

Anjuman Islam Janjira Degree College of Science

Murud-Janjira, Raigad-402401
Affiliated to University of Mumbai

As per NEP 2020

Class: -S.Y.B.Sc.(G.S)	Subject: - Major Chemistry-II (Progressive Inorganic and Organic Chemistry II)
Semester: - IV	Course code: -S3MJ6
Exam Event: - Summer 2026 (FH)	Marks: - 30
Date: - 6/03/2026	Duration: - 1:00 Hours

Q.1 A) Select the correct option & complete the sentences (Any six)

- The highest oxidation state of chromium in its salts is:
a) +3 b) +4 c) +6 d) +2
- The 5d series of transition elements comprises:
a) Lanthanides b) Actinides c) 6th period d-block elements d) 5th period p-block elements
- The molecular formula of diborane is: The hydrated ions of Cu^{2+} absorb light in the _____ region and hence appear blue in colour.
a) Infrared b) Ultraviolet c) Visible (orange-red region) d) Gamma
- The effective atomic number (EAN) of Co^{3+} in $[\text{Co}(\text{NH}_3)_6]^{3+}$ is:
a) 48 b) 35 c) 36 d) 24
- When ammonia solution is added to a cupric salt solution, deep blue colour is observed due to the formation of:
a) $[\text{Cu}(\text{NH}_3)_4]^{2+}$ b) $[\text{Cu}(\text{H}_2\text{O})_6]^{2+}$ c) $[\text{Cu}(\text{OH})_2]$ d) CuO
- Which of the following ligands is incorrectly named?
a) H_2O – aqua b) F^- – fluoro c) NH_3 – amine d) CN^- – cyano
- Nickel ions with dimethyl glyoxime form:
a) Blue solution b) Green gas c) Red colored precipitate d) Yellow crystals
- _____ is a major sink for the removal of NO_2 from the air.
a) Plants b) Soil c) Rain (water droplets in atmosphere) d) Oxygen
- Photochemical smog is caused by a high concentration of:
a) SO_2 and CO_2 b) Hydrocarbons and NO_x c) CO and SO_3 d) Nitrogen and Oxygen
- Dimer of NO_2 is _____
a) N_2O b) N_2O_3 c) N_2O_4 d) NO_3

(B) Attempt any Three of the following.

- Write down the electronic configuration of first transition series
- Write down the common oxidation states of transition metals.
- Explain Characteristic property of complex ion
- Write down the IUPAC nomenclature of given coordination compound



- a) $[\text{Co}(\text{NH}_3)_6] \text{Cl}_3$ b) $[\text{Ag}(\text{NH}_3)_2] \text{Cl}$ c) $[\text{Co} \text{Cl}(\text{NH}_3)_5]^{2+}$
 d) $[\text{Co}(\text{NO}_2)_3(\text{NH}_3)_3]$ e) $[\text{Co} \text{H}_2\text{O}(\text{NH}_3)_5] \text{I}_3$

5. What is Acid Rain? Explain its causes, effects, and control measures.

Q.2 (A) Select the correct option & complete the sentences (Any six)

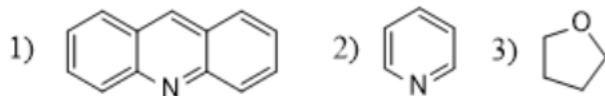
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- Among furan, pyrrole and thiophene, which is most reactive towards electrophilic substitution?
 a) Thiophene b) Furan c) Pyrrole d) Pyridine
- Chichibabin reaction is related to:
 a) Nitration of pyrrole b) Sulphonation of furan c) Amination of pyridine d) Halogenation of thiophene
- Diels–Alder reaction is shown by:
 a) Pyridine b) Thiophene c) Furan d) Pyrrole
- In methylcyclohexane, the methyl group prefers:
 a) Axial position b) Equatorial position c) Both equally d) Inside the ring
- During ring flipping of cyclohexane:
 a) Axial becomes equatorial and vice versa b) Cis becomes trans
 c) R becomes d) Configuration changes permanently
- The interaction responsible for instability of axial substituent is:
 a) Hydrogen bond b) 1,3-diaxial interaction c) Peptide bond d) Ionic bond
- A compound having no plane of symmetry and non-superimposable mirror image is:
 a) Achiral b) Mesomeric c) Chiral d) Planar
- What is the product of the Wittig reaction between a phosphorane and an aldehyde?
 a) Alkene b) Alkyne c) Alkane d) Alcohol
- What type of reaction is the McMurry reaction?
 a) Coupling reaction b) Reduction reaction c) Oxidation reaction d) Substitution reaction
- What occurs during a Wagner-Meerwein rearrangement?
 a) Migration of an alkyl group b) Formation of a new carbon-carbon bond
 c) Loss of a leaving group d) All of the above

(B) Attempt any Three of the following.

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1. Name the following heterocyclic Compound



- Discuss the reactivity of Pyridine.
- Discuss the Conformational Analysis of Tert-Butyl Cyclohexane
- Explain Cis-trans isomerism in disubstituted 1,3-Dimethyl cyclohexane.
- Describe Wittig reaction with mechanism.