



JAJ-003-1013004

Seat No. _____

B. Sc. (Sem. III) (CBCS) Examination

November - 2019

Chemistry : C-301

Faculty Code : 003

Subject Code : 1013004

Time : **2:30** Hours]

[Total Marks : **70**

- 1 (a) Answer the following : 4
- (1) How many electrons and nuclei are present in H_2^+ molecule ?
 - (2) Give condition for orthogonal wave function.
 - (3) Give full form of LCAO.
 - (4) BF_3 and NH_3 possess _____ hybridization.
- (b) Answer any **one** : 2
- (1) Write (not derive) the wave functions for sp hybridization.
 - (2) Explain Eigen function and Eigen value giving one example.
- (c) Answer any **one** : 3
- (1) Give postulates of wave mechanics.
 - (2) Prove $\psi = \sqrt{2}/a \sin \pi x/a$ is normalized wave function.
- (d) Answer any **one** : 5
- (1) Derive Schrödinger wave equation in three dimensions. (Cartesian Coordinates)
 - (2) Derive the wave equation for sp^2 hybridization.

- 2 (a) Answer the following : 4
- (1) Give method of preparation of biphenyl from benzyl chloride.
 - (2) Write only reaction: Bromobenzene from benzene.
 - (3) Write the symbol of Neodymium and Promethium.
 - (4) In Lanthanide ions _____ and _____ are colorless as they do not absorb in the visible region
- (b) Answer any **one** : 2
- (1) What is Misch Metal?
 - (2) Explain Wurtz-Fittig reaction.
- (c) Answer any **one** : 3
- (1) Explain Lanthanide contraction.
 - (2) Complete the following reaction :

p-Chloronitrobenzene $\xrightarrow{15\% \text{ NaOH } 160^\circ}$

1-Chloro-2,4-dinitrobenzene $\xrightarrow{\text{Aq. Na}_2\text{CO}_3, 130^\circ}$
- (d) Answer any **one** : 5
- (1) Describe color isotopes and spectral properties of Lanthanides ions.
 - (2) Write preparation of Aryl halides by direct halogenation and diazonium salts.
- 3 (a) Answer the following : 4
- (1) Give method of preparation of 1° alcohol from Grignard reagent.
 - (2) Reaction of aniline with nitrating mixture gives _____.
 - (3) Give the structure of trimethylamine.
 - (4) Give the IUPAC name of $\text{CH}_3 - \text{O} - \text{CH}_2 - \text{CH}_3$.

- (b) Answer any one : 2
(1) Explain Lucas Test.
(2) Give synthesis of Benzene from Aniline.
- (c) Answer any **one** : 3
(1) Explain any three methods to prepare primary amines.
(2) Explain nitration of Phenol.
- (d) Answer any **one** : 5
(1) Differentiate 1°, 2°, 3° amine using Heisenberg's test.
(2) Explain reaction of epoxide with alcohol, ammonia and LiAlH_4 .
- 4 (a) Answer the following : 4
(1) Give the structure of Allylphenyl ether.
(2) Which intermediate is formed in Reimer-Tiemann reaction ?
(3) Define condensed phase rule.
(4) Name the phases present in Sulphur system.
- (b) Answer any **one** : 2
(1) Short note on Kolbe Schmitt reaction.
(2) Define Eutectic point with the help of a diagram.
- (c) Answer any **one** : 3
(1) Explain Claisen rearrangement.
(2) Explain one component water system with a neat diagram.
- (d) Answer any **one** : 5
(1) Write short note on Fries Rearrangement.
(2) Explain reaction of epoxide with alcohol, ammonia and LiAlH_4 .

- 5 (a) Answer the following : 4
- (1) Define Saturated and Unsaturated solution.
 - (2) Henry's law is valid for which type of gas ?
 - (3) Define Nernst Distribution Law.
 - (4) Name the factors influencing solubility of a gas.
- (b) Answer any **one** : 2
- (1) Solid X added to a mixture of benzene and water in that 10 ml of benzene contain 0.13g of X and 100ml of water layer contain 0.22g of X on shaking. Calculate K_D .
 - (2) Explain dissociation of solute in one of the solvents.
- (c) Answer any **one** : 3
- (1) Derive Nernst Distribution Law thermodynamically.
 - (2) Explain the effect of pressure on solubility of a gas.
- (d) Answer any **one** : 5
- (1) Discuss in detail Steam Distillation.
 - (2) Explain temperature composition curve with diagram for Ideal and Non-Ideal solutions.
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