D–1484

Sub. Code
34411

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2019.

First Semester

INORGANIC CHEMISTRY – I

(CBCS – 2018 – 19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. What is meant by bond order?

2. What is Kapustinski equation?

3. What are levelling solvents? Give one example.

4. What are the limitations of Bronsted concept of acids and bases?

5. What are molecular sieves? Give one example.

6. What are buffer solutions? Give one example.

7. Distinguish between semiconductors and insulators.

8. What is meant by Frenkel defect?

9. Define the Lewis concept of acids and bases.

10. What is meant by Lattice energy?

PART B — (5 × 5 = 25 marks)

Answer ALL questions by choosing either (a) or (b).

11. (a) Explain briefly the dsp^2 and sp^3 hybridisation with suitable examples.

Or

(b) Draw the Mo energy level diagram for NO molecule predict the bond order and magnetic properties of NO^+ molecular ion.

12. (a) Discuss briefly the concept of multicentre bonding with suitable example.

Or

(b) Explain briefly the concept of sigma, pi and delta bonding.

13. (a) Explain briefly the acid strength, of $HclO_3$, $HBrO_3$, HIO_3.

Or

(b) Explain Anderson and Keggin structures with suitable examples.

14. (a) Distinguish between hexagonal close packing and cubic close packing.

Or

(b) Give the crystal structure of fluorite and Cscl.

15. (a) Discuss any five properties of ionic compounds.

Or

(b) Discuss briefly the structure of three dimensional silicates with suitable example.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Discuss briefly the structure of XeF_2, XeF_6 and XeO_3 on the basis VSEPR theory.

17. (a) What are differentiating solvents? Why are they called so? Explain them with suitable examples. (5)

(b) Define the terms : ionic radius, ionisation potential and electron affinity. How do they vary along the groups and across the periods of periodic table. (5)

18. What is HSAB concept? Discuss briefly its principle, applications and limitations with suitable examples.

19. Draw and explain the structures of FCC and BCC types of solids.

20. (a) Explain briefly the metal excess defect and metal deficiency defect with suitable examples. (6)

(b) Discuss briefly the structure of diamond. (4)

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D–1485	Sub. Code
	34412

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2019.

First Semester

ORGANIC CHEMISTRY – I

(CBCS 2018-19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Tropolone doesn't form an oxime-Why?

2. Account for the following :

   Dipolement of formal dehyde is 2.27D but for acetaldehyde dipolemoment is 2.72D.

3. Draw erythro and threo form of 2,3-dichloropentane.

4. Differentiate enantiomer and diastereaisomer.

5. Explain peroxide effect with suitable example.

6. What is meant by the order of the reaction?

7. Distinguish between electrophile and nucleophile.

8. What is the role of anhydrous aluminiumchloride in Freedel Craft alkylation reaction?

9. What is hydrogen bonding? Give suitable example.

10. Define plane of symmetry.

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) (i) Which ring in azulene is reactive towards electrophilic substitution? Give reasons.

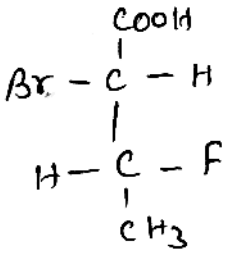
(ii) Comment on the aromaticity of the following compounds

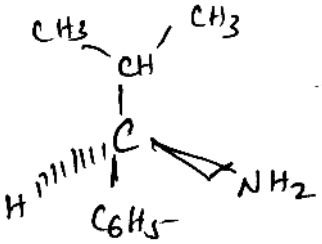
 and 

Or

(b) Explain mesomeric effect with suitable examples.

12. (a) Predict the absolute configuration for the following molecules. (2.5+2.5)

(i) 

(ii) 

Or

(b) Explain the optical activity of the compound having more than one Chiral centre.

13. (a) Explain the stability of carbonium ion.

Or

(b) What is Pinacol-Pinacolone rearrangement? Give the mechanism for the above rearrangement.

14. (a) Give the mechanism for aromatic nitration reaction.

Or

(b) Compare S_N1 and S_N2 reactions.

15. (a) Define and explain Hammond postualte with the reaction $CH_4 + Hf$ and $CH_4 + HI$.

Or

(b) How do you account for the aromatic character of cyclopentadienyl anion and tropylium cation?

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. How would you explain aromaticity by HMO theory?

17. Explain the optical activity of biphenyl's, spiranes and cyclophanic compounds. (3+3+4)

18. Give the mechanism for the following rearrangements

(a) Wagner-Meerwein

(b) Baeyer-Villiger. (5+5)

19. Write notes on :

(a) Gatter mann koch formylation.

(b) Diazonium coupling

(c) Vilsmier Haack reaction. (4+3+3)

20. (a) Differentiate the reaction intermediate and transition state. (2)

(b) In propene C =C bond length is 1.353 A° but in ethene C = C bond length is 1.334 A°. Give reason. (2)

(c) Explain Kinetic and thermodynamic controlled reactions with suitable example. (6)

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D-1486

Sub. Code
34413

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2019.

First Semester

PHYSICAL CHEMISTRY — I

(CBCS 2018-19 Academic Year onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Write the statement of zeroth law of thermodynamics.

2. What is reaction isotherm?

3. What is entropy?

4. Write Debye Huckel — Onsagar equation.

5. Write a short note on Carnot cycle.

6. What is meant by a reversible cell? Give an example.

7. State Heisenberg' s uncertainty principle.

8. What is eigen value of a function?

9. What is order of a reaction?

10. Define isotopic effect.

SECTION B — (5 × 5 = 25 marks))

Answer ALL questions, choosing either (a) or (b).

11. (a) Derive Gibbs Helmholtz equation.

Or

(b) Give the statements of first law of thermodynamics.

12. (a) Eplain Debye Huckel theory of ionic interactions.

Or

(b) Discuss the applications of conductivity measurements.

13. (a) What are quantum mechanical operators? Set up of an operator for energy.

Or

(b) Explain the concept of wave particle dualism.

14. (a) What is steady state approximation? Give its significance.

Or

(b) Write and explain any one method to study the kinetics of fast reactions.

15. (a) Explain the method of determination of mean activity coefficient of electrolytes.

Or

(b) Derive Butler-Volmer equation.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. What is fugacity? Give its experimental determination.

17. Set up Schrodinger wave equation for a particle in a one dimensional box. Solve it to its wave function and energy.

18. Explain different types of electrode systems with examples.

19. Define the following :
    (a) Activity
    (b) Over voltage
    (c) Transport number
    (d) Fast reactions and
    (e) Photo voltaic effect.

20. Describe the application of ARRT to unimolecular reactions.

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D–1487

Sub. Code
34421

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2019.

Second Semester

Chemistry

INORGANIC CHEMISTRY – II

(CBCS 2018-19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Write the names of the following coordination compounds according to IUPAC system.

   (a) $K_3[Al(C_2O_4)_3]$

   (b) $[Co(NH_3)_6]Cl_3$

2. $[Ni(CN)_4]^{2-}$ is diamagnetic and square planar while $[NiCl_4]^{2-}$ is paramagnetic and tetrahedral. Why?

3. What is meant by crystal field stabilisation energy?

4. What are isobars? Give one example.

5. What is meant by half life period?

6. What is meant by spallation reaction?

7. Give the composition of nucleus.

8. What are actinoids? Why are they so called?

9. Give the electronic configuration of Ce^{4+} and Eu^{2+}.

10. Lu^{3+} and Yb^{2+} show diamagnetism. Why?

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions by choosing either (a) or (b).

11. (a) What is meant by geometrical isomerism? Discuss the geometrical isomerism exhibited by the co-ordination compounds of coordination number 4.

Or

(b) State and explain Jahn-Teller distortion.

12. (a) Discuss the various factors affecting the nuclear stability.

Or

(b) What is meant by artificial radioactivity? Explain the working of cyclotron.

13. (a) What is nuclear fusion? Explain with suitable example.

Or

(b) Discuss the importance of Geiger Muller counter with principles.

14. (a) Using MO theory, explain the sigma and pi-bonding in square planar complexes.

Or

(b) What is 10 Dq? What are the factors affecting 10 Dq?

15. (a) What is meant by lanthanide contraction? Explain its any two consequences.

Or

(b) Discuss briefly the oxidation states of lanthanides.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Discuss briefly the valence bond theory with suitable examples. What are its limitations?

17. Discuss the structures of $[Co(NH_3)_6]^{3+}$, $[CoF_6]^{3-}$ and $[Fe(H_2O)_6]^{2+}$ on the basis of crystal field theory.

18. Discuss briefly the applications of nuclear chemistry in agriculture and biology.

19. (a) Explain briefly the Liquid Drop Model for nuclear structure. (6)

(b) Calculate Q value in Mev of the following nuclear reaction. The exact mass of $^{27}_{13}Al$ isotope is 26.9815 amu and $^{30}_{14}S_i$ is 29.9738 amu. The masses of $^{4}_{2}He$ and $^{1}_{1}H$ are 4.0026 amu and 1.0078 amu respectively. $^{27}_{13}Al + ^{4}_{2}He \longrightarrow ^{30}_{14}S_i + ^{1}_{1}H + Q$.

20. How are lanthanides separated by ion-exchange and solvent extraction methods?

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D-1488

Sub. Code
34422

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2019.

Second Semester

ORGANIC CHEMISTRY — II

(CBCS 2018-19 Academic Year onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. What is the product obtained in the following reaction? Give reason for your answer.

$CH_2 = CH - NO_2 + H - X \rightarrow ?$

2. Peroxide effect is observed only in the case of HBr and not in the other hydrogen halide. Why?

3. Benzaldehyde undergoes cannizzaro reaction whereas acetaldehyde doesn't. Explain.

4. Draw the conformers of 1, 2-disubstituted cyclohexane.

5. Describe the geometry of carbene.

6. Write note on Sand Meyer reaction.

7. Define singlet excited state.

8. What is electrocyclic reaction? Give an example for it.

9. Explain Grignard addition with suitable example.

10. List out any two chemical properties of free radical.

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Discuss the stereochemistry of bromine addition in unsaturated molecules.

Or

(b) Discuss the addition reaction which takes place in the conjugated diene.

12. (a) Give the mechanism for the following reaction

(i) Perkin reaction

(ii) Michael addition.

Or

(b) Mention the important any two application of lithium dimethyl cuprate.

13. (a) What is the role of free radical in the chain reaction?

Or

(b) Discuss the mechanism for Beckmann rearrangement.

14. (a) Describe the photophysical process by Jablonski diagram.

Or

(b) Electrocyclic reaction is a stereospecific reaction - Explain by FMO approach.

15. (a) Discuss briefly about E1 mechanism of elimination reaction with suitable illustration.

Or

(b) Discuss elaborately about Norrish type I reaction.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. (a) Compare elimination and substitution reaction. (5)

(b) Electrophilic addition is a regiospecific reaction - Explain. (5)

17. (a) Explain prochirality with an example. (4)

(b) List out the two important application of hydroboration reaction. (6)

18. (a) Discuss the following chemical reactions of carbene.

(i) addition

(ii) insertion

(iii) rearrangement. (6)

(b) Write a note on Barton reaction. (4)

19. Explain the following photo chemical reaction with suitable example.

    (a) Norrish type I

    (b) Paterno-Buchi reaction. (5 + 5)

20. Discuss the orientation of double bond in elimination reaction.

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D-1489

Sub. Code
34423

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2019.

Second Semester

PHYSICAL CHEMISTRY — II

(CBCS 2018-19 Academic Year onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. How is chemisorption distinguished from physisorption on the basis of number of adsorbed layers?

2. Write down the Langmuir adsorption isotherm and explain the terms.

3. Distinguish between the terms adsorption and absorption.

4. What is the need for the usage of sensitizer in photochemical reactions?

5. Write the mechanism of H_2 — Cl_2 photochemical reaction.

6. Define quantum yield.

7. What are initiators?

8. What are addition polymers?

9. Write a note on dendrimers.

10. What are conducting polymers? Give an example.

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) What are micelles? Explain their types with examples.

Or

(b) Explain the characteristics of adsorption of gases on solid material.

12. (a) Draw Jablonski diagram and explain the various photophysical processes.

Or

(b) Discuss the reactions of hydrated electron.

13. (a) Write the principle and working of flash photolysis technique.

Or

(b) State and explain the laws of photochemistry.

14. (a) State and explain the kinetics of cationic polymerization.

Or

(b) Write a note on artificial photosynthesis.

15. (a) What are thermally stable and biodegradable polymers? Explain.

Or

(b) What are colloids? Give their classification.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Discuss the Langmuir — Hinshelwood mechanism of unimolecular surface reactions.

17. Derive the BET adsorption isotherm. How is the surface area of an adsorbent calculated from it?

18. (a) Write the differences between thermal and photochemical reactions. (5)

(b) What are chemical actinometers? Explain. (5)

19. Discuss the kinetics and mechanism of free radical polymerization.

20. Write short notes on :

(a) Photovoltaic cell and

(b) Dye sensitized solar cells. (5 + 5)

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