

Bs/CHEM.M-3 (T)

2025

(FYUGP)

(3rd Semester)

CHEMISTRY

(MINOR)

Paper Code : CHEM.M-3 (T)

**(Inorganic Chemistry II : s- and p-Block
Elements)**

Full Marks : 75

Pass Marks : 40%

Time : 3 hours

(PART : B—DESCRIPTIVE)

(Marks : 50)

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

1. (a) Write a note on the limitations of HSAB principle. 3
- (b) Explain the different types of acid-base reaction. 4
- (c) Explain the concept of conjugate acid-base pair with examples. 3

26L/77a

(Turn Over)

(2)

OR

2. (a) Explain the relative strengths of acids based on the values of K_a and pK_a . 3
- (b) What are Lewis acids? Arrange the following in order of their increasing strength : 2
 BF_3 , B_2H_6 , BPh_3
- (c) Explain why hard acids coordinate with hard bases and soft acids coordinate with soft bases. 3
- (d) What are levelling solvents? Give examples. 2
3. (a) What are borates? Discuss the preparation and structure of meta-borates. 1+4=5
- (b) What are inter-halogen compounds? Give the preparation of any two inter-halogen compounds. 1+2=3
- (c) Write the properties of halogens. 2

OR

4. (a) What is diagonal relationship? Discuss the diagonal relationship between B and Si. 1+3=4

26L/77a

(Continued)

(3)

- (b) Describe the structure and bonding of diborane. 4
- (c) Write a short note on inert pair effect. 2
5. (a) Discuss the structure and bonding of XeO_3 molecule. 3
- (b) Write a note on the uses of argon and helium. 4
- (c) What are clathrates? Give their uses. 3

OR

6. (a) Explain the structure of $XeOF_4$ on the basis of VSEPR theory. 3
- (b) Discuss the occurrence of noble gases. 4
- (c) Explain the preparation and properties of XeF_6 . 3
7. (a) What are inorganic polymers? How are they classified? 1+2=3
- (b) Discuss the steps involved in the preparation of silicones. 5
- (c) Write a short note on the applications of silicates. 2

26L/77a

(Turn Over)

OR

8. (a) What are phosphazenes? Give the synthesis and structures of any two phosphazenes. 1+2+2=5

(b) Compare the properties of inorganic and organic polymers. 5

9. (a) Explain the classification of Lewis acids. 3

(b) Discuss the bonding and structure of boric acid. 3

(c) Give one preparation each and structures of any two oxo-acids of nitrogen. 2+2=4

OR

10. (a) Discuss the preparation and uses of silicon oils. 3

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

(c) What are oxo-acids? Name the oxo-acids of chlorine. 1+2=3

Subject Code : Bs/CHEM.M-3 (T)

Booklet No. **A** 68

Date Stamp

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To be filled in by the Candidate

BA / BSc / BCom / BBA / BCA
3rd Semester End Term
Examination, **2025 (FYUGP)**

Subject

Paper

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Roll No.

Regn. No.

Subject

Paper

DESCRIPTIVE TYPE

Booklet No. B

INSTRUCTIONS TO CANDIDATES

1. The Booklet No. of this script should be quoted in the answer script meant for descriptive type questions and vice versa.
2. This paper should be **ANSWERED FIRST** and submitted within 1 (one) Hour of the commencement of the Examination.
3. While answering the questions of this booklet, any cutting, erasing, overwriting or furnishing more than one answer is prohibited. Any rough work, if required, should be done only on the main Answer Book. Instructions given in each question should be followed for answering that question only.

Signature of
Scrutiniser(s)

Signature of
Examiner(s)

Signature of
Invigilator(s)



2025

(FYUGP)

(3rd Semester)

CHEMISTRY

(MINOR)

Paper Code : CHEM.M-3 (T)

(Inorganic Chemistry II : s- and p-Block Elements)

(PART : A—OBJECTIVE)

(Marks : 25)

The figures in the margin indicate full marks for the questions

SECTION—I

(Marks : 15)

Put a Tick (✓) mark against the correct answer in the brackets provided : 1×15=15

1. Which of the following is the conjugate base of H_2SO_4 ?

(a) HSO_4^- ()

(b) SO_4^{2-} ()

(c) H_3O^+ ()

(d) OH^- ()

2. Which pair represents hard acid and hard base?

(a) Ag^+ and I^- ()

(b) Mg^{2+} and F^- ()

(c) Cu^+ and CN^- ()

(d) Hg^{2+} and S^{2-} ()

3. The solvent that levels all strong acids to the strength of H_3O^+ is

(a) NH_3 ()

(b) H_2O ()

(c) HF ()

(d) $\text{C}_2\text{H}_5\text{OH}$ ()

4. Basic beryllium acetate contains

(a) Be—O—Be bonds ()

(b) Be—C bonds ()

(c) Be—N bonds ()

(d) Be—H bonds ()

5. Which is the correct formula of boric acid?

- (a) H_3BO_3 ()
- (b) $\text{H}_2\text{B}_2\text{O}_5$ ()
- (c) B_2H_6 ()
- (d) HBO_2 ()

6. Inert pair effect is most pronounced in

- (a) alkali metals ()
- (b) alkaline earth metals ()
- (c) heavier *p*-block elements ()
- (d) transition metals ()

7. Which theory explains the linear shape of XeF_2 ?

- (a) VBT ()
- (b) MO theory ()
- (c) Crystal field theory ()
- (d) Hybridization theory ()

8. Which noble gas forms clathrates most easily?

- (a) Helium ()
- (b) Neon ()
- (c) Xenon ()
- (d) Krypton ()

9. The shape of XeF_4 is

- (a) octahedral ()
- (b) square planar ()
- (c) trigonal bipyramidal ()
- (d) tetrahedral ()

10. Which of the following is a silicone repeating unit?

- (a) —Si—C— ()
- (b) —B—N— ()
- (c) —P=N— ()
- (d) —Si—O—Si— ()

11. Zeolites are a type of

- (a) silicones ()
- (b) silicates ()
- (c) borazines ()
- (d) phosphazines ()

12. The strongest acid among the following oxo acids of chlorine is

- (a) HClO ()
- (b) HClO_2 ()
- (c) HClO_3 ()
- (d) HClO_4 ()

13. Which of the following is a Lewis acid?

(a) NH_3 ()

(b) H_2O ()

(c) AlCl_3 ()

(d) OH^- ()

14. Which interhalogen has T-shaped structure?

(a) ClF ()

(b) ClF_3 ()

(c) BrF_5 ()

(d) IF_7 ()

15. The hybridization of Xe in XeF_2 is

(a) sp^3 ()

(b) dsp^3 ()

(c) d^2sp^3 ()

(d) sp^3d^2 ()

SECTION—II

(Marks : 10)

Answer the following questions in brief :

2×5=10

1. State the HSAB principle.

2. Define allotropy. Give an example of allotrope of carbon.

3. Write the structure of borazine. Why is it called inorganic benzene? Marks : 10)

Answer the following questions in brief :

1. State the HSAB principle.

4. Give two uses of noble gases.

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5. Define Brönsted-Lowry acid and base with examples.

inorganic benzene?
