. 3
- (b) How is the metal obtained from its oxide ores electrolytically? 3

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