

**2025/TDC(CBCS)/ODD/SEM/  
CHMHCC-301T/432**

**TDC (CBCS) Odd Semester Exam., 2025**

**CHEMISTRY  
( 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*

**UNIT—I**

1. Answer any *two* of the following questions :

2×2=4

- (a) Define allotropy. Write the allotropic forms of phosphorus. 1+1=2
- (b) What is inert pair effect? Illustrate with an example. 1+1=2
- (c) How does  $B_2H_6$  react with ammonia at low and high temperature?

2. Answer any *one* of the following questions : 6

(a) (i) What are silanes? Describe one method of their preparation. Compare their reactivity with alkanes. 1+1+1=3

(ii) How would you prepare boric acid from diborane? What is the action of heat on boric acid? 1+2=3

(b) (i) How is  $IF_5$  prepared? Explain its structure on the basis of hybridization scheme. 2+2=4

(ii) Account for the fact that inter-halogen compounds are more reactive than the parent halogens. 2

### UNIT—II

3. Answer any *two* of the following questions : 2×2=4

(a) Why xenon form compounds only with  $O_2$  and  $F_2$ ?

(b) Draw the structure of  $XeOF_4$ . Mention the hybridization state of central atom. 1+1=2

(c) Write two applications of noble gas compounds.

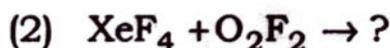
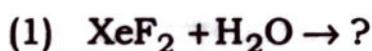
4. Answer any *one* of the following questions : 6

(a) (i) How is  $\text{XeF}_4$  prepared? Draw and explain the structure of the molecule. 1+3=4

(ii) What is the action of moisture on  $\text{XeF}_6$ ? 2

(b) (i) Explain the structure of  $\text{XeF}_2$  on the basis of molecular orbital theory (MOT). 4

(ii) Complete the following chemical equations : 1×2=2



UNIT—III

5. Answer any *two* of the following questions : 2×2=4

(a) How does  $\text{CO}_2$  act as a Lewis acid?

(b) Give conjugate bases for the following Brønsted acids :

(i) Acetylene

(ii)  $\text{HCO}_3^-$

(c) Define soft base and give one example.

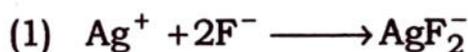
6. Answer any *one* of the following questions : 6

(a) (i) What is meant by levelling effect?  
Explain this effect on the basis of  
solvent-system concept of acids and  
bases. 1+3=4

(ii) What is differencing solvent?  
Explain with an example. 2

(b) (i) What are the limitations of Lowry-  
Brönsted concept? 2

(ii) Justify the following reactions on  
the basis of HSAB principle : 2×2=4



#### UNIT—IV

7. Answer any *two* of the following questions :

2×2=4

(a) What are inorganic polymers? Give two  
examples. 1+1=2

(b) What are silicone rubbers? Write one  
use of it. 1+1=2

(c) Write the formula of discrete silicate ion  
in pyrosilicates.

8. Answer any *one* of the following questions : 6

(a) (i) What are silicones? Give a brief account of their applications in technology. 1+3=4

(ii) Taking a suitable example, explain the preparation of a cyclic polymer. 2

(b) What are silicates? Draw the structures of four different types of silicate and give the name and formula of one example of each type. 1+5=6

UNIT—V

9. Answer any *two* of the following questions : 2×2=4

(a) Define flux and slag with suitable examples.

(b) Distinguish between calcination and roasting.

(c) Which metals generally occur in their native state in nature?

10. Answer any *one* of the following questions : 6

(a) (i) What is an Ellingham diagram? Discuss briefly the application of this diagram. 1+3=4

( 6 )

(ii) Name two important ores of zinc with their formulas. 2

(b) (i) What is metallurgy? How is the metal obtained from its oxide ores electrolytically? 1+3=4

(ii) What are the advantages and disadvantages of hydrometallurgy? 2

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