



CHE 503

M.Sc. (First Semester) EXAMINATION, 2023-24

(CBCS Mode)

CHEMISTRY

(Main Group Elements)

Time : Three Hours]

[Maximum Marks : 75

Note: There are **three** sections (A, B and C) and candidate has to attempt all questions. Marks are indicated against each section.

Section-A

1. Answer all parts of this questions : $5 \times 3 = 15$
- (a) Draw the structure of a polyion having tricapped trigonal prismatic structure.
 - (b) When do you expect KM_nO_4 to dissolve in benzene ?
 - (c) Explain the structure of methyl lithium.
 - (d) Why are there two different Al-C bond lengths in $Al(CH_3)_6$?
 - (e) Define conjuncto boranes with two examples.

Section-B

Note: Answer all questions of the following : $4 \times 5 = 20$

2. (a) Describe the synthesis and commercial uses of organolithium compounds.

Or

- (b) Discuss the structure and bonding in cyclic polyphosphazenes with suitable illustrations.
3. (a) What do you understand by energetics of hybridization ? Explain with two suitable examples.

Or

- (b) Why polythiazyl is known as dimensional metal ? Explain.
4. (a) Discuss Wade's rule of bonding in boranes.

Or

- (b) Explain the structure and bonding in B_5H_9 , B_5H_{11} and B_6H_{10} .
5. (a) With suitable structures, explain bonding in pyrosilicates and double chain silicates.

Or

- (b) Explain bonding in bismuth polycations and cis bridged SbF_5 .

Section-C

Note: Answer any two questions of the following : $2 \times 20 = 40$

6. Explain bonding in boranes by LCAO method.
7. Explain synthesis and the structural aspects of ionic, covalent and metallic carbides with suitable examples.
8. Describe the preparation, properties, structure and applications of organomercury compounds.
9. Discuss $d\pi - P\pi$ bonding with suitable illustrations. What are the consequences of this type of bonding on molecular structure ?

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