

LONG QUESTIONS :-

- ① What is Fajan's rule? Explain the factors effecting it?
- ② Define hybridisation & Explain types of hybridisation?
- ③ What is molecular orbital theory? Explain or draw MOED of following molecules.
a) Homodiatomic molecules - N_2, O_2^-, O_2^{-2} .
b) Heterodiatomic molecules - NO, NO^+, CN^-, HF .
- ④ Explain in detail about LACO concept?
- ⑤ What are silicones? Explain its preparation methods & its classification?
- ⑥ Write synthesis & properties of hydrazene & hydroxylamine?
- ⑦ Explain the structure of diborane & its synthesis?

SHORT QUESTIONS :-

- ① What are ionic solids? Explain lattice & hydration energy?
- ② What are carbides & nitrides? Explain its types?
- ③ Explain synthesis & properties of phosphazene?
- ④ Write about the types of higher boranes. Explain the Lewis acid nature of BX_3 molecules?
- ⑤ Write the synthesis of Inorganic graphite?
- ⑥ Explain USPRT theory & its limitations?

UNIT-2 :-

LONG QUESTIONS :-

- ① What is bond polarisation? Explain factors influencing it?
- ② What is hyper conjugation? Explain applications of hyperconjugation?
- ③ What are alkanes? Write any two preparation methods of alkanes?
- ④ Explain free radical substitution reaction of alkanes?
- ⑤ What is Zaitseff's rule? Explain with an example?
- ⑥ Explain Markonikoff's & Antimarkonikoff's rule with an example?
- ⑦ What are alkenes & Alkynes? Write any two preparation methods?
- ⑧ Explain Aromaticity in benzenoid compounds?
- ⑨ What are electrophilic substitution rxns & Explain with mechanism.
a) Nitration. b) Sulphonation. c) Halogenation.
- ⑩ What are ring attracting group & ring deactivating groups?
a) Ring activating group - Effect of NH_2 group, $-\text{OCH}_3$ group.
b) Ring deactivating group - Effect of NO_2 group, $-\text{SO}_3\text{H}$ group.

SHORT QUESTIONS :-

- ① Write any two applications of Inductive & Mesomeric effect?
- ② Write the chemical properties of Alkenes?
- ③ What are dienes & Explain the types of dienes?
- ④ What is Diels-Alder reaction?
- ⑤ Write chemical properties of Alkynes?
- ⑥ What is Friedel-Crafts alkylation? Explain with mechanism?
- ⑦ What is Friedel-Crafts acylation? Explain with its mechanism?

8) What is Birch reduction? Explain with an example?

UNIT-4 :-

LONG QUESTIONS :-

- 1) What is salt analysis? Explain @ solubility product
⑥ Common Ion effect
- 2) Explain the theory of sodium carbonate extract?
- 3) What is Isomerism? Write its classification?
- 4) What is conformational analysis? Explain types of conformational isomers?
- 5) Write the conformational analysis of ethane?
- 6) Write the conformational analysis of 2-chloro ethanol?
- 7) Write the conformational analysis of Cyclohexane?
- 8) What is geometrical isomerism or cis-trans isomerism?
- 9) Explain E-Z nomenclature of alkenes?
- 10) Explain BST theory with limitations?
- 11) Explain the laws of crystallography?
- 12) Write the experimental methods for study of crystals?

SHORT QUESTIONS :-

- 1) Write the representation of stereoisomers?
- 2) Write conformations of 1,2-dichloroethane?
- 3) What are solids & write its types?
- 4) Explain Bragg's equation?
- 5) What is face lattice & Bravais lattice? Explain \neq crystal system?
- 6) Explain law of rationality of Indices?

SHORT :-

(UNIT-III)

1. Define intermolecular forces & explain types of intermolecular forces.
2. Write the structural diff. b/w solids, liq & gases?
3. What is surface tension & viscosity?
4. Explain Andrew Isotherms of CO_2 ?
5. Write about critical constants?
6. What is liquification of gas & Explain the process involved in it?
7. Law of corresponding states?
8. Derive reduced equation of state?
9. What are black body radiation & explain plank's Quantum theory?
10. What is Compton Effect?
11. Derive an eq. for Rayleigh's jeans law?

LONG :-

1. Explain the relation b/w critical constant & Vanderwaal constant?
2. Explain J.J. Thomson effect?
3. Explain Experimental determination of Critical constant?
4. Explain Vanderwaal equation of state? (ve & pc)
5. Explain the deviations of Ideal gas?
6. Explain the drop number method?
7. What is Heinsberg uncertainty principle?
8. Explain de broglie's wavelength concept?

SEM-III

(IMPORTANT QUESTIONS)

I unit

- ① Define Lanthanide Contraction and explain its consequences.
- ② Discuss oxidation states, Magnetic properties, colours and spectral prop. of lanthanides.
- ③ Write the separation techniques of lanthanides. (a) Ion exchange (b) Solvent extraction.
- ④ Compare / differentiate between lanthanides and Actinides.
- ⑤ Explain Werner's theory & Sidgwick's theory (EAN rule) & VBT with examples, Applic, limitat.
- ⑥ Explain isomerism in co-ordination compounds.
- ⑦ Explain 18 valence rule in metal carbonyls.
- ⑧ Discuss preparation, properties & structures of $Ni(CO)_4$, $Fe_2(CO)_9$ & $Cr(CO)_6$.
- ⑨ Write a note on classification of organometallic compounds.
- ⑩ Discuss preparatⁿ, properties & Applications of Li, Al and Mg organometallic comp.
- ⑪ Unit II
Discuss the following reactions: (a) Favorskii rearrangement, (b) Arndt-Eistert reaction, (c) Schmidt Reaction, (d) HVZ reaction.
- ⑫ Prepare aliphatic and Aromatic carboxylic acids.
- ⑬ Discuss chemical properties of H, -OH, COOH groups of Carboxylic acids.
- ⑭ Explain following reactⁿs of nitrohydrocarbons - MeF reaction, Halogenation & Reduction.
- ⑮ Prepare nitrobenzene by nitration reaction.
- ⑯ Discuss chemical prop. of amines - Alkylation, Acylation, Carboxylamine reaction and Hinsberg's separation.
- ⑰ Discuss the synthetic importance of diazonium salts.
- ⑱ Discuss the following electrophilic substitution reactions of aromatic amines
a) Bromination (b) Nitration.

- 19 Give any two preparation methods for cyanides and Isocyanides
- 20 Unit III & IV
Derive the expression of work in Isothermal reversible expansion process of gas.
- 21 Explain the concept of Carnot cycle and give the expression for efficiency of heat engine.
- 22 What is entropy. Derive the equation of entropy change in
 a) Reversible isothermal process b) Reversible -Adiabatic process
 c) Phase change/transfer.
- 23 Derive the following equations: a) $C_p - C_v = R$
 b) $\Delta G = \Delta H - T\Delta S$.
- 24 Discuss the following: a) Joules Thomson effect b) Kirchoff's equation
 c) Gibbs & Maxwell reaction.
- 25 Explain the following: a) Significant figures b) Accuracy c) Precision.
- 26 Define errors and its classification.
- 27 Discuss tautomerism in the following: a) Carbonyl compounds b) Nitrohydrocarbons
 c) Ethylacetoacetate d) Diethylmalonate
- 28 Discuss reactions of carbanions: a) Addition reactⁿ b) Perkin's reactⁿ
 c) Benzoin condensatⁿ d) Stability of carbanions.
- 29 Define following terms: Phase, Component, Degree of freedom, triple point, eutectic point, condensed phase rule.
- 30 Explain phase diagram for one component system, (water system)
- 31 Explain two component system of Pb-Ag system.
- 32 Explain Congruent melting point in Mg-Zn system.
- 33 Explain incongruent MP in NaCl-H₂O system using phase diagram.

SEM-V . Chemistry Imp Qustns 2022

- ① Define various types of molecular spectra. ^{V-I}
- ② Give the selection rule for (a) Rotational (b) IR spectroscopy (c) Electronic spectroscopy.
- ③ Write the determination of bond length of rigid diatomic molecule.
- ④ Discuss Anharmonic motion of real molecule & energy levels in IR spectroscopy.
- ⑤ Write about fingerprint region & diff. modes of vibrations in poly atomic molecules.
- ⑥ Discuss the types of electronic transitions ^{V-I} i.e., $\sigma \rightarrow \sigma^*$, $n \rightarrow \sigma^*$, $n \rightarrow \pi^*$ & $\pi \rightarrow \pi^*$.
- ⑦ Define the terms (a) chromophore (b) Auxochrome (c) Bathochromic (d) Hypsochromic shift. ^{V-I}
- ⑧ Define the terms (a) spectroscopy (b) Transmittance (c) Absorbance (d) Molar absorptivity. ^{V-I}
- ⑨ Explain Beer-Lambert's law & its limitations. ^{V-I}
- ⑩ Write a note on Equivalent & non-equivalent protons. ^{V-II}
- ⑪ Explain chemical shift & factors affecting chemical shift. ^{V-II}
- ⑫ What is spin-spin coupling & splitting of signals. ^{V-II}
- ⑬ Write the ¹H-NMR spectrum of (a) Ethyl bromide (b) Acetaldehyde (c) Acetophenone (d) Ethyl acetate. ^{V-II}
- ⑭ Discuss the following (a) Nitrogen rule (b) Molecular ion peak (c) Base peak (d) Isotopic peak. ^{V-II}
- ⑮ Draw mass spectrum of (a) Ethyl chloride (b) Ethyl bromide (c) Acetophenone. ^{V-II}

- (16) Discuss (a) Batch extraction (b) Continuous extraction.
 (c) Counter current extraction.
- (17) Discuss the following in chromatography (a) classification
 (b) Solvent systems (c) Nature of adsorbents.
- (18) Explain thin layer chromatography (TLC).
- (19) Explain paper chromatography (PC)
- (20) Write about ascending, descending, radial & 2D chromatography.
- (21) Write the principle involved in (a) PC (b) TLC (c) Solvent Extraction.
- (d) Gas chromatography (GC) (e) Ion exchange chromatography (IEC)
- (22) Write about wet packing & Dry packing techniques.
- (23) Explain column chromatography (CC).
- (24) Explain cation & anion exchange resins in IEC.
- (25) Explain Gas chromatography. U-IV
- (26) Explain HPLC. U-IV
- (27) Write the applications of the following chromatography.
- (a) TLC (3) (b) IEC (4) (c) CC (3) (d) GC (3) (e) HPLC (2)