

2022

Time - 3 hours

Full Marks - 60

*Answer all groups as per instructions.
Figures in the right hand margin indicate marks.*

*Candidates are required to answer
in their own words as far as practicable.*

GROUP - A

1. Answer all questions and fill in blanks as required. [1 × 8]
- (a) Give an example of ionic organometallic compound.
 - (b) Oxidation number of Pd in $[\text{PdCl}_4]^{-2}$ is _____.
 - (c) EAN of Ni in $[\text{Ni}(\text{CO})_4]$ is _____.
 - (d) Give two examples of Group-IIIB cations.
 - (e) What is the relationship between ionic product and solubility product of a supersaturated solution ?
 - (f) Write two examples of π -acceptor ligands.
 - (g) Associative mechanism of rate law for nucleophilic substitution occurs in which type of complexes ?
 - (h) Number of molecular orbitals in ferrocene is _____.

GROUP – B

2. Answer any eight of the following questions within two to three sentences each. [1½ × 8

- (a) What is the function of HCl in Group-II of qualitative analysis ?
- (b) Define solubility product.
- (c) Define common-ion effect.
- (d) What is Wilkinson's catalyst ?
- (e) What are labile complexes ?
- (f) Why substitution rate of Mn^{+2} is greater than Fe^{+2} ?
- (g) Under which condition the loss of stabilisation is least in an octahedral complex ?
- (h) What do you mean by Tolman catalytic loops ?
- (i) What is water gas ?
- (j) Write the formula of Zeise's salt.

GROUP – C

3. Answer any eight of the following questions within 75 words each. [2 × 8

- (a) What is –18 electron rule ?
- (b) What are tetrahapto ligands ?

[3]

- (c) Give one method of preparation of Zeise's salt.
- (d) How ferrocene is prepared in the laboratory ?
- (e) Why Ag^+ , Hg_2^{+2} and Pb^{+2} are grouped together in Gr-I of qualitative analysis ?
- (f) What is the function of saturated NH_4Cl in analysis of Gr-III A cations ?
- (g) State Thumb's rule.
- (h) What is meant by equation in octahedral complexes ?
- (i) What do you mean by thermodynamic stability ?
- (j) Write the decreasing order of trans effect of the ligands Cl^- , NH_3 , NO_2^- .

GROUP – D

Answer any four questions within 500 words each.

- 4. What is trans effect ? Explain Electrostatic polarisation theory of trans effect. [6]
- 5. Discuss the mechanism of nucleophilic substitution in square planar complexes. [6]
- 6. What is hydroformylation ? Explain the mechanism of hydroformylation. [6]
- 7. What is Wacker process ? Explain the mechanism for the reaction. [6]

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8. Discuss the structural features of methyl lithium. [6]
9. How will you explain the π -acceptor behaviour of CO with the help of molecular orbital concept ? [6]
10. How ferrocene is prepared ? How it gives acylation and alkylation reactions ? Explain with chemical equations. [6]

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GROUP – A

1. Answer all questions and fill in blanks as required. [1 × 8]
- (a) Malachite green is a _____ type of dye.
 - (b) Write molecular formula of ribose sugar.
 - (c) What is the isoelectric point value of Alanine ?
 - (d) Write the name of repeating unit present in polypeptides and proteins.
 - (e) Steroids are _____ lipids.
 - (f) Which enzyme is used as catalyst in the reaction of Starch → Glucose ?
 - (g) Aspirin is a _____ type of medicine.
 - (h) Write the name of two α -amino acids.

[2]

GROUP – B

2. Answer any eight of the following questions within two to three sentences each.

[1½ × 8

- (a) Write the name of components present in nucleosides.
- (b) Define enzyme.
- (c) What happens when an α -amino acid reacts with formaldehyde ?
- (d) Define simple lipid.
- (e) What is globular protein ?
- (f) What do you mean by calorific value of food ?
- (g) Define antibiotic with an example.
- (h) What is azo dye ? Give an example.
- (i) What is a prosthetic group ?
- (j) Define nucleotide.

GROUP – C

3. Answer any eight of the following questions within 75 words each.

[2 × 8

- (a) Explain isoelectric point.

[3]

- (b) Explain denaturation.
- (c) Write a note on rancidity.
- (d) Differentiate between ribose and de-oxyribose.
- (e) Discuss the medicinal value of curcumin.
- (f) Explain saponification value.
- (g) Write the characteristics of enzymes.
- (h) Discuss vat dyes.
- (i) Explain Zwitter ion.
- (j) Briefly explain end group analysis.

GROUP – D

Answer any four questions within 500 words each.

- 4. What are the functions of nucleic acids in the human body ? [6
- 5. Discuss the synthesis of α -amino acids by (i) Strecker synthesis,
(ii) Azalactone synthesis. [3 + 3
- 6. Write notes on : [3 × 2
 - (a) Active site and specificity
 - (b) Fischer's lock and key model

[4]

7. Discuss the synthesis of methyl orange and crystal violet and write their two uses. [2 + 2 + 1 + 1]
8. Write notes on : [3 × 2]
- (a) Hydrogenation of oils and fats
 - (b) Iodine number
9. Discuss the synthesis of paracetamol and write its uses. [4 + 2]
10. Discuss the catabolic pathway of fats. [6]

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GROUP – A

1. Answer all questions and fill in blanks as required. [1 × 8]
- (a) What is the composition of sodalime glass ?
 - (b) Potash-lead glass is also known as _____.
 - (c) Write two uses of ceramics.
 - (d) Give one example of nitrogenous fertilizer.
 - (e) Give one example of basic dye.
 - (f) Give one example of non-ferrous alloy.
 - (g) What is the full form of PETN ?
 - (h) Give one example of secondary battery.

[2]

GROUP – B

2. Answer any eight of the following questions within two to three sentences each. [1½ × 8

- (a) Which gas is used in rocket propellant ?
- (b) What is steel made of ?
- (c) What is the composition of oil paint ?
- (d) What is the electrolyte in a solid-state battery ?
- (e) What is the percentage of nitrogen in urea ?
- (f) What are the basic ingredients of cement ?
- (g) What is carbon fibre ?
- (h) What is clay made from ?
- (i) Give one example of non-silicate glass.
- (j) Is borosilicate glass toxic ?

GROUP – C

3. Answer any eight of the following questions within 75 words each. [2 × 8

- (a) What are fuel cells ?
- (b) What are pigments ?
- (c) What are mixed fertilizers ?

[3]

- (d) What are the properties of safety glass ?
- (e) Define Alloys.
- (f) What are the uses of lead azide ?
- (g) What are solar cells ?
- (h) What are carbon nanotubes ?
- (i) Write two examples of emulsifying agents.
- (j) Write two examples of additives.

GROUP – D

Answer any four questions within 500 words each.

- 4. Define Glossy state and discuss its properties. [6]
- 5. What are high technology ceramics ? Discuss their applications. [6]
- 6. Describe different types of fertilizers with suitable examples. [6]
- 7. Distinguish between primary and secondary batteries. Write some characteristics of battery. [6]
- 8. Describe classification of surface coatings. [6]
- 9. Describe composition and properties of different types of steel. [6]
- 10. Describe preparation and explosive properties of RDX. [6]